ISSN 1462 2815

SWELLING STUDIES OF PHYSICAL AND CHEMICAL CHITOSAN HYDROGELS

Gorriparthi Varalakshmi [1]*, and Anitha C. Kumar [2]

[1] PhD Research Scholar, Department of Chemistry, Acharya Nagarjuna University, Nagarjuna Nagar, Guntur, AP, India.
[1] Assistant Professor, Department of Chemistry, Samskruti College of Engineering and Technology, Ghatkesar, Hyderabad, Telangana, India.
[2] Professor, School of Chemical Sciences, Mahatma Gandhi University, Kottayam, Kerala, India.
*Corresponding Author Email: vgoriparthi09@gmail.com

DOI: 10.5281/zenodo.11407444

Abstract

Hydrogels have been available for more than half a century and they have many uses in various practices ranging from industrial to biological. Hydrogels are a polymeric network that can able toabsorb a large quantity of water and swells up to an equilibrium point. The water absorbing capacity of hydrogels depends on hydrophilic functional groups and space availability in the polymeric structure. Here in this work, we prepared hydrogels from an animal based natural polymer-Chitosan. Crosslinkers plays an important role in the properties of hydrogels. Chitosan hydrogels were prepared without crosslinker and by using different concentrations of glutaraldehyde, which is the most commonly used crosslinker. Chitosan hydrogels can hold a large amount of water by swelling. Swelling nature of uncrosslinked and crosslinked hydrogels were studied in aqueous medium at various temperature and in different P^H mediums at different intervals of time.

Keywords: Chitosan, Glutaraldehyde, Swelling properties, Hydrogels.

INTRODUCTION

Hydrogels are hydrophilic polymer materials that are cross-linked, three-dimensional and can retain, swell, and hold large volumes of water or aqueous fluids (1). The associations are comprised of homopolymers or co-polymers and are insoluble due to the presence of chemical cross-links (tie-points, junctions), or physical cross-links, such as embarrassments or crystallites (2). These gels are effective in day-to-day life and used extensively in food, husbandry manufacturing, cosmetic make up foundations, medicine, and medical discourse etc. Currently, Hydrogel get wide orbit of applications because of their lower berth price, nonpoisonous, and environment-sociable nature. Hence, these are used as biomaterials that reveal sensible purpose in several fields of biomedical or therapeutic industry (3).

Chitosan, is a linear polysaccharide collected of β-(1-4)-linked d-glucosamine and N-acetyl-d glucosamine. Chitosan is derived from Chitin, which is extracted from hard skeleton matter of shellfish, lobster, shrimp, and crabs. The structure of Chitosan is shown in figure 1. It has lots of applications in the medical, health, and pharmaceutical industry because of its biocompatible nature. Any form of chitosan (solution, dryflakes, and fine powder) can dissolve in organic acids such as acetic acid, formic acid, tartaric acid, and citric acid of P^H <6. Crosslinked chitosan is frequently used to prepare microspheres of their form, they have been widely used for drug delivery such as antibiotics, anticancer agents, vaccines, etc. (4, 5). The positive amino group of chitosan is very active and readily binds with negatively charged surfaces such as mucosal membranes. The free amino group of chitosan can form crosslinked polymer networks with dicarboxylic acids to build up the material. It forms gels with several multivalent anions. The hydrogels of chitosan, like other hydrogels, contain much

Principal
Samskruti College of Engg. & Technology
Kondapur (V), Ghatkesar (M), Medchal Dist.

ISSN 1462 2815

water. Part of this water is tightly bound to the polymer and the rest is present as free water. Chitosan and its derivatives are one of the best-opted material for medical and pharmaceutical industries, particularly in their swollen state but possess low mechanical strength, to overcome this disadvantage crosslinking is the best method most commonly used crosslinkers are aldehyde, epoxy, starch, guar-gum, epichlorohydrin, sodium tripolyphosphate etc.

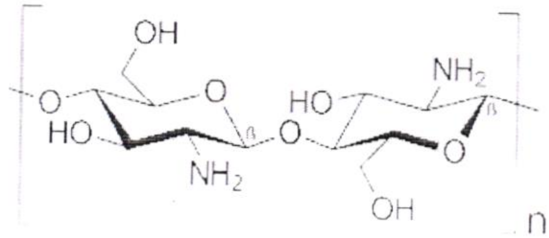


Figure 1: Structure of Chitosan

In the present study we have chosen glutaraldehyde as the crosslinker. We were prepared chemically crosslinked chitosan hydrogels with glutaraldehyde, which is an extreme crosslinker. The aldehyde group of glutaraldehyde interacts with the amino group of chitosan, thus forming Schiff's bases. The potentiality of hydrogel membrane depends on many factors. This paper also reports the variation of swelling ratio dependents on temperature, $P^{H,}$ and concentration of the crosslinking agent.

MATERIALS AND METHODS

Materials:

Chitosan (Ch), Glutaraldehyde (GA) & Acetic acid (Ac) are all chemicals purchased from Avra Synthesis Private Ltd, Hyderabad, Telangana, India. All obtained chemicals were used withoutany further purification. Buffer solutions of P^H=4, 7&9.2 purchased from Quality traders, Gorantla, Guntur.

Millipore water is used from the Merk Millipore system

Methods:

Hydrogel Preparation: Chitosan hydrogels were prepared with varying concentrations of glutaraldehyde from 0% to 0.125%. Initially chitosan allows for dissolution in a dilute acetic acid medium with stirring for 8-10 hours, after completion of dissolution chitosan is added with glutaraldehyde of various concentrations and continued stirring for 30-60 min.

Swelling experiments: For the swelling studies we prepared the dry films from the gels. The swelling property of dry film of hydrogels with and without cross-linker were examined by dropping 0.15gm of dry film in deionized water at room temperature at particular intervals of time until reached constant (stable weight) weight, simultaneously measuring the film weight in swollen state at each interval, In the same way, dry sample of known mass (wd) allow to float in a buffer solution of P^H=4,7 & 9.2. After a particular period (t) dry film remove from the buffer and their swollen sample weight (W_t) was noticed after whipping with filter paper to remove excess water, the water-retaining capacity of the film known Experimentally, the percentage swelling ratio of a polymeric hydrogel can be defined by mass difference process and is characterized by the following equation.

ISSN 1462 2815

Percent of Inflammation = [(Wt-Wd)/Wd] ×100

Where, Wt= mass of inflamed gel and

Wd = mass of dehydrated gel (dry gel).

FTIR Studies: Cary 630FTIR with diamond ATR, Agilent Technologies Ltd., was used to study the hydrogel samples within the wavelength range of 4000-600cm^{-1}. Each spectrum was measured on an average of 64 scans at aspectral resolution of 4cm^{-1}.

RESULTS AND DISCUSSION

Polymeric gels are inter-linked either physical and chemical interconnecting or thus the cross-linking implicit as a molecule at any rate of its size. The minor modifications are takes place in a polymeric gel by varying upon ecological factors such as temperature, pH, electric charge, and enzyme or ionic species, which lead to different physical texture of the gel. The inflammation property of hydrogels is due to degree of ionization of the cross-linking of monomers with the functional groups present in a polymer chain (6). Chitosan-based hydrogels are of two types (a) physically crosslinked gel and (b) chemically crosslinked gels. The first one is obtained by the weak wander Waals interaction and the second one is obtained via covalent crosslinking agents or ionic crosslinking agents. Figure 2 shows the schematic representation of the crosslinked hydrogel formation.

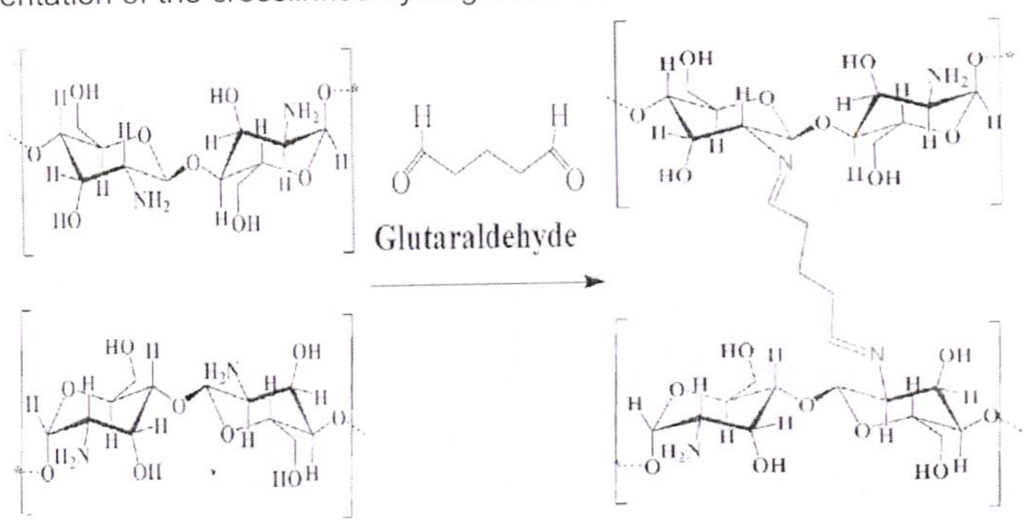


Figure 2: Schematic representation of the crosslinked hydrogel (cross linker – glutaraldehyde)

Preparation of chitosan hydrogel without crosslinker(Physical Hydrogel): Prepared 0.5, 1, 1.5, 2, 2.5, 3 and 3.5 percentages of chitosan in 10ml of 2% aqueous acetic acid at room temperature with continuous stirring for complete dissolution (8-10 hrs) and results a clear and viscous fluid. Transfer it to a sample bottle, gel nature was observed with concentrations (%) of 2.5, 3 & 3.5. These gels were a stable minimum of 2 days at room temperature, no gel was observed with remaining concentrations even after 7-10days. In this case, gels formed due to self-crosslinking of chitosan polymer, but at low concentrations, it fails. Decaying of gels nature was observed while keeping samples at room temperature with time and mentioned in table 1.

Principal
Samskruti College of Engg. & Technology
Kondapur (V), Ghatkesar (M), Medchal Dist

ISSN 1462 2815

Table 1: The chitosan gel preparation at various concentrations of chitosan

s.no	%chitosan(ch)	volume of ch(ml)	Status of Gel formation	Gel formation time(hrs)	Gel decay time (days)
1	0.5	10	No gel	-----------	----------
2	1	10	No gel	-----------	-----------
3	1.5	10	No gel	-----------	-----------
4	2	10	No gel	-----------	-----------
5	2.5	10	Gel	6-8	1
6	3	10	Gel	6-8	2
7	3.5	10	Gel	6-8	2

Preparation of chitosan hydrogel with varying concentrations of glutaraldehyde crosslinker: Since we got comparatively stable hydrogels with 3% of chitosan, it was selected for crosslinking. Solutions were prepared in the similar method and we prepared five different hydrogel samples by kept constant concentration of chitosan and varied the glutaraldehyde concentration from 0% to 0.125%. The details are given in the table 2.

Table 2: The chitosan gel preparation at various concentrations of glutaraldehyde crosslinker (Gha)

s.no	%ch	Vol. of ch (ml)	%Gha	Vol. of Gha(ml)	Status of Gel formation	Gel formation time(mins)	Gel(5ml) decay time (days)
1	3	10	0.025	0.33	No gel	30	------
2	3	10	0.05	0.33	No gel	30	1
3	3	10	0.075	0.33	Gel	30	2
4	3	10	0.1	0.33	Gel	30	3
5	3	10	0.125	0.33	Gel	30	4

As have seen in table 2, glutaraldehyde 0.125 % gels were stable up to 4 days. The photographs of the same gel on day 3 and day 5 are shown in figure 3.

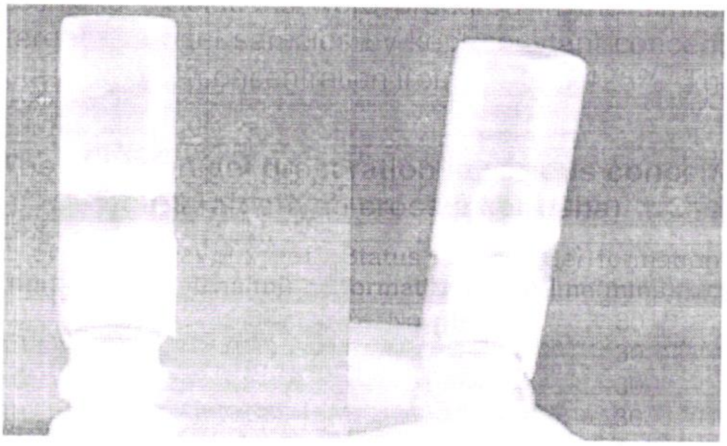


Figure 3: Hydrogel on day 3 followed by day 5(3% chitosan with 0.125%gluteraldehyde)

Swelling studies: These studies help to know the gel's stability in a water medium. Dry films were prepared from the same gel combination solutions. To study the swelling nature, a piece of film is weighed and dropped in deionized water (PH-7). The weight of the swollen film is measured in a regular interval. The swelling nature of chitosan physical gel at different temperature were studied and the results are shown in figure 4. The swelling ratio increases from with increase in temperature. It might be

ISSN 1462 2815

due to the temperature help to break the internal bonds ie; hydrogen bonds in hydrogel and freely allow the water and attained an equilibrium point in approximately 100 mins.

The crosslinked gel with crosslinker 0.125% is also analyzed the same way at varying temperatures in deionized water (PH-7) for 100minutes in an interval of 10mins. The results are shown in the same figure4. In this case equilibrium was attained so early at 50 to70min and noted maximum swelling ratio (%S) is 250 at 46^0c which is low compared to physical gels. In the case of physical gel, the value is 965. This low value in crosslinked hydrogel might be due to strong covalent bonds in the internal structure, it does not allow the hydrogels to swell by restricting the free movement of the chain and water absorption capacity.

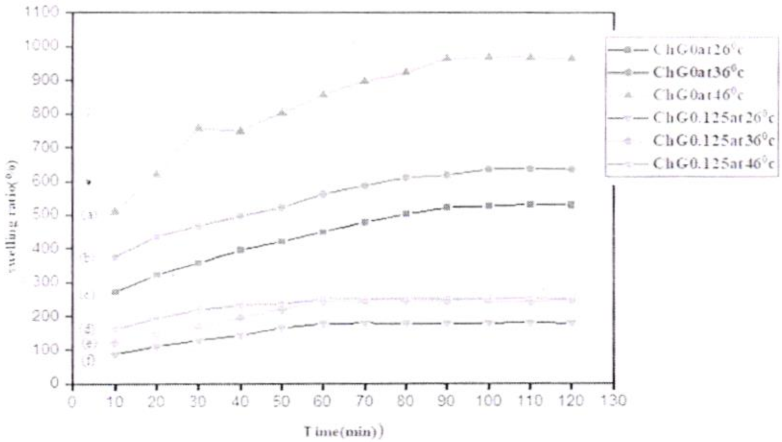


Figure 4: Swelling studies of noncrosslinked chitosan and crosslinked chitosan in water (P^H=7) at various temperatures.

Hydrogels are normally formed by the crosslinking of linear polymers, depending on the type ofcrosslinker, hydrogel membranes are of two types Covalent and ionic, glutaraldehyde is one of the best covalent cross-linker which leads to the formation of covalent linkages between the polymeric chain. Crosslinked hydrogels vary in properties compared to noncrosslinked, particularly in their molecular structure, ionizing capacity, hydrophilicity, and degree of crosslinking. Owing to a change in crystallinity, swelling behavior differs from crosslinked to noncrosslinked.

The swelling behavior of covalent/ionic hydrogel membranes depends on external factors including the nature of the crosslinker, degree of crosslinking, the effect of time, temperature, theproportion of the crosslinker, the volume of the cross-linker, and the P^H of medium. During the swelling amino group of chitosan polymer undergoes protonation, which describes the rate of swelling. Interactions of polymer to crosslinker and degree of swelling are determined by many factors, P^H of the swelling medium is one among them.

The swelling behavior of the hydrogels in different P^H were also studied. Figure 5 shows the swelling behavior of noncrosslinked hydrogel in buffer solutions of P^H=4, 7and 9.2 at room temperature. It was shown high values at P^H=4 and low values at P^H=7and 9.2, which indicates the swelling properties of hydrogel films elevated at low values and not significant with increasing values of P^H. Figure 6 shows the behavior of crosslinked hydrogels with crosslinker 0.125% at various P^H values (4,7&9.2). The results shows that the swelling ratio is predominately high at lower P^H=4 and gradually decreases with increasing P^H (7&9.2). Noncrosslinked Gels swollen mœ in acidic

Principal
Samskruti College of Engg. & Technology
Kondapur (V), Ghatkesar (M), Medchal D.

media (P^H=4) and shows a high swelling ratio than crosslinked gels. Usually, we are expecting a high swelling ratio with increasing densities of crosslinker 0.125>0.1>0, but practically it has proven the reverse order. The swelling ratio %S is dependence on P^H in the case of crosslinked membranes and they are high at P^H=4, but low at P^H (7&9.2). The change in P^H causes for protonation of an amino group of chitosan and various concentrations of crosslinker were responsible for obtaining different values of the swelling ratio. The swelling behavior of crosslinked gels at various P^H are shown in figure 6.

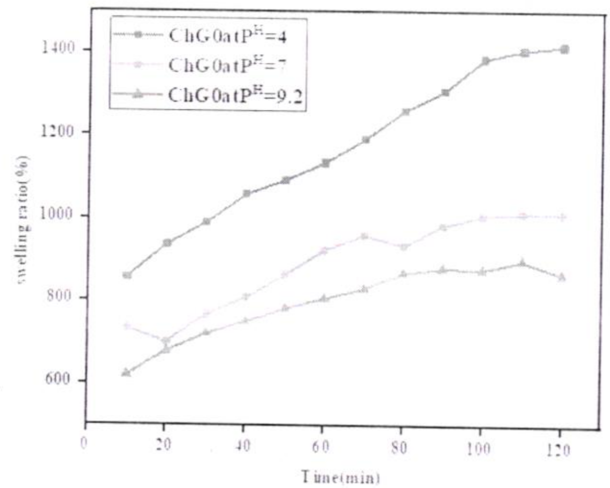
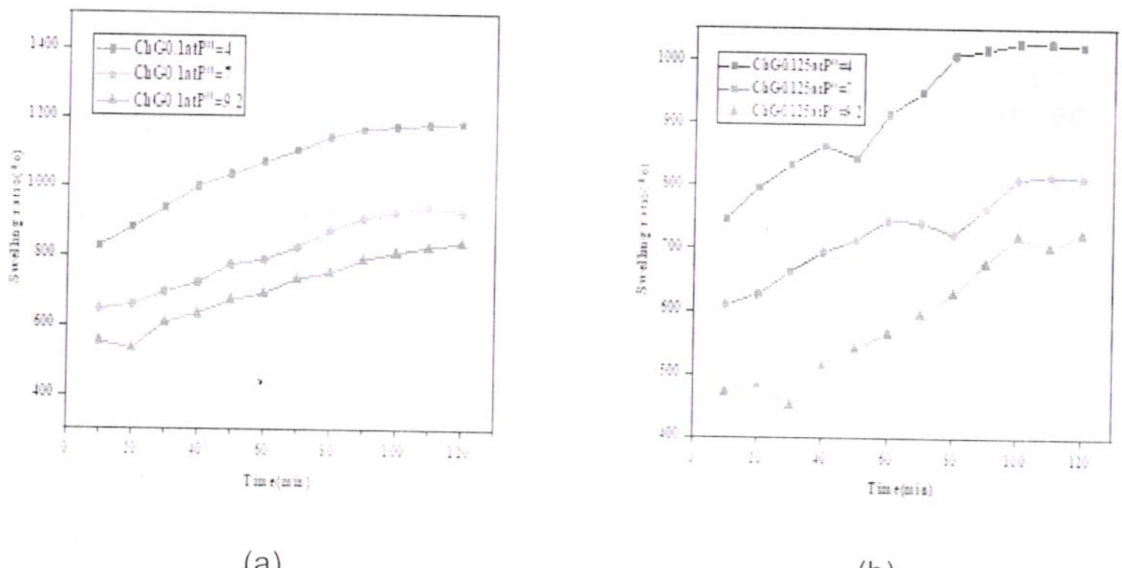


Figure 5: Swelling behavior of uncrosslinked hydrogel at various P^H =4, 7&9.2

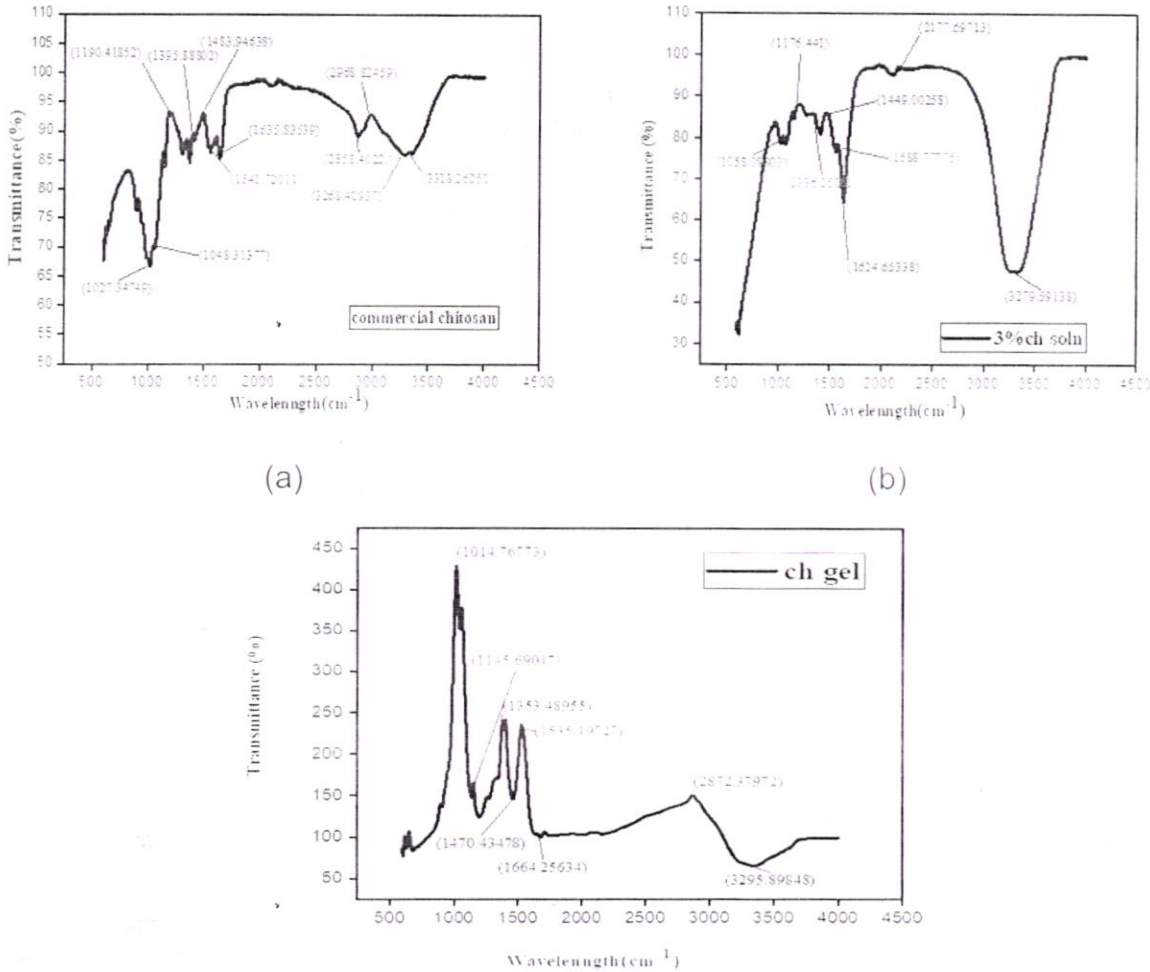


(a) (b)

Figure 6: Swelling behavior of crosslinked hydrogels at various P^H (a) 0.1% and (b) 0.125%.

FTIR Studies: Commercial chitosan, 3%chitosan solution in acetic acid, which is noncrosslinked and crosslinked chitosan with glutaraldehyde (0.125%Gha) were analyzed and the results are shown in figure 7a,b and c.

www.commprac.com
ISSN 1462 2815



(a) (b)

(C)

Figure 7: FTIR Spectrum of commercial chitosan (a), 3%chitosan solution in acetic acid(noncrosslinked) (b) and crosslinked chitosan with glutaraldehyde (c).

With commercial chitosan, N-H and O-H stretching vibration bands were observed at corresponding wavelengths were found at 3268 cm^{-1}, 3318 cm^{-1}respectively, same stretching vibrations were found at 3279 cm^{-1}, 3295 cm^{-1} for solution and gel. 2968 cm^{-1}, 2858 cm^{-1} can be attributed to C-H stretching vibrations of symmetric and asymmetric forms and the same (C-H) stretching vibration of the corresponding wavelength reported as 2177 cm^{-1} for solution and 2873cm^{-1} for gels.1635 cm^{-1} intensity band observed due to C==O stretching of amide I which is slightly varied as 1624 cm^{-1} in solution and 1664 cm^{-1} in gel. The characteristics peak of N-H bending usually appears in the range of 1650-1550 cm^{-1}(7), which is recorded at 1540 cm^{-1} with commercial chitosan after protonation with acetic acid peak shifted to1588 cm^{-1}&1535cm^{-1}. This can be attributed to the modification of chitosan structure with glutaraldehyde by crosslinking.1483 cm^{-1}, 1449 cm^{-1}, 1470 cm^{-1}&1395 cm^{-1}, 1336 cm^{-1}, 1353 cm^{-1} from the figures indicates C-H bending vibrations of alkyl and methyl groups consecutively. The peak range of 1300-1000 cm^{-1} characteristic of Ethers(C-O-) observed as 1190 cm^{-1} (Fig.7a),1176 cm^{-1} (Fig.7b) & 1145 cm^{-1} (Fig.7c). Usually wavelength range of 1690- 1640 cm^{-1} significance of imine bond (C==N), the sharp peak of 1664 cm^{-1} noticed in thecase of gel which confirms Schiff's base structure (8).

Principal
Samskruti College of Engg. & Technology
Kondapur (V), Ghatkesar (M), Medchal Dist.

CONCLUSION

Chitosan hydrogels were prepared without crosslinker and with varying concentrations of crosslinker. These gels were examined for swelling behavior at various temperatures, in water, and at different ranges of buffer solution. Crosslinked hydrogels reported a high swelling ratio concerning the above conditions because crosslinked hydrogels are internally linked with each other, acidic medium (P^H=4) more favor to swelling behavior which is comparatively less in the case of (P^H=7) & (P^H=9.2). Swelling behavior of noncrosslinked hydrogels varies considerably with varying temperatures, but it is negligible in the case of the crosslinked hydrogel.

FTIR analysis attributed to confirm the formation of the amide linkage, in the crosslinked hydrogels.

References

1) Klouda L, Mikos AG, Thermo responsive hydrogels in biomedical applications. *Eur J Pharm Biopharm* 68:34–45, 2008

2) P.K. Prashant, B.R. Vivek, N.D. Deepashree, P.P. Pranav. "Hydrogels as a drug delivery system and applications: a review", *International Journal of Pharmacy and Pharmaceutical Sciences*, vol. 4, pp. 1-7, 2012.

3) L. Takashi, T. Hatsumi, M. Makoto, I. Takashi, G. Takehiko, S. Shuji. "Synthesis of porouspoly (N-isopropylacrylamide) gel beads by sedimentation polymerization and their morphology", *Journal of Applied Polymer Science*, vol. 104, pp. 842, 2007.

4) Sheng Lin-Gibson, Howard J. Walls, Scott B. Kennedy, and Eric R. Welsh. Chitosan Hydrogels: Crosslink Kinetics and Gel Properties. *Journal of Polymeric Materials: Science &Engineering*. 2003, Vol.88, PP 199-200.

5) Sushmit S. Rithe, Pravin G. Kadam, and Shashank T. Mhaske. preparation and analysis ofnovel hydrogels prepared from the blend of guar gum and chitosan: cross-linked with glutaraldehyde. *Journal of Advances in Materials Science and Engineering*. December 2014, Vol.1, No.2.

6) Zhang Y, Zhu W, Ding J. Preparation of thermosensitive microgels via suspension polymerization using different temperature protocols. *J. Biomed. Mater. Res. Part A*.2005;75A:342–349

7) C.Yuen, S. Ku, P. Choi, C. Kan, S. Tsang .Determining Functional Groups of Commercially Available Ink-Jet Printing Reactive Dyes Using Infrared Spectroscopy. *Research Journal of Textile and Apparel*.2005, Vol.9, No.2, PP 26–38. Doi: 10.1108/rjta-09-02-2005-b004.

8) Ragaa EL-sheikh, Moustafa M. S. Abo-ELfadl, Mohamed E. A. Ali, Khalid Khader, Impactof sludge produced from drinking water plants on groundwater and its treatment by a natural polymer. *Journal of American Science*. 2017, Vol.13, No.2.

ZKG INTERNATIONAL

ISSN: 2366-1313

Prediction Of Titanic Survival Using Machine Learning Techniques

[1]Mr.K.Vamshee Krishna, [2]Jampally Chandu Kumar Yadav,[3]Boddu Dayakar,[4] Palagiri Anu Priyanka, [5]paramshetty Satya Sai

[1] Assistant Professor, Dept. Of CSE, Samskruti College of Engineering & Technology, TS.

[2,3,4,5]B. Tech Student, Dept. Of CSE, Samskruti College of Engineering & Technology, TS.

Abstract: *It can be very important to uncover the root causes of past human suffering so that future crises can be eliminated. The incident of April 15, 1912 is an example of a human tragedy in which approximately 1,500 passengers and crew members lost their lives. Today, continuing research shows that if the right steps are taken, it is possible to reduce human harm. Nowadays there are many new and effective technologies, with the help of data analysis the truth can be established. In these studies, reviewed, Titanic survivors were studied primarily as a tool to learn techniques. In monitoring, out of all the organizations, 891 organizations were used for learning and 418 organizations were used for testing and comparisons were examined between different learning systems, which gave importance to this research.*

***Keywords*—**Machine Learning, Prediction, Pattern Recognition, Statistical Analysis.

I INTRODUCTION

Machine learning, a great sub field of artificial intelligence, evaluates important tasks that include prediction using the truth or, it can be said, specifically using mathematics to discover hidden patterns in data. It is important to note that where the traditional methods require appropriate methods, machine learning presents better decisions in the output.[1] Look at 1.

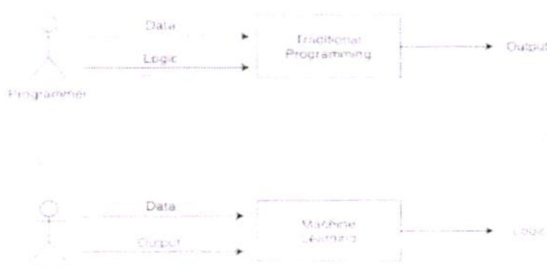


Figure 1 Difference between Traditional Programming and Machine Learning

Fig1: In the traditional system, the programmer feeds this system with the facts, logic and results of the program. But.

Principal
Samskruti College of Engg. & Technology
Kondapur (V), Ghatkesar (M), Medchal Dist.

ISSN: 2366-1313

with the knowledge acquired by the equipment, the programmer provides the version with data and output, and the model then generates logic or software. In this research work, a

The Titanic data set is used to evaluate the survival of the Titanic based on all observational analyzes of observational learning techniques such as logistic regression, random forest, decision making, K - nearest neighbor, etc.

According to the information, the aliens are the ship's gift, so all the predictions are passed on by the lovers so that it can maximize its survival. Before starting, to train the model, it is important to first record the data in all aspects such as missing values, similar formatting, outliers, etc. [2] [3]. For more information, a clear picture of how to make a cartoon is given in parent 2.

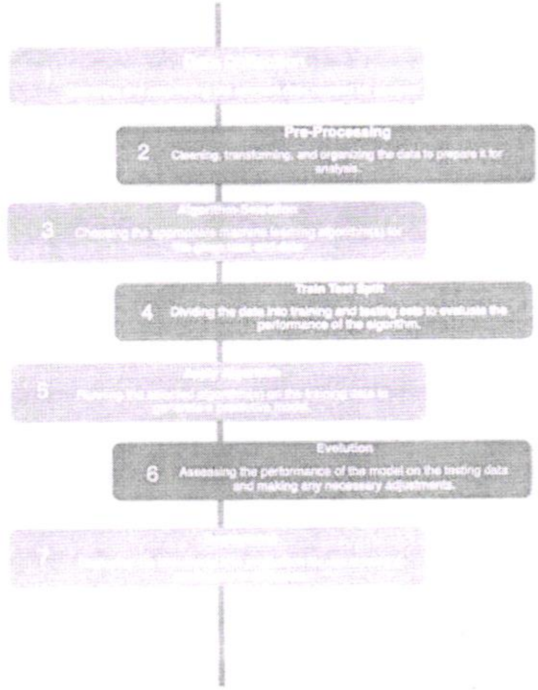


Figure 2: Workflow of Data analysis

Figure 2 describes the process of data analysis and how the author arrived at the belief. It is best to calculate all statistical methods properly

so it is easy to know the truth of the real way.

The purpose of this paper is to explore and analyze the Titanic data using learning tools to predict passenger survival. Special articles in the value of monitoring acquisition methods such as logistic regression, random forest, stochastic gradient descent, decision tree and nearest neighbor Divide the passengers into groups, survivors or not. The purpose of the evaluation is to evaluate the overall performance of the algorithms based on specific evaluation measures, including

Principal
Samskruti College of Engg. & Technology
Kondapur (V), Ghatkesar (M), Medchal Dist.

ISSN: 2366-1313

accuracy, F1 score, recall, and accuracy. In addition, the article discusses data preparation techniques, feature engineering, and data visualization to better understand data. The results obtained from this study can be useful for the development of prevention methods and emergency strategies of maritime transport in the future.

II LITERATURE REVIEW

The titanic DATA-SET has been widely used in many studies to explore modeling strategies, task selection strategies, and machine learning algorithms. The DATA SET served as a benchmark for competition and training, and its evaluation confirmed the importance of predicting survival. The studies reviewed as part of this data assessment demonstrate the simplicity and importance of the titanic data set in advancing reconnaissance and predictive modeling. From the study of data mining techniques to the study of the sigma trait Parameters in synthetic neural networks

Table 1 Summarized view of Literature Review

Ref.	Year	Method Used	Assessment
1	2019	Data Set Provider	Kaggle.com provides the Titanic dataset and platform for the Machine Learning from Disaster competition, which serves as a popular benchmark for predictive modeling.
2	2013	Data Mining	This paper provides a comprehensive survey of data mining techniques, including supervised and unsupervised learning, and their applications in various fields.
3	2007	Feature Selection	The paper proposes a spectral feature selection method for both supervised and unsupervised learning tasks, which can improve the accuracy and efficiency of predictive modeling.
4	2018	Predictive Modeling	This study uses the Titanic dataset to predict the survivors of the disaster and compares the performance of various machine learning algorithms.
5	2012	Predictive Mmodeling	It proposed a predictive modelling approach using the Titanic data set and offers a comprehensive review of related concepts and methods
6	2017	Predictive Mmodeling	This GitHub repository contains a predictive model for the Jack Dies competition, which is based on the Titanic data set and serves as a similar benchmark for machine learning.
7	2017	Predictive Mmodeling	This study uses various machine learning algorithms to analyze the Titanic disaster and identifies the most important factors for survival prediction.
8	1995	Neural Networks	The paper investigates the impact of sigma function parameters on the backpropagation learning algorithm in artificial neural networks
9	2009	Decision Trees	This paper presents an implementation of the ID3 decision tree learning algorithm and provides a tutorial on how to apply it to predictive modeling tasks.
10	2018	Predictive Mmodeling	This study compares the performance of different machine learning techniques on the Titanic data set and identifies the most accurate

III DESCRIPTION OF DATA AND EXPERIMENTAL SET UP

The data series consists of two columns and eleven columns. Parch ticket, P-

Principal
Samskruti College of Engg. & Technology
Kondapur (V), Ghatkesar (M), Medchal

ISSN: 2366-1313

elegance, call, passenger ID, life expectancy, gender, age, Sib Sp, price,

cabin, and onboard are lines. Besides ability, our goal is survival. The data thus categorizes certain family ties. Blood brothers, followers, spouses and children (wives and fiances are not considered spouses). This is how the data set defines family relationships. Mother and father are parents. A child refers to a son, daughter, granddaughter, or half-brother. Because some young people are better off traveling with a babysitter, the value of their parchment has gone down.

Before any form of analysis of the data is done, the author

should smooth the data set. Some important missing points are also found in the literature and should be addressed. Missing values in the variables such as Embarked, Cabin and Age are filled with the option selected by the main age. In this state, the Cabin column is deleted and updated with the value type of the Onboard Exclusion Value column. Along the middle line, fill in the missing value in the age column.

Research and evaluation of data

First, we can do an analysis of the information about our problem. The data were analyzed by clinical analysis of the data to identify the factors that affect the survival rate. By correlating each behavior with survival, the data is analyzed carefully. Figure 3 shows how sex affects survival rates.

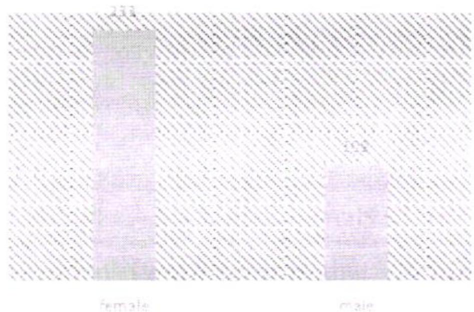


Figure 3: SUM of Survived by Sex

Figure 3 shows that women have a better survival rate than older men, as illustrated in Figure 6. The survival rates of women and men were calculated as 74.20382% and 18.89081%, respectively. Other attributes, including car price, cabin, title, family, P-perfect, auto, and survival, have a similar relationship. The name was created using the call property.' Sibbs and Parch were united. We are able to determine the importance of each character in the passenger's survival on this journey.

IV MACHINE LEARNING MODELS

Many learning algorithms are used to be accurate and hopefully survive.

ISSN: 2366-1313

a. logistic regression is a version of the distribution in place of a version of regression and is a simple distribution model that produces very good results with linearly separated classes [4] [5]. we use the logistic regression version here because our results are both survival and non-survival. logistic regression is a reliable and useful method for binary and linear class problems.

b.random forest is the owner manager. it can be used in learning gadgets to get answers in regression and distribution mode. "a random forest is a distributed system that has multiple tree selections of specific properties of the given data and uses the average to improve the expected results of that data" [6] according to as the name suggests. as part of the main data, instead of relying on a single selected tree, random forest collects the predictions from each tree and predicts the final result using that prediction. which received the most votes.

c. stochastic gradient descent (sgd), the author uses massive data and a method that optimizes the descent for the duration of each search as quickly as possible when selecting the weight vector. gradual descent is a method of searching in continuous or infinite space where 1) the assumptions are constant and 2) the error varies depending on the parameters. the weights are initialized in sgd from the given data (titanic DATA-SET) and the code modifies the load vector with a statistic. when a calculation error is made, gradient descent gradually adjusts it to improve convergence.

d. decision tree is a method to obtain supervised knowledge that can be used to solve problems of type and regression such as titanic datasets, however, it is mainly used to solving classroom problems [7]. it has a tree structure, with internals for data set locations, branches for input options, and leaves for results. the order node and the leaf node are 2 nodes that form a selection tree. while leaf nodes are the result of such choices and do not have branches, decision nodes are used as choices and include more branches. the examination or assessment is usually based on the characteristics of the given data.

e. k-neighbors neighbors (knn) is a monitoring system that can be used for all types and returns. by calculating the distance between the test data and all the training points present in the big data, knn tries to predict the best classes for the test data. then determine where k is the maximum, just like the test [8] [9]. the knn algorithm determines which classes have the best results by counting the number of

Principal
Samskruti College of Engg. & Technology
Kondapur (V), Ghatkesar (M), Medchal Dist

ISSN: 2366-1313

times that control data is available for each "k" statistical class. the value in the regression condition is the average of the "k" decisions of the training program.

V RESULT

The first step in engaging in a survey is data collection. Exploratory statistics analysis makes understanding data and relationships between capabilities less problematic. Use various graphic techniques. A reference above uses histograms and ggplot. Some conclusions were drawn and data was discovered using a case study. Based on the research data analysis process, the need to construct schools and forecast versions is recognized in engineering works. The mastery of modes by machines presupposes the good quality of passengers who survive. To make predictions in class problems, the Random Forest method is used. With a precision of zero.827261504, a return of 0.813453456, an F1 score of zero.8237261504, and a precision of 0.827261504 in line with the confusion matrix, Random Forest appears to be the true version. This shows that Random Forest has an overall overestimation of the prediction skill in this data set using the selection function. For a detailed picture of the statistical analysis, see Table 2.

Table 2. Performance Matrix Representation

Algorithm	Accuracy	F1-Score	Recall	Precision
Logistic Regression	78%	0.78	0.78	0.79
Random Forest	82%	0.82	0.81	0.82
Stochastic Gradient Descent	58%	0.45	0.58	0.63
Decision Tree	79%	0.79	0.79	0.79
K-nearest neighbor	66%	0.64	0.66	0.67

It is very obvious that when using a specific design process, the accuracy of the model can also be affected. The perfect models for this type of problem are Random Forest and Decision Tree because they provide a high level of accuracy. The results of our experiment, as evidenced in Figure 4, show the performance of many machine learning algorithms used to estimate the survival of the Titanic. We evaluate the performance of the algorithms using accuracy, F1 score, recall, and precision. The Random Forest algorithm came out on top with an accuracy of 82%, an F1 index of zero.82, a return of 0.8 one, and a precision of 0.82. The logistic regression and decision tree algorithms also performed well with 78% and 79% accuracy, respectively. However, the stochastic gradient descent algorithm guarantees a perfect result with an accuracy of only 58%. The K-nearest neighbor rule performed slightly better

Principal
Samskruti College of Engg. & Technology
Kondapur (V), Ghatkesar (M), Medchal Dist.

ISSN: 2366-1313

with sixty-six percent accuracy. These results suggest that Random Forest rules are the most suitable for predicting the survival of Titanic passengers using learning techniques.

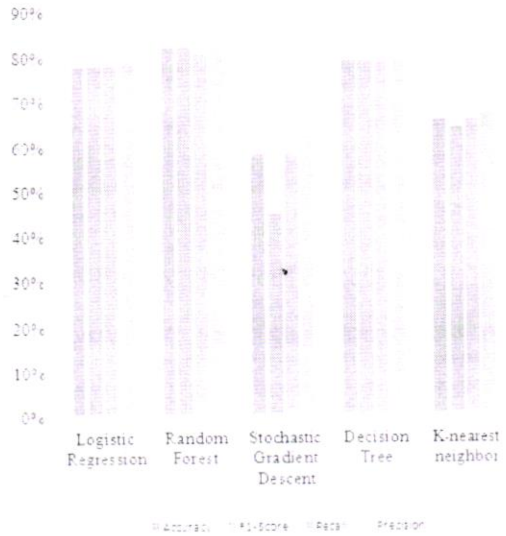


Figure 3: Performance Measures

Fig3: Display the results of the algorithms. This graph demonstrates the algorithm's performance in relation to accuracy and other factors.

VI CONCLUSION

The design using the system brought awareness to the perceived value of passengers who survived. The random forest method is used to make predictions about target species. The accuracy of each model is determined using the confusion matrix, and the Random Forest model comes out on top with an accuracy of zero.82. This shows that the Random Woodland estimator performs in this data with very good selection ability. It is clear that when using the best modeling methods, the accuracy of the models can also change. The modes that provide the best level of accuracy for classification problems are random forest modes. Machine learning and statistical analysis were used in this work. This diagram can be used as a template for learning how to integrate EDA and core knowledge tools. With the use of more bookstore libraries, notably Vibrant in R, the concept can be improved in the future to create more graphical user interfaces. It is necessary to create interactive pages, where the same values as the chart attribute (like plot or histogram) will also change if the attribute value is changed at length. By combining our effects, we can obtain more comprehensive conclusions.

REFERENCES

1. Kaggle.com. (n.d.). Titanic: Machine Learning for Disaster. Retrieved October 29, 2019, from http://www.kaggle.com/

2. Jain, N., & Srivastava, V. (2013). Data mining techniques: A survey paper. IJRET: International Journal of Research in Engineering and Technology, 2(11), 2319-1163.

Principal
Samskruti College of Engg. & Technology
Kondapur (V), Ghatkesar (M), Medchal Dist.

ISSN: 2366-1313

3. Zhao, Z., & Liu, H. (2007). Spectral feature selection for supervised and unsupervised learning. Proceedings of the 24th international conference on Machine learning. ACM.

4. Farag, N., & Hassan, G. (2018). Predicting the Survivors of the Titanic Kaggle, Machine Learning From Disaster. In ICSIE'18 Proceedings of the 7th International Conference on Software and Information Engineering (pp. 1-7). ACM.

5. E. Lam and C. Tang, CS229 Titanic–Machine Learning From Disaster, 2012.

6. Liu, J. (2017). Arkham/Jack-Dies. GitHub. Retrieved August 30, 2017, from https://github.com/Arkham/jack-dies

7. Singh, A., Saraswat, S., & Faujdar, N. (2017). Analyzing Titanic disaster using machine learning algorithms. 2017 International Conference on Computing, Communication and Automation (ICCCA). IEEE.

8. Han, J., & Morağ, C. (1995). The influence of the sigmoid function parameters on the speed of back propagation learning. In From Natural to Artificial Neural Computation (pp. 195-201). Springer.

9. Peng, W., Chen, J., & Zhou, H. (2009). An implementation of ID3-decision tree learning algorithm. Retrieved from http://web.arch.usyd.edu.au/wpeng/DecisionTree2.pdf

10. Ekinci, E. O., & Acun, N. (2018). A comparative study on machine learning techniques using Titanic data set. 7th International Conference on Advanced Technologies.

11. Xiao, Y., Wang, T., & Wu, J. (2014). Two methods of selecting Gaussian kernel parameters for one-class SVM and their application to fault detection. Knowledge-Based Systems, 59, 75-84.

12. Prasadu Peddi, and Dr. Akash Saxena. "studying data mining tools and techniques for predicting student performance" International Journal Of Advance Research And Innovative Ideas In Education Volume 2 Issue 2 2016 Page 1959-1967

Principal
Samskruti College of Engg. & Technology
Kondapur (V), Ghatkesar (M), Medchal Dist.

ISSN: 2366-1313

Edge Assisted Crime Prediction and Evaluation of Framework for Machine Learning Algorithms

[1] Mr.K.Vamshee Krishna, [2] K Prasad,[3] Korivipalli Sai Sharanya,[4] Johirul Islam, [5]Mudavath Sharath

[1] Assistant Professor, Dept. Of CSE, Samskruti College of Engineering & Technology, TS.

[2,3,4,5]B. Tech Student, Dept. Of CSE, Samskruti College of Engineering & Technology, TS.

Abstract: *The growth of the global population, especially in large cities, has created new problems, especially in terms of legislation and the implementation of effective civil protection. Therefore, in this paper, a method is proposed to estimate crime occurring in a city, based on all past events and public observations. In particular, this study presents the crime detection and evaluation framework for the system to gain knowledge of the community algorithms. Thus, a comprehensive analysis of four types of serious crimes, such as murder, speeding trials, abuse of girls and boys, and drugs, leads to positive results among the preparation process. All the research and its implementation showed a visible example of crime in many parts of the United States. The general work is done by selecting, analyzing and using the machine learning (ML) model and finally reporting the crime. Violation risk is estimated by using distribution patterns for time, programming language and region. To anticipate what will happen, ML methods that include Decision Trees, Neural Networks, K-Nearest Neighboring, and Functional Learning are used, and their overall performance is is compared by processing data and using modifications. The highest accuracy of eighty-one percent is achieved for the decision tree rule set throughout the crime prediction. The results showed that the use of machine learning techniques made it easier to predict crimes, which helped to improve public safety.*

Keywords—Machine Learning, Edge Computing, Crime Prediction, Impact Learning, Decision Tree, KNN, MLP

I INTRODUCTION

One of the main concerns of citizens around the world is civil protection. Many reasons, including the rapid growth of cities, have led to growing concerns. The migration of people to cities is well known in recent years and, according to UN

ISSN: 2366-1313

estimates, more than 70% of the population will live in cities by 2050 [1]. Furthermore, according to the Global Crime Database, which defines terrorist acts as "acts committed with the assistance of non-state actors against civilians, this means that objective concern, as a means to achieve the political goal", is diverse. of criminals over the past decade is the highest on record. Machine control (ML) techniques are important for smart city projects and can be used to reduce crime as they help solve smart city problems.

This image was adapted for support from the Korean government-funded Institute of Information Technology Planning Evaluation (IITP) (MSIT) (No.2019-zero-01287, Evolvable Deep Learning Model Generation Platform for Edge Computing) and MSIT (Ministry of Science). and ICT), Korea, under the Grand Information Technology Research Center Support Software (IITP-2020-2015-0-00742) supervised by IITP. *Dr. CS Hong is the founder.

Urban development and vaporization of the obtained fact [2].

This document can provide an overview of crime in your area. S. A., like Bangladesh. We use facts from 2012 to 2019 to show adults. Using the crime prediction version, we find that zone 1 is more damaged than different cities while zone 2 is not damaged. Using all these statistics, we created a 2021 crime forecast (check this). We present the political comparison between 2019 and 2021. We have a situation to inform city residents and local authorities about the most dangerous places, thus presenting value to the community and increasing public protection. In this case, this type of forecast can be useful for influencing the manner, such as controlling the effectiveness and efficiency of work, as well as for vacationers who have blind visibility to the most dangerous areas of the city .

Machine learning techniques, including expertise learning [3], decision tree [4], K-Nearest Neighbors [5], and MLP classifier, are used to make predictions. These algorithms are scored based on the number of correct actions and strategies used. We summarize the main points of the program as follows:

1) First, we proposed a fault prediction and evaluation framework for network-side ML algorithms. It is not easy to identify an old measure of crime detection, but it can also be measured as a set of modern information intended to prevent crime.

Samskruti College of ...
Kondapur (V), Ghatkesar (M), Medchal Dist.

ISSN: 2366-1313

2) Second, we implemented several ML algorithms including decision trees, neural networks, K-Neighborhood, and constraint analysis at the end of the planning process. In this, really the criminal record of the u. S. It is used to confirm the effectiveness of the proposed system through comprehensive analysis.

3) Finally, our interventions have proven effective in anticipating crime, which includes murders, speedy trials, rape of women and children, and truth-telling to protect the community.

The remainder of this article is presented as follows. The relevant work is described in Chapter II and the reporting process is contained in Chapter III. The results and discussion are then presented in Section IV, with details on the machine learning techniques. Finally, we conclude in section V.

Fig. 1. A Crime Prediction and Evaluation Framework for Machine Learning Algorithms of Network Edge

II Related Work

A group of researchers used WEKA, an open source statistical mining software, to analyze crime rates from non-standardized community and crime data. was provided by the University of California-Irvine with information on criminal activity for the Mississippi Kingdom received from the community scout.Com [6]. Based on old and public records, Luis et al. The concept of a model to predict the crime situation in the city [7]. Another group of studies has determined the direction of the standard model of violation prediction using the decision tree algorithm (J48). The rule J48 detected the unknown crime with an accuracy percentage of 94.25287 according to the test results [8]. In another study, the authors used cognitive and scientific techniques to predict crime in the Chicago crime data [9]. Details of the crime were obtained from the Chicago Police Department's website. In a unique study, crime data from Vancouver over the past 15 years was analyzed using advanced data processing techniques. When it comes to predicting crime in Vancouver, the accuracy ranges from 39% to 44% [10]. Other schools have published legal prediction models, mostly based on cities (regions or regions that make up the city of Buenos Aires) and using the Python programming language for predictions first. In addition to [6-10], we provide a general

Principal
Samskruti College of Engg. & Technology
Kondapur (V), Ghatkesar (M), Medchal Dist.

ISSN: 2366-1313

guide to this work that enters the year, this model will provide the crime for the past year.

III Proposed Framework

We carried out this work using a working machine. To use the obtained data, we followed five steps [11], as shown in Figure 1. The number of samples and the number of variables are sufficient to maintain good accuracy. The proposed framework consists of six methods. The first is the collection of information, which is accompanied by control. We were the first to come to the truth after we gathered together. In this step, we will start by checking for missing values before moving directly to the characteristic test. Finally, we select the function for the label and the working file. We rent the ML route once completed

TABLE I
DATA SET ATTRIBUTES DETAILS INFORMATION.

Attributes	*Description*	*Type*
Murder	Number of Murder in different city of the country.	Numerical
Speedy trial	Speedy trial in five Metropolitan areas of the country.	Numerical
Woman and Child Repression	Up and down of this crime is shown in number.	Numerical
Narcotics	Number of Narcotics in different city of the country.	Numerical

This information is broken for education and exit. According to the university literature, this ML approach has led to predictions. The proposed framework is to use the body in the community.

A. Peripheral network

Edge networking is a distributed computing model that makes computing and data storage closer to the need to reduce latency and save bandwidth [12], [13]. Edge captures and processes data as close as possible to the data or events planned. It collects statistics on the use of sensors, computing gadgets, and machines before sending them to other servers or the cloud [14]. These statistics can be used for power measurement and physical understanding, enabling automation, or providing insight into the current status of a device, gadget, or device. product [15], depending on preferences and needs.

B. Data sources

We collected all the data from the United States Police website [16]. We have used the date from 2012 to 2019. We have seen a wide range of facts about crime here, but we have selected some of the most important, which are rising and very old in the United States. Table I describes the data collected for our study.

C. Prior information

Crime prediction data is the first priority when collecting various statistics [13]. Murder, Speedy Trials, Abuse of Women and Children, and Narcotic are the top four in this database for predicting crime. We have put many disks on this website, but not everything is put on the wall anymore.

ISSN: 2366-1313

We use 3 different steps to advance the statistics for this purpose.

"It's worthless, look."

"Measuring the scale.

"Special selection.

Pay attention to the missing value: The holding value The missing value is incorrect in the highest cases as the tax that is not stored in the example. In the information industry, lack of value is a daily occurrence. In addition, most future presentation methods cannot handle missing data. Therefore, this problem must be solved before the model begins to evolve. We use the expression to update the missing value. To find the optimal solution, this is equal to the average value of a to create reality, calculation is necessary. Subtract the total number of digits from the total range of values in the data collection [15]. Equation: 1 is used to get the implicit.

$$Mean = \frac{\sum_{i=0}^{n} x_n}{n} \quad (1)$$

Feature Scaling: Feature scaling or normalization is one of the most important techniques in machine learning techniques; Without it, the target systems will not function properly. Min-Max scaling, variance scaling, normalization, mean normalization, and unit vectors are a number of characteristic scaling techniques available. For this task, we use min-max normalization. The normalization range in min-max in [0, 1] or [-1, 1] is given by equation: 2 and the min-max values in [0,1].

$$x = \frac{x - \min(x)}{\max(x) - \min(x)} \quad (2)$$

Feature Selection: Another task that must be done before deploying a release is feature selection. The main purpose of this method is to find ways to influence the work for different purposes. We removed a few important points that were not important for different purposes, while keeping the important points. The calculation cost is reduced when the range of key points is reduced. There are thirteen unique systems in our database.

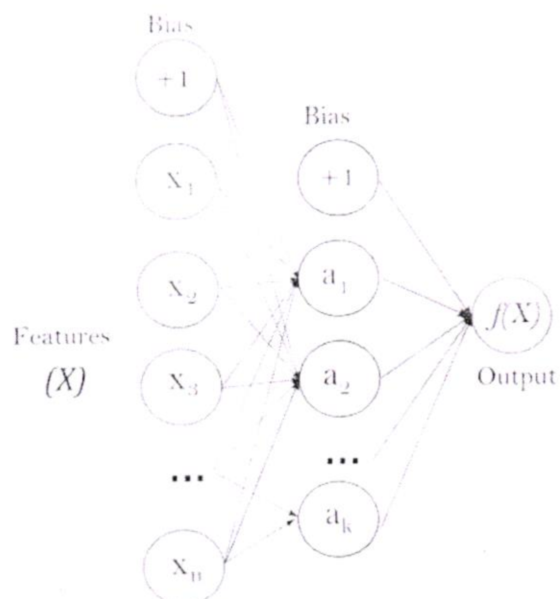


Fig. 2. Diagram of MLP Classifier [17].

D. Data Split

Training information is the muse for all system learning algorithms. All of the statistics collected has been split into

ISSN: 2366-1313

sections. The first is a education set, while the second one

TABLE II

DETAILED TRAINING PARAMETERS OF IMPLEMENTED ALGORITHMS

Name of Al-algorithms	Description	Initial Parameters
K-Nearest Neighbors	The majority of votes from its fixed neighbors classify the new data point.	Nearest Neighbour: 5
MLP Classi-fier	All input is processed through a series of hidden layers, and a final output is anticipated as a result.	Random state: 1
Decision Tree	The more splits there are in a tree, the more information it captures about the data.	Class weight: None
Impact Learning	On the training data set, a huge number of Epoch are run. Iteration is another name for Epoch.	Epoch: 2000

F. Training model

We use four control algorithms to find the most accurate results. For this information, all methods are similar to praising bureaucracy. Based on the lowest error rate of the algorithms, a particularly efficient model was detected. Table II contains the results of all algorithms in addition to their limitations.

Impact Learning: Impact for knowledge is a professional learning technique that uses supervised classification and linear or polynomial regression. It is also useful for evaluating the true pattern of the competition. There is rarely a good way to understand the impact of independent versus competitive capabilities using this method. In a separate article, the result of the herb cultivation value (RNI) [3] is presented. RNI is represented by the equation: 3 in this case.

$$Imp = (y - (\frac{k\sum_{i=1}^{n} w_i x_i}{r - w_i k} + b))^{2/N} \quad (3)$$

K- Nearest Neighbor Classifier: The K-Nearest Neighbors

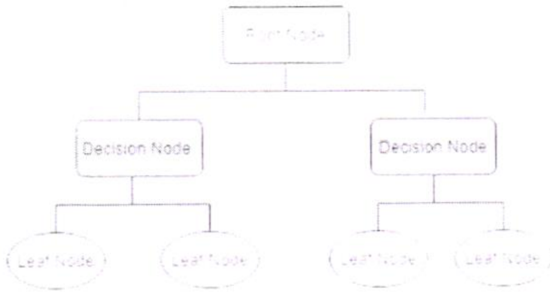


Fig. 3. Diagram of Decision Tree Classifier

This technique is one of the most important machine learning algorithms and it is based on supervised learning. The K-NN algorithm collects all available data and classifies new data based on their similarity to previous data. This means that by using the K-NN method [5], the new data can be quickly classified into a good group. The maximum distance between the selected neighbors is calculated using the KNN method. KNN uses the Euclidean distance function to calculate the distance between the existing data and each new data. Equation 5 can be used to calculate the Euclidean distance.

$$EuclideanDistance = \sqrt{\sum_{i=0}^{n} (x_i - y_i)^2} \quad (4)$$

MLP Classifier: The term MLP classifier refers to a neural network that uses multi-layer Perceptron classifiers. Unlike other classifiers such as Support Vectors or Naive Bayes Classifier, MLP Classifier uses the underlying neural network to

Principal
Samskruti College of Engg. & Technology
Kondapur (V), Ghatkesar (M), Medchal Dist.

ISSN: 2366-1313

perform classification. The perceptron is composed of two layers: a fully connected input layer and an output layer. In Figure 2, the first layer X1, X2... Xn is the input layer and f(x) is the output layer. MLPs have the same concept and publishing process, but they can have several hidden layers between them, as shown in Figure 2.

Decision Tree: This is a versatile forecasting technique that can be used in many situations. In general, decision trees are algorithmic methods for determining alternative ways to classify a data set based on certain criteria. It is one of the most used educational monitoring methods [4]. The goal is to create a model that can learn and predict the value of different objectives using instructions from a decision tree. This is good for knowledge discovery because there is no parameter change. The two nodes of a decision tree are the decision node and the leaf node. Selected nodes are used to make decisions and have many branches, while leaf nodes are the result of decisions and have no additional branches. Figure 3 describes the decision tree process. It is divided into 3 stages. The first stage is the root node, and all others are siblings of the root node.

IV Result and Discussion

The crime data has been subjected to extensive testing to achieve the best results for crime prediction. To begin with, the data breach is first in Google Co lab, and 30% of it is

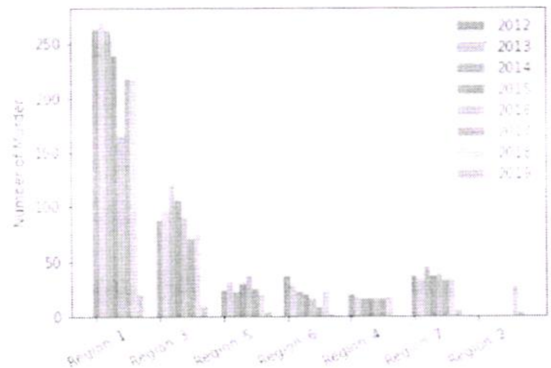


Fig. 4. The rate of Murder in various region.

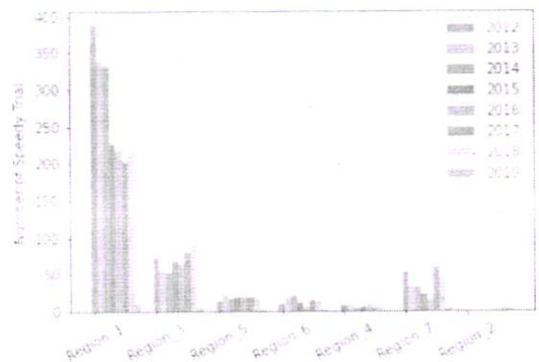


Fig. 5. The rate of Speedy Trial in various region.

of the data set is divided into training and testing. We selected machine learning algorithms [18] and used the training data to create separate models for each algorithm used for testing. The results obtained show the performance of each classifier and the best classifier based on several metrics such as precision, accuracy, recall and F-test for the given data.

Principal
Samskruti College of Engg. & Technology
Kondapur (V), Ghatkesar (M), Medchal Dist.

ISSN: 2366-1313

Equation 5 is used to calculate the precision.

$$Accuracy = \frac{TP - TN}{TP - TN.FP - FN} \qquad (5)$$

The F1 score is calculated by taking the harmonic mean of accuracy and recall. *Equation:5* represents the F1 score.

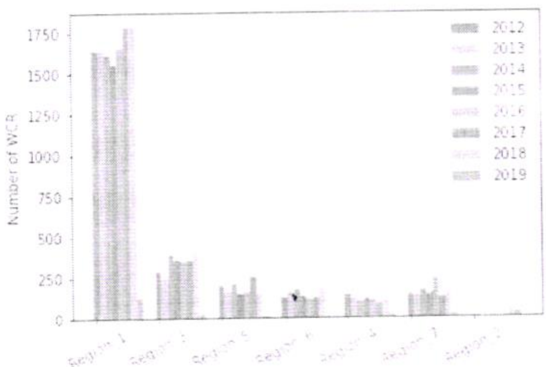


Fig. 6. The rate of WCR in various region.

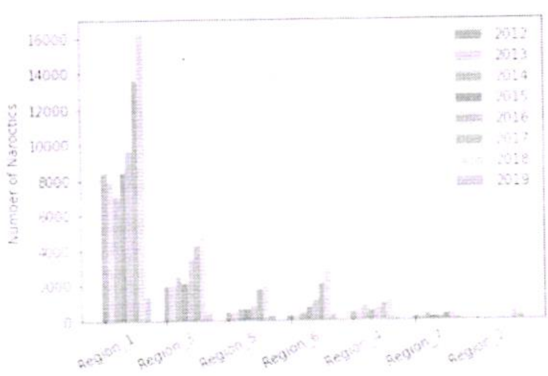


Fig. 7. The rate of Narcotics in various region.

$$F1score = \frac{2TP + TN}{2TP + FP + FN} \qquad (6)$$

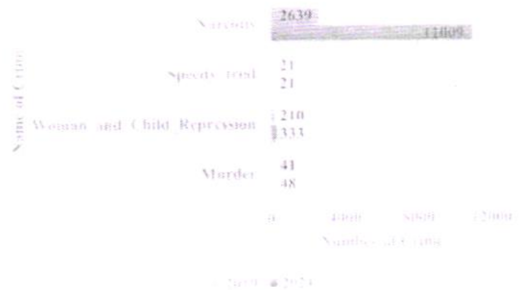


Fig. 8. Crime prediction in 2021 using Decision Tree and compression this crime what was happed 2019.

TABLE III

[illegible]

Algorithm	Accuracy	F1 Score	Recall	Precision
K-Nearest Neighbor	0.73	0.66	0.69	0.70
MLP Classifier	0.77	0.70	0.73	0.71
Decision Tree	0.81	0.73	0.73	0.78
Impact Learning	0.76	0.69	0.72	0.72

speech. The predictive ability of four artificial intelligence methods has been studied to identify serious crimes.

Table III compares the accuracy, precision, recall, and F1 performance scores of each method. We are able to obtain high levels of accuracy for all these algorithms by using four powerful methods. Table III shows that the decision tree has the highest accuracy of 81%, while the KNN classifier has the lowest accuracy of 73%. In addition, the decision tree algorithm produces the highest value for all other performance measures, 73% of F1 score and recall, and 78% of accuracy. On the contrary, the KNN Classifier algorithm produces the lowest value for performance evaluation, 73% precision, 66% F1 gain, 69% recall, and 70% precision. We also

Principal
Samskruti College of Engg. & Technology
Kondapur (V), Ghatkesar (M), Medchal Dist.

ISSN: 2366-1313

performed the performance of each performance measure for the other two algorithms, MLP classifier and disturbance learning. The accuracy of the MLP classifier is 77%, while the accuracy of the learning intervention is 76%, which is comparable. The MLP classifier performs well in terms of F1 score and recall compared to interference learning, but interference learning performs better in terms of accuracy.

V CONCLUSION

In this paintings, we added a criminal offense prediction and assessment framework for system gaining knowledge of algorithms at the edge of the network. We collected records from 2012 to 2019 to research and evaluate our predictions. We use system gaining knowledge of to are expecting crime events, which can be useful for enhancing city public safety, a chief trouble addressed in many towns round the world. It's interesting to see how things are finished earlier, and changes can affect the design, specifically when the date spans more than one intervals. With information proof, this solution was created for a selected town within the u . S .. However, if equivalent data may be used, the method will be applied to different cities. Based at the schooling information of the 4 algorithms, we determined that the decision tree approach was powerful and accurate in predicting crime facts. The negative overall performance of the Stump choice set of rules can be attributed to a few inconsistencies in diverse crimes and associated traits (showing the poor comparison of the four algorithms); KNN legs are tighter and only provide correct effects if the measurements comply with the standard model.

REFERENCES

1. Y. Wu, W. Zhang, J. Shen, Z. Mo, and Y. Peng, "Smart city with Chinese characteristics against the background of big data: Idea, action and risk," Journal of Cleaner Production, vol. 173, pp. 60–66, Feb. 2018.

2. M. Kowsher, A. Tahabilder, and S. A. Murad, "Impact-learning: A robust machine learning algorithm," in ACM International Conference Proceeding Series, pp. 9–13, Jul. 2020.

3. Priyanka and D. Kumar, "Decision tree classifier: A detailed survey," International Journal of Information and Decision Sciences, vol. 12, no. 3, pp. 246–269, 2020.

4. L. Jiang, Z. Cai, D. Wang, and S. Jiang, "Survey of improving K- nearest-neighbor for classification," Proceedings - Fourth

Principal
Samskruti College of Engg. & Technology
Kondapur (V), Ghatkesar (M), Medchal Dist.

ISSN: 2366-1313

International Conference on Fuzzy Systems and Knowledge Discovery, FSKD 2007, vol. 1, pp. 679–683, 2007.

5. L. McClendon and N. Meghanathan, "Using Machine Learning Algorithms to Analyze Crime Data," Machine Learning and Applications: An International Journal, vol. 2, no. 1, pp. 1–12, Mar. 2015.

6. Fonseca, Luis, F. C. Pinto, and S. Sargent. "An Application for Risk of Crime Prediction Using Machine Learning." International Journal of Computer and Systems Engineering 15.2, pp. 166-174, 2021.

7. E. Ahishakiye, D. Taremwa, E. O. Omulo, and I. Niyonzima, "Crime Prediction Using Decision Tree (J48) Classification Algorithm," 2017. [Online]. Available: www.ijcit.com188

8. S. K. Senthil Kumar, G. Adarsh, J. Shashank, and A. Sameer, "CRIME PREDICTION AND ANALYSIS USING MACHINE LEARNING",

[Online]. Available: http://ijte.uk/

9. S. Kim, P. Joshi, P. S. Kalsi, and P. Taheri, "Crime Analysis Through Machine Learning," in 2018 IEEE 9th Annual Information Technology, Electronics and Mobile Communication Conference, IEMCON 2018, pp. 415–420, Jan. 2019.

10. S. A. Murad, Z. R. M. Azmi, Z. H. Hakami, N. J. Prottasha, and M. Kowsher, "Computer-aided system for extending the performance of diabetes analysis and prediction," pp. 465–470, Sep. 2021.

11. L. U. Khan, I. Yaqoob, N. H. Tran, S. M. A. Kazmi, T. N. Dang, C. S. Hong, "Edge Computing Enabled Smart Cities: A Comprehensive Survey," IEEE Internet of Things Journal, Vol.7, Issue 10, pp.10200- 10232, Oct. 2020.

12. Prasadu Peddi, and Dr. Akash Saxena. "studying data mining tools and techniques for predicting student performance" International Journal Of Advance Research And Innovative Ideas In Education Volume 2 Issue 2 2016 Page 1959-1967

Principal
Samskruti College of Engg. & Technology
Kondapur (V), Ghatkesar (M), Medchal Dist.

ZKG INTERNATIONAL
ISSN: 2366-1313

Forest Fire and Smoke Detection Using Deep Learning Models

[1] Mr.K.Vamshee Krishna, [2]Immareddy Manasa, [3]Pagidi Sai Kumar, [4]Eeri Mahender, [5]kusari Ganesh

[1] Assistant Professor, Dept. Of CSE, Samskruti College of Engineering & Technology, TS.

[2,3,4,5]B. Tech Student, Dept. Of CSE, Samskruti College of Engineering & Technology, TS.

Abstract: *Every 12 months, there are many forest fires round the world that go unmeasured and unaccounted for. There are many particular research available for checking out or possibly geared up to be used to resolve this hassle. People use sensors to trip over the range. But this case does now not practice to large forest regions. In this article, we proposed a new technique of furnace research, which makes use of contemporary era. In unique, we have organized an Artificial Intelligence platform. Computer imaginative and prescient for smoke and fire reputation and detection, based on nonetheless pics or video input from the digicam. The deep getting to know technique "constitutional neural network" can be used to find the supply of the fireplace. This will permit video surveillance of forested regions to deal with more tough conditions in the real world. The reality is that it especially relies upon at the algorithm we can use and the facts and divide it into schooling units and exams.*

Keywords— Fire detection, image classification, Open CV, deep learning, and Convolution Neural Networks

I. INTRODUCTION

Forests are the protectors of the ecological stability of the arena. Unfortunately, hearth is regularly visible even though it has already unfold to the woodland, making it hard and from time to time impossible to solve and forestall. The end result is brilliant destruction and harm to the surroundings (30% of the carbon dioxide (CO2) inside the environment comes from burning), further to the damage to the ecology (a number of smoke and carbon dioxide (CO2)) inside the surroundings.). The way is to shop your self from making unlawful decisions. The reason of the system is to understand the risks that may be made with the main sources of recording noise in the woodland, via using the recorded records and figuring out the person of every phase[1].

It is important to load the mills sufficiently and the people are recommended to put out the hearth as quickly as possible. In

Principal
Samskruti College of Engg & Technology
Kondapur (V), Ghatkesar (M), Medchal Dist.

ISSN: 2366-1313

addition, the logistics infrastructure is ideal sufficient to make sure sufficient transport of hearth preventing equipment and protection is important, as well as regular monitoring of the unfold of fire. A excellent approach for hearth detection and firefighting is maximum of the unique detection strategies of fire chance, environmental dimensions and human habitation, which includes with all vital factors and early detection. an extended manner through the studies manner. , logistics and getting to know thru simulation and fireplace combating

In order to lessen the growth in the incorporated seats, we used a new non-stop construction technique referred to as "dropout" which has established to be very effective.[6] Analysis of a spread of computational strategies together with regression, choice trees, neural networks, and more. Has been used to expect fires close to forests [8] A magnificence primarily based on semi-uncontrolled to decide whether or not its location is too much strength, weak (MA) organization or susceptible (LA) in the forest area. . Location [8]. To save you wildfires from getting out of manage, it's far critical to study firefighting inside the United States early and save you it from spreading.

To save you these losses, it is essential to adopt a global and multifaceted approach that permits enterprise continuity and reaction instant. In this newsletter, we have organized a present day technique for detecting the virus, using the modern gadget. More exactly, we have organized an Artificial Intelligence platform. The pc that can be used has an excellent feeling and techniques for recognizing and seeing smoke and fireplace, based on instantaneous photographs or video from a digicam. The deep mastering technique of "constitutional neural network" can be used to decide the hearth.

II RELATEDWORK

In traditional stove studies, many research have always focused on locating the principle capabilities of stove snapshots. Chen [7] analyzed the strength alternate using RGB and Shakoor model in particular based totally at the distinction between consecutive frames and proposed a rule primarily based on the global attention preference rule. Celek and Demirep [5] proposed a rule based on a median for all conditions in a specific woodland. [3] WSN has the most important contribution because of the reality that 33% of researchers use WSN to tune digital devices, forty one% use WSN to copy records into their structures, and forty eight% use WSN because the real transmission of sensor nodes. [4] A powerful Ada Boost (RAB) classifier is proposed to enhance school accuracy and class

Principal
Samskruti College of Engg. & Technology
Kondapur (V), Ghatkesar (M), Medchal Dist

ISSN: 2366-1313

Flame pixel first-class uses the CyBC shade version to separate microfinance from luminance components. In addition, Wang [8] extracted the candidate places of foci in an photo the use of the HSI colour version and calculated the coloration dispersion of flames to decide the foci vicinity. However, the concept of seeing the colour of the coronary heart is frequently tilted in the direction of a form of the environment which includes lighting and shadow. Borges and Inquired [9] accompanied the Bayes classifier to address the maximum common fireplace, based totally at the capability to boom the range of zones, surfaces and barriers of the stove place for color. Mueller [10] proposed a neural network-based totally oven detection technique using an optical go with the flow for oven localization. In this manner, the optical sliding sample is blended to differentiate among dynamically changing fire and system. In addition, Foggia [11] proposed some of specialists who combine the effects of measuring the fireplace shadow, its shape and its motion characteristics. Although this isn't sufficient, the material brought to the coloration, which has texture, exceptional and glare, can lessen false detection. However, those approaches require that the fireplace information inside the seize photo is very important to find the device and can not reproduce the spatial and temporal records to make contributions to an amazing fireplace environment. Furthermore, for almost all sensible uses of the traditional method, it's far first-rate to apply simplest one, although the photo or consecutive pairs of frames are affected throughout a fire. It is consequently most well known now not to forget the dynamic conduct of the oven in the short time, while the fireplace has a dynamic conduct in the long term.

APPROACH BASED ON EPLEARNING

Recently, deep learning has been implemented in many fields, along with item/beauty detection in pictures, speech popularity, and herbal language processing. Scientists have achieved a variety of studies on the point of interest based totally at the depth to know the splendor of the entire spectacle. A thorough understanding of the technique presents many differences between traditional computational theory and foresight-based totally fire detection. The first is that the capability is not explored with the aid of the expert, however alternatively captured within the community after getting to know with a massive range of different types of analysis at school. Therefore, the search for the proper skills turned into reoriented in the direction of creating an awesome network and getting ready the program. Another distinction is that the detector/classifier can be obtained by studying concurrently with assets from the

Principal
Samskruti College of Engg. & Technology
Kondapur (V), Ghatkesar (M), Medchal Dist.

ISSN: 2366-1313

equal neural network. .Therefore, the best community version turns into greater crucial beneath inexperienced education policies. Sebastian [12] proposed a CNN-based community hearth detection device wherein capabilities are detected simultaneously with the college's Multi-layer Perception (MLP) neural net classifier. Zhang et al. [13] additionally proposed a CNN-primarily based fireplace detection system that works in a cascade model. In their technique, all pictures are first analyzed the usage of the worldwide picture-stage classifier, and if a fireplace is detected, a primary-order patch classifier is used to appropriately discover the stove region. Mohammed et al.

[14] suggested a fire detector primarily based completely on CNN's properly-tuned hearth detectors. This version is an powerful CNN model for fire detection and local operations.

III SYSTEM DESIGN AND DEVELOPMENT

Fire check room, as proven in Figure 2. Webcams are video capture gadgets related to a computer or computer network, generally using a USB port for video links, permitting the laptop fashions used as videophones or videoconferencing stations. Webcams can also be used with many pc video telecommunications structures that consist of safety monitoring and video recording.

At the pinnacle level, it consists of a USB digital digicam and verbal exchange with an open CV module related to Adrian No that controls the constitutional neural community (Convent / CNN), the deep getting to know method for fire research.

The micro controller evaluates the sensors of each day using the long message and completes the output from the CNN output. If it's far concluded that a fire has been detected, a hearth alarm is sent thru the control information machine (MIS) to the citizens of the location and to the closest hearth panel. The maximum. If sending a message with the aid of verifying the connection does now not work, it sends a message through the business enterprise's brief message service (SMS). The fireplace test unit includes bodily system including a USB virtual camera, an Arduino micro controller board, and a software software that embodies the CNN fireplace detection device and basically drives the device.

The software subsystem is the non-physical a part of the search engine, which oversees the inspection of the system through the hunt digicam, determining whether or not the readings imply that there is hearth, use the photograph made with open CV and elevator signals in case of fire. Open CV (Open Source Computer Vision) is a library of specialized functions for real-time PC vision and its library is

Principal
Samskruti College of Engg. & Technology
Kondapur (V), Ghatkesar (M), Medchal Dist.

ISSN: 2366-1313

used for image processing. It is used solely to carry out all operations associated with Images. Machines assist to look the whole thing, converting vision into numbers the use of pixels.

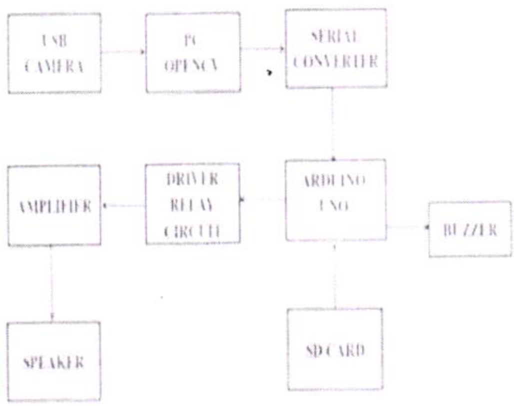


Figure1.Block Diagram of Fire detection system

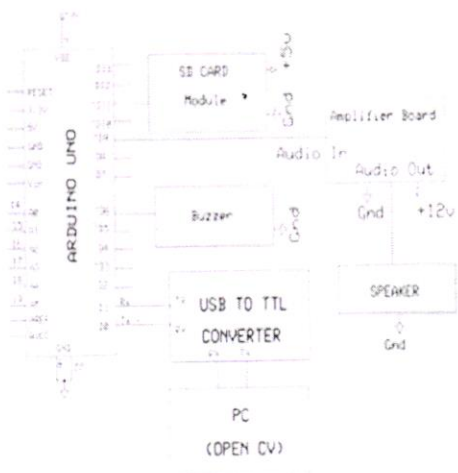


Figure2. Circuit diagram of Hard ware circuit

CONVOLUTIONAL NEURAL NETWORKS:

Constitutional Nèural Network (Convent/CNN) is a deep learning method that could soak up the input image, assign importance (learned weights and biases) to numerous items/objects inside the image and may distinguish them from every different. The prepossessing required in Convent is reduced as compared to specialized algorithms. While inside the base approach the filters are manual, with enough schooling CNN has the potential to evaluate the filter/property. Picture 3. Show pics on CNN. The community layers are made from a couple of 3-dimensional aircraft. Each 3-D plane includes several neurons that make CNN's appropriate for resolving picture records. The enter approach into the CNN ought to consist of the photograph facts and its mileage illustration with the aid value of the 3-dimensional matrix. A part of the picture is attached to a Convoy layer referred to as function extractor layer to carry out the convolution operation and calculate the point objects between the receiver and the real output. The pooling layer is used to reduce the spatial quantity of the input photo after convolution and it is utilized by the convolution layer. It has a grievance - Filter (F) and Stride (S). The overall machine includes weights, biases and neurons. It connects neurons in one layer to neurons in all layers. It is used to categories the photo of the group thoroughly via the take a look at. Soft max or Logistic layer is a closed layer of CNN. This is on the shutdown of the FC layer. Logistics is used for binary instructions

ISSN: 2366-1313

and the small maximum is for a couple of classes.

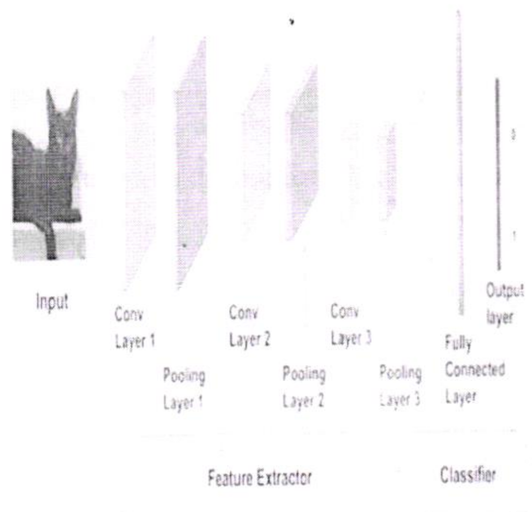


Fig3.StructureofCNN

IV SYSTEM ARCHITECTURE SYSTEM IMPLEMENTATION AND TESTING

In a convolution operation, numerous kernels of various sizes are finished at the input records to create a map. This potential map is entered inside the next operation called sub sampling or pooling wherein maximum operations are taken into consideration by way of them in a small area. This characteristic is vital to lessen the period of the symbol vectors and to achieve a uniform translation for a few topics. Another crucial layer of the CNN pipeline is the overall procedure, wherein excessive-level abstractions are modeled from the input records. Among those three primary features, the coordination and absolute layers incorporate neurons whose weights are found out and altered to higher represent the information captured at some stage in the layers. Popular training.

The tool architecture consists of hardware and software. Hardware accessories consist of Chimney Detection Tool, so you can set up software program add-nos. In order to growth the charge of

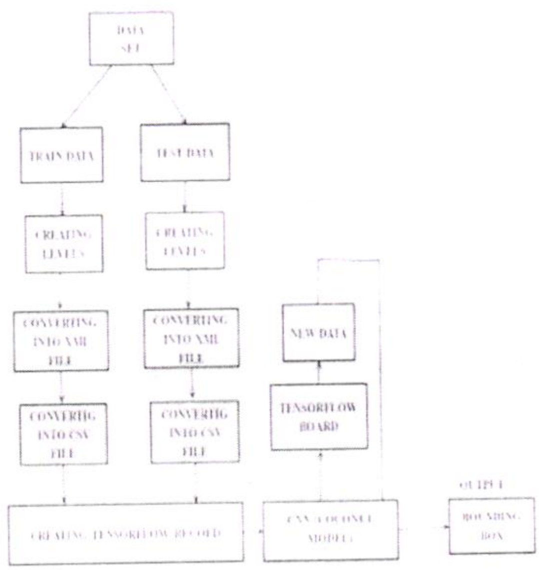


Figure4: Flow diagram for fire detection software

The item detector is created to train a sturdy classifier. We need an entire lot of pics which should differ masses from each other. So they have to have wonderful backgrounds, random object, and ranging lighting conditions. The one in all a kind samples fireplace training are as shown in determine 1.

Principal
Samskruti College of Engg. & Technology
Kondapur (V), Ghatkesar (M), Medchal Dist.

ISSN: 2366-1313

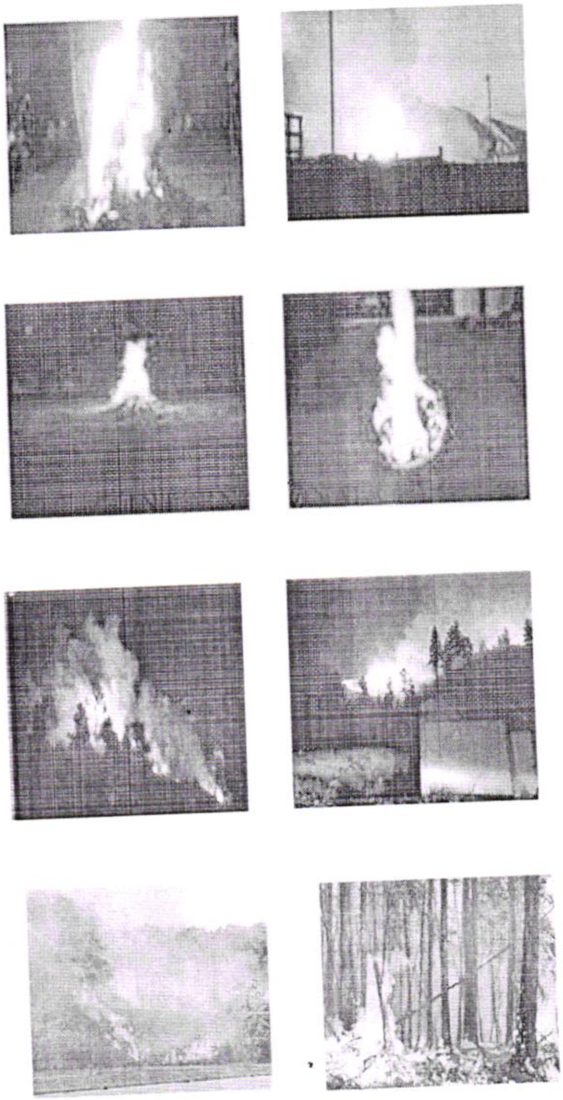


Figure5: Sample images for classes.

In order to test our newly created object detector, we can usage the code which we already creaked.

V RESULTS AND DISCUSSIONS

The motive of these drawings is to present a technique that can be easily applied to a drawing device if one in the long run desires to gather the complete range. Therefore, it ought to now not be used as a take a look at case consisting of photos of teens advocates throughout worldwide emergencies with foreground photographs generally received with virtual digicam connections to low-level gadgets which includes I 'Arduino Uno, a micro controller board. Like every AT mega328P. The video classifier completes all assessments carried out at the classifier module. To prevent fake alarms from being triggered, a threshold for the organization self belief stage is about. Therefore, alarm is easiest when the feel of self is extra than or same to the threshold. The cause is to stumble upon a focus of the video flow with very excessive exposure and the goal of a warning as quick as viable. To improve class speed, Tensor Flow's "optimize_for_inference" script was used to do away with any non-inference in the model. The script additionally performs numerous optimization strategies along with normalizing the feature right into a weighted convolution which allows enhance the model.

Principal
Samskruti College of Engg. & Technology
Kondapur (V), Ghatkesar (M), Medchal Dist.

ISSN: 2366-1313

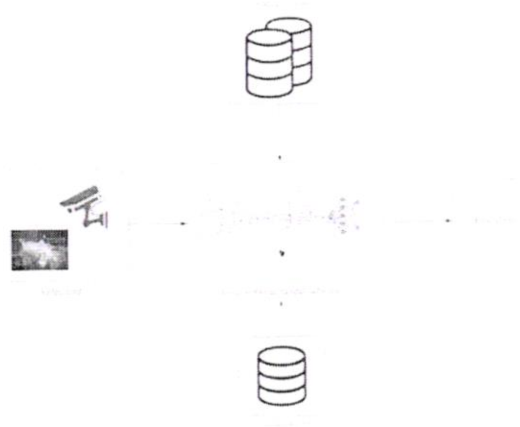


Figure6: Video processing unit on a dedicated server.

VI CONCLUSION

In the work of art, we put together a Convolution neural community from scratch and learn in a very large data set. The essential aim of the diagram is to enlarge the useful community (IoT) strength meter that may update the modern-day bodily meter as a real electricity supply and also can reduce the problems related to false and past due instances. With such chimney detectors. The neural network can be without difficulty run on low-stop hardware together with Arduino U no, a micro controller board primarily based on ATmega328P at a charge of 24 frames in keeping with 2d. The identical performance is obtained by using a pattern of famous fireplace records and check records created by using ourselves (including real fires and out-of-fires lit with thrilling photos similar to the pix captured with the useful assets of a virtual digicam connected to Arduino) as a depend of truth. In addition, the IoT capability allows the inspection center to provide clients with actual-time feedback and fire alerts in case of emergency.

REFERENCES

1. World fire statistics CTIF—international association of fire services for safer citizens through skilled fire-fighters, 2019, https://www.ctif.org/world-fire-statistics.

2. Fire outbreaks cost Ghana over GHC1 million in 2012 general news 20 https://www.ghanaweb.com/GhanaHomePage/ News Archive/Fire-outbreaks-cost-Ghana-over-GHC1- million-in2012-253460

3. J.Chen, D.C.Hovde, K.A.Peterson, and A. W. Marshall, "Fire detection using smoke and gas sensors," Fire Safety Journal, vol. 42, no. 8, pp. 507– 515, 2007.

4. Z. Tang, W. Shuai, and L. Jun, "Remote alarm monitor system based on GSM and ARM," Procedia Engineering, vol. 15, pp. 65–69, 2011.

5. R. C. Luo and K. L. Su, "Autonomous fire- detection system using adaptive sensory fusion for intelligent security robot," IEEE/ASME Transaction son Mechatronics, vol. 12, no. 3, pp. 274–281, 2007.

6. K. L. Su, "Automatic fire detection system using adaptive fusion algorithm

ISSN: 2366-1313

for fire fighting robot," in Proceedings of the 2006 IEEE International Conference on Systems, Man and Cybernetics, pp. 966–971, Taipei, Taiwan, October 2006.

7. Chen, T.H.; Wu, P.H.; Chiou, Y.C. An early fire- detection method based on image processing. In Proceedings of the International Conference on Image Processing (ICIP), Singapore, 24–27October2004;
Pp.1707–1710.

8. Prasadu Peddi, and Dr. Akash Saxena. "studying data mining tools and techniques for predicting student performance" International Journal Of Advance Research And Innovative Ideas In Education Volume 2 Issue 2 2016 Page 1959-1967

Principal
Samskruti College of Engg. & Technology
Kondapur (V), Ghatkesar (M), Medchal Dist.

ZKG INTERNATIONAL
ISSN: 2366-1313

AUTOMATED RESUME SCREENING USING NATURAL LANGUAGE PROCESSING

[1]Mrs.A.Rajini Devi, [2] Polasa Ganesh, [3]Anthannagari Ramya, [4] Mamidi Ganesh, [5]Chellapuram Nikhil

[1] Assistant Professor, Dept. Of CSE, Samskruti College of Engineering & Technology, TS.

[2,3,4,5]B. Tech Student, Dept. Of CSE, Samskruti College of Engineering & Technology, TS.

Abstract: *The most reliable candidates for the job should be in the careful attention to the job posting, completed during the evaluation of the CV that uses NLP in recruiting. Resume analytic is now more time efficient than manual analytic because of trends in deep learning and natural language processing (NLP). In this article, we look at some of the current computerized resume analysis methods. In order to increase the accuracy and efficiency of the analysis process, this method uses the spread of the method created by the deep method of deep learning, changing learning, genetic algorithms, and multiple recording environments. In addition, some studies investigate the use of descriptive methods to improve the validity of the analysis. The experimental results of this research show that the proposed strategy is more effective than traditional methods. The results of this study can help human resources workers and recruiters to adjust the recruitment process to accurately and fairly identify potential candidates.*

I INTRODUCTION

An important step in the hiring process is resume evaluation, which includes analyzing activities to find the best candidate for a job. This process is time-consuming and prone to human error, which can lead to a lack of qualified personnel. Automated resume scanning has recently gained popularity as a method to solve this problem. Automated resume scanning uses a variety of techniques to improve accuracy and efficiency, including deep learning algorithms, machine learning, and natural language processing (NLP).

Many studies have shown many ideas for automating resume screening. Lee et al. (2020) added a deep learning framework that uses short-term memory networks (LSTM) and constitutional neural networks (CNN) [6].

Principal
Samskruti College of Engg. & Technology
Kondapur (V), Ghatkesar (M), Medchal Dist.

ISSN: 2366-1313

Project scope:

The main objective of the CV analysis using NLP methods such as S-BERT [9] and cosine similarity is to develop automated methods capable of efficiently removing and scoring jobs based on their overall similarity with the job description. CV resources are listed and then taken into account. With the CV parser package, important statistics from the CV are extracted.

Objective

The main goal of using NLP algorithms for CV analysis, along with Cosine Similarity and S-BERT, is to ensure that more qualified people make the decisions and pay more attention, even to the use of superficial processes. The particular dream of the recruitment process is to become more powerful through the work of the assessment process. Providing the best way to reduce the risk of bias in training analysis by using modern NLP algorithms such as cosine similarity and S-BERT to improve re-evaluation, fact-checking. Blow up numerous resumes while saving time and money by eliminating the need for human analysis. To improve the candidate experience, there is a faster and more powerful analysis. Improve the quality of employment.

II LITERATURE SURVEY

In 2021, Nandhini S, Gomathi S and Lavanya S published "Research on the Application of Questionnaire" in the International Journal of Advanced Research in Computer Science and Software Engineering. This study introduces a resume analysis program that extracts information from resumes using NLP techniques and aligns them according to their suitability for the job description.

"Resume Crimatization Using Natural Language Processing and Machine Learning" was published by Kondapalli Sai Pranay in the International Journal of Current Technology and Engineering in 2020. The process described in this article uses NLP and machine learning to display the text back on the screen. and convert them to job descriptions.

In 2019, "Exploratory Research on Technology-Based Learning and Effectiveness" of Shweta Agrawal and Sumit Gupta was published in the International Journal of Innovative Technology and Exploratory Engineering. This study describes the use of cognitive and NLP tools to evaluate CVs and rate them according to their suitability for the job description.

Principal
Sanskruti College of Engg. & Technology
Kondapur (V), Ghatkesar (M), Medchal Dist.

ISSN: 2366-1313

The article "Research on Mobile Computing" by Aditi Kaushik and Shruti Jain was published in the International Journal of Computer Science and Mobile Computing in 2018.

Pradeep Kumar Mishra and Sanjay Kumar published "Resume Parsing and Analysis Using Natural Language Processing" in the International Journal of Innovative Research in Computing and Communication Engineering in 2017. resume using NLP techniques to extract true information, including intelligence and take advantage of them.

"Automatic CV filtering using machine learning," by Anindya Sarkar and Debajyoti Mukhopadhyay, was published in the International Journal of Engineering and Technology in 2016. The algorithm outlined in the paper examines CVs for using machine learning techniques and classify them according to their success. of the care with which they wrote the descriptive works.

III OVERVIEW OF THE SYSTEM

The system

Resume review technology tools use a coaching process in which recruiters or HR managers compare resumes based on their qualifications, interests, etc. Among the dominant methods are:

Taleo: This system is a cloud-based recruitment system that evaluates resumes and selects the right candidates for the given process using AI-based algorithms. Using herbs as language and learning, it compares text and the process of description primarily based on similarity [10].

Jobscan: is an online resume scanner that uses Applicant Analysis System (ATS) generation to evaluate resumes based on specific descriptions [5]. It examines the content, intelligence, and other relevant information to determine whether it works or not and repeats similar work.

Now automatically reviews the job model for relevance to the job description using NLP delivery, which includes location analysis, search semantics, and insights. The accuracy of these algorithms, however, requires success, especially when it comes to identifying the best candidates for the job.

Disadvantages of the existing system

Inadequate customization: Many resume reviews now rely on predefined methods or methods that may not be optimal for a particular process or company. Since the

Principal
Samskruti College of Engg. & Technology
Kondapur (V), Ghatkesar (M), Medchal Dist

ISSN: 2366-1313

percentage of positive and negative results is low, qualified candidates can be bypassed by selecting a larger number of unqualified candidates.

Focus a little: Some background checks are better at remembering a few points, which include keywords or previous years, leaving important information about the candidate's abilities or accomplishments.

Language discrimination: Lack of diversity among applicants is due to back-testing material that may be closely related to certain languages, key phrases, or cultures [2].

Poor analysis accuracy: The accuracy of NLP algorithms used to analyze the returned data may be affected by the use of configuration or consistency issues, which may result in data deletion.

Lack of content: The current resume screening process may not be based on a candidate's educational content, artistic interests, or abilities, leading to testing errors.

Proposed system

The tracing tool can extract useful features from the description function, reset them, and map them to length vectors. using S-BERT and cosine similarity [4]. Cosine similarity and S-BERT similarity scores will be used to determine how similar the application performance is to the described process. The approach under investigation is to improve screening accuracy, reduce bias and ensure that the most convenient recipients are selected to achieve the best possible outcome, e.g.

Advantages of the proposed system

Improved accuracy: NLP algorithms, including SBERT and cosine, are equally effective at identifying relevant resumes for job descriptions. These algorithms are designed to understand the context of text and determine the meaning of words.

A big step forward: NLP algorithms can evaluate hundreds or thousands of resumes in minutes, making them a bit faster than manual analysis. Job seekers will thus save a lot of money and time [3].

NLP algorithms, including SBERT and cosine similarity, can be customized for specific workplaces, jobs, or employers to perform better background checks.

More precise matches: S-BERT and cosine similarity algorithms are designed for healthy candidates with descriptive criteria based on the relevance and similarity of their abilities, willingness and value.

Linguistic Autonomy: Hiring managers will find that evaluating the resumes of

Principal
Samskruti College of Engg. & Technology
Kondapur (V), Ghatkesar (M), Medchal Dist.

ISSN: 2366-1313

candidates with a background in only one language is not easy thanks to the ability of NLP algorithms to translate rewritten words in different languages.

Processing unstructured data: NLP algorithm.

IV ARCHITECTURE

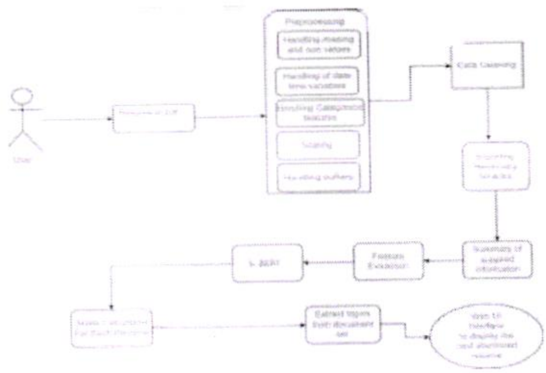


Fig 1: Architecture of Automatic Review of Resumes

As shown in Figure 1. The automatic CV analysis method can be defined in the framework. Five steps lead to the entire CV evaluation process. We will now take a look at each step of the automatic resume review.

Five steps to automated resume review:

1. Collecting Information: There are many websites, including job boards, professional websites, and company websites, that can be used to collect resumes. Also, write a job description or requirements for the main job.

2. Preparation: In the first stage, remove all empty sentences, punctuation marks and unnecessary information from CVs and process descriptions. Lemmatization, radicalization and tokenization are used at this stage to provide content tokens.

3. Search Features: Create word embedding from prepossessed resumes and job descriptions by extracting key features using NLP techniques like S-BERT. The corresponding semantic and normal meaning of the sentence is displayed in the embedding.

4. Ranking: Determine each job applicant's ranking as a candidate by calculating the cosine similarity score of their resume and job description. If the candidate has a similar cosine score, he will rank higher and perform better for the job.

5. Ineligible applicants: Applicants who do not get similar cosine scores shall be disqualified. Some applicants may have their services canceled or placed on a lower list for book review.

V RESULTS SCREEN SHOTS

Main page:

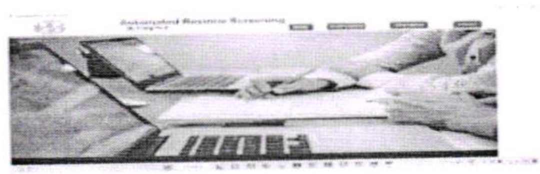


Fig 2: Main Page

The above image shows the main page of the Automated Resume Screening using

ISSN: 2366-1313

NLP.

Resume Screening:

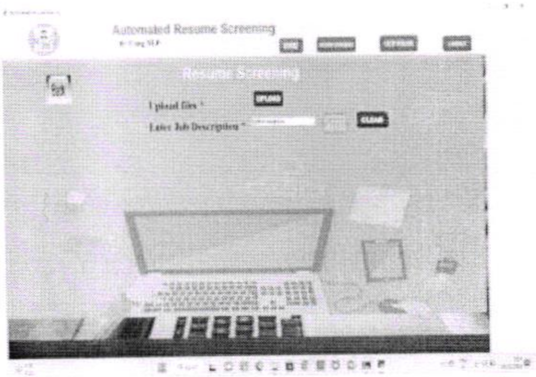


Fig 3: Resume Screening

The above image shows the Resume Screening page of the Automated Resume Screening using NLP

Resume Upload:

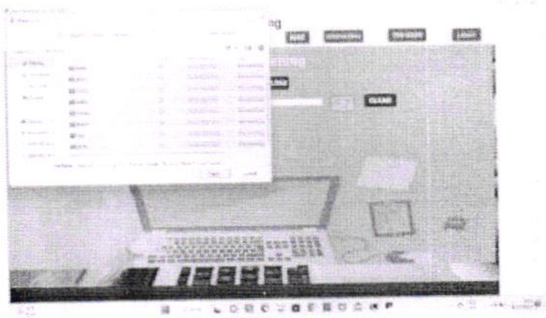


Fig 4: Resume Upload

The above image shows the Resume Upload page of the Automated Resume Screening using NLP.

Resume Shortlist:

Fig 5: Resume Shortlist

The above image shows the Resume Shortlist page of the Automated Resume Screening using NLP.

View Resume:

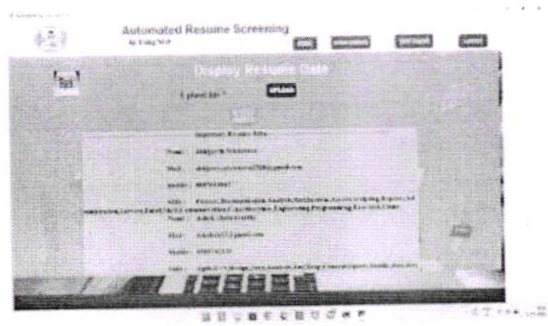


Fig 6: View Resume

The above image shows the View Resume page of the Automated Resume Screening using NLP.

VI CONCLUSION

Marking this end, we will say that using NLP algorithms for regression analysis - such as SBERT and cosine similarity - gives more benefits than other methods. These algorithms are very special, efficient and flexible, and they are able to monitor false information, including texts rewritten in different languages. They can also

Principal
Samskruti College of Engg. & Technology
Kondapur (V), Ghatkesar (M), Medchal Dist.

ISSN: 2366-1313

reduce discrimination of people and improve candidates, improve recruitment strategies. It is important to remember that algorithms have limitations and are not the best choice in all situations [11]. It is therefore important to use these algorithms as part of a broader recruitment process that also includes human decision-making and decision-making models. The use of NLP algorithms in recruiting, such as SBERT and cosine similarity, is a promising development that has the potential to improve the organization's candidate tracking and selection process.

REFERENCES

1. Singh, A. K., & Shukla, P. (2020). "Automated resume screening and evaluation using machine learning techniques". Journal of Intelligent & Fuzzy Systems, 39(4), 5947-5960.

2. Oh, J., & Lee, S. (2019). "A study on the extraction of competencies from job postings and their correlation with resumes using natural language processing". Expert Systems with Applications, 115, 475-486.

3. Xu, C., Lu, J., Liu, J., & Wei, X. (2021). "Resume screening using deep learning and natural language processing". Knowledge-Based Systems, 215, 106864.

4. Bhowmik, R., Garg, N., & Gupta, A. (2021). "Resume Screening Using Semantic Similarity and Clustering Algorithms". In Proceedings of the 2021 3rd International Conference on Communication, Devices and Computing.

5. Elakkiya, R., & Muthurajkumar, S. (2021). "Automated Resume Screening System using Semantic Similarity". In 2021 International Conference on Computing, Electronics & Communications Engineering (ICCECE).

6. Garg, N., Bhowmik, R., & Gupta, A. (2021). "Automated Resume Screening Using Semantic Similarity Based Sentence Embedding". In 2021 International Conference on Smart Electronics and Communication (ICOSEC).

7. Huang, S., Li, W., Wang, L., & Huang, H. (2021). "Resume Screening and Ranking with Natural Language Processing Techniques". Applied Sciences, 11(5), 2095.

8. Kang, Y., & Lee, J. (2020). "Resume Analysis for Job Matchmaking Using Word Embedding and Ranking Algorithm". In Proceedings of the 2020 International Conference on Artificial Intelligence in Information and Communication.

Principal
Samskruti College of Engg. & Technology
Kondapur (V), Ghatkesar (M), Medchal Dist.

ISSN: 2366-1313

9. Li, X., & Shen, X. (2021). "Resume Ranking and Classification Based on SBERT". In 2021 International Conference on Computer, Information and Telecommunication Systems (CITS).

10. Liu, J., Zhang, R., Yang, W., & Guan, R. (2021). "A Semantic Similarity-Based Resume Screening System". Journal of Intelligent & Fuzzy Systems, 40(1), 787-797.

11. Ma, Z., Wang, Y., & Zhao, Y. (2021). "Automated Resume Screening with Semantic Similarity and Gradient Boosting". In Proceedings of the 2021 3rd International Conference on Cybernetics, Robotics and Control.

12. Prasadu Peddi, and Dr. Akash Saxena. "studying data mining tools and techniques for predicting student performance" International Journal Of Advance Research And Innovative Ideas In Education Volume 2 Issue 2 2016 Page 1959-1967

13. Mandviwalla, M., & Kappelman, L. A. (2021). "Automated Resume Screening Using Semantic Similarity and Machine Learning". Journal of Information Systems Education, 32(1).

Principal
Samskruti College of Engg. & Technology
Kondapur (V), Ghatkesar (M), Medchal Dist.

ZKG INTERNATIONAL
ISSN: 2366-1313

Efficient Water Quality Prediction Using Supervised Machine Learning

[1] Mrs.A.Rajini Devi, [2]Medisetti Devi, [3]Bikshala Thanuja, [4]Mekala Rohit, [5]Gaddam Vamshi

[1] Assistant Professor, Dept. Of CSE, Samskruti College of Engineering & Technology, TS.

[2,3,4,5]B. Tech Student, Dept. Of CSE, Samskruti College of Engineering & Technology, TS.

Abstract: *The predominant goal of this project is to use technology to understand the satisfactory of water. Portability is broadly used to measure the satisfactory of a body of water. Water under the preliminary cost become not used to measure the overall water pleasant of the consumption on this view. PH, hardness, solids, chlorinates, sulfate, conductivity, natural carbon, trigonometrical and turbidity aren't. To create the excellent water first-rate, these parameters are used as vector vectors. To estimate the fine of lavatories, the item uses types of algorithms: decision tree (DT) and K-Nearest Neighbor (KNN). These checks were performed the usage of actual information from uncommon places in Andhra Pradesh, further to blended records which are not conventional. Based at the results of the two unique classifications, it's far established that KNN merchandise perform higher than other classifications. The tool has hence acquired knowledge and predictive potential. Portability, water best, information mining and distribution are all analyzed.*

KEY WORDS- Machine Learning, Supervised Learning, K-Nearest Neighbour (KNN), Decision Tree, Hyper Parameter Tuning, Python Programming.

I. INTRODUCTION

Measuring water nice is a complex assignment because of many elements. This concept is inextricably related with many water applications. Different dreams require certain styles. There are many studies being performed on water delusion predictions. Water great is regularly determined through the bodily and chemical procedures carefully linked to water use planning. Acceptance and rejection values should be adjusted for every variable. Water that meets the design criteria for a particular use is considered suitable for that use. If the water does no longer meet those

Principal
Samskruti College of Engg. & Technolo
Kondapur (V), Ghatkesar (M), Medchal Dis

ISSN: 2366-1313

requirements, it ought to be handled earlier than use. Water high-quality can be measured using some of bodily and chemical parameters. Therefore, an unbiased reading of the traits of every variable isn't always usually possible in practice to as it should be describe water in one location or time.

A greater tough method is to combine the effects of various physical and chemical approaches into one price. The best (commonly linear) load characteristic represents the stability of the variables and its first-class level is included within the index of every variable. These competencies are primarily based on the direct measurement of the renovation of a substance or the value of a bodily variable through the investigation of water samples. The major purpose of this look at is to evaluate how device learning algorithms may be used to expect water best.

II LITERATURE REVIEW

A framework for assessing the adequacy of water first-class parameters - Assessment of parameter values and uncertainty in parameter distribution.

Write hyperlinks open overlay panel Hui Ying Pak a, C. Joon Chuah a d 1,

Water best management is the inspiration of water control; however it has the ability to turn out to be a useful application, specially for growing international locations with closed centers. The border. In this assessment, we move a step in addition from the same vintage WQI improvement framework by using introducing WQI Adjusted (WQIADJUSTED) mode to correct lacking values and fill within the final facts for WQI development. Sub-WQIs had been elevated to cope with water first-rate issues. WQI consequences (weighted and unweighted) are obtained using numerous optimization methods, consisting of horizontal difference and gist measurement, versus. In order to establish a foundation for selection-making, the new device has absolutely modified from the previous one to assess the adequacy of the WQI, as a whole, more than today, it does now not rely on the dimensions of the index and the uncertainty related to the distribution of non-results. -huge values of 1. Settings. The amount of observations required to offer a solid WQI is optimized instead of the fine compromise in a human-defined WQI, normally based on probabilistic Monte Carlo simulation. The Johor River Basin (JRB), Malaysia, is used as a case observe for the software on this new framework. JRB is an important hub for Johor, one in all Malaysia's maximum populous states, and for Singapore, United

ISSN: 2366-1313

States, south of Johor. WQIMLR is usually better at describing huge watersheds than WQIPCA for heavy, low-pleasant watersheds. Optimization of the document confirmed that approximately one hundred and thirty samples are required if a 2% distinction within the WQI is to be prevented. The outcomes (particular to JRB) further show that the famous coli facts is the most sensitive parameter for missing values, and the distribution of unadjusted parameters is in comparison to **INONU-ADJUSTED and WQIADJUSTED.**

WATER QUALITY INDEX AND NO PARAMETERS.

Garima Srivastava, Pradeep Kumar;

This article gives the dynamic modifications within the calculation of water great index additives. The water fine index gives us a number of parameters that represent the total water high-quality of a place and time, based on the whole wide variety of several parameters. The goal of the index is to convert complicated top class water statistics into comprehensible and usable facts. In this text, a tool might be supplied to calculate the upper water degree of the indicator at some stage in the quantity of court cases not misplaced.

Application of water great for environmental assessment of Dokan Lake, Kurdistan Region, Iraq.

Abdul Hameed M. Jawad Alobaidy1, Haider S.

The water satisfactory index (WQI) turned into determined for Lake Dokan, Kurdistan Province, Iraq, and ten water satisfactory parameters (pH, dissolved oxygen, turbidity, conductivity, hardness, alkalinity and sodium , biochemical necessities for oxygen, nitrate and nitrite). A relative weight is assigned to every index on a scale of one to four primarily based on the significance of the index to marine existence. The results display that the water high-quality of Dokan Lake modified from clean in 1978, 1979, 1980, 1999, 2000 and 2008 to risky in 2009. The results of numerous forms of anthropocentric pollution in different parameters with CE and BOD. . . Some argue that pool upkeep is vital to right control. The use of the WQI is also encouraged as a beneficial device for the general public and provider companies to evaluate the satisfactory of source water in Iraq.

III System Analysis

Predicting water exceptional the usage of tool getting to know includes comparing several parameters which includes pH diploma, dissolved oxygen, turbidity, and concentrations of diverse pollution to assess the general water terrific. Water. Here is a diagram of the prevailing device

ISSN: 2366-1313

and the proposed device for water excellent forecasting using machine mastering:

Existing System:

In the existing water exceptional prediction device the usage of system learning, numerous techniques were used. These techniques typically contain gathering water super statistics from several sources which include sensors, laboratories, or on-line databases. Characteristics including pH, turbidity, dissolved oxygen, temperature and numerous pollutant concentrations are regularly considered for prediction. Machine mastering algorithms which includes regression, choice wooden, random forests, help vector machines, and neural networks are then done to this records to develop predictive models. These models are expert on historical information to have a look at patterns and relationships among water great parameters and environmental factors. Once professional, models may be used to anticipate water pleasant parameters at destiny times or places. However, the accuracy and reliability of those predictions considerably depend on the quality and amount of statistics available for training.

Disadvantages:

Current hobby in hydrometers also depends on quite a few guide statistics and analysis, which may be time-consuming, labor-in depth, and errors-prone. Old strategies may lack accuracy and performance in predicting water high-quality. In addition, these strategies won't be able to procedure big amounts of statistics or capture styles of participation in specific watersheds. In addition, the shortage of real-time monitoring and forecasting talents in existing systems also can save you you from responding in a well timed manner to adverse water conditions, making for the hazard of environmental health. .

Proposed System:

The water gadget idea is ideal for predicting the goal of improving the limits of gift ideas. This can be a combination of advanced learning tools including deep learning, hybrid techniques, or hybrid algorithms combining multiple algorithms. Additionally, efforts can be made to improve collection techniques by using additional sensors in our water bodies, using general equipment, or collecting statistics from IoT gadgets to track time. Additionally, the application engine can focus on developing changes to visualize and update its predictions based on any new data. Overall, the goal of the tool is to provide accurate, reliable and timely water

Principal
Samskruti College of Engg. & Technology
Kondapur (V), Ghatkesar (M), Medchal Dist.

ISSN: 2366-1313

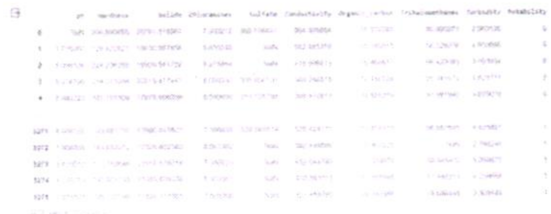
quality forecasts to support decision-making and water quality monitoring by organizations at non-profit.

Advantages:

Equipment for water forecasting, the usage of the know-how of buying, is a good deal better than the contemporary technique. First, the gadget's acquired expertise of the algorithm can procedure the facts, prioritization and evaluation, as a result reducing human effort and error. Through advanced algorithms, the making plans process can enhance the accuracy and reliability of the pleasant water best, therefore creating a better desire in assisting to manipulate and control pollutants. Machine mastering styles can also replace and examine new records, bearing in mind non-stop improvement of performance during the last 12 months. In addition, the noted system can help to monitor the real time and forecast of the precise water satisfactory, making quick intervention and effective safety in opposition to water and public health. Overall, the combination of device mastering strategies with top-stage water forecasting affords a inexperienced, correct and responsive model to control water resources and ensure environmental sustainability.

IV Data set Description

A water consumption data set typically includes various attributes related to water excellent from one-of-a-type property, further to a goal variable indicating whether or no longer the water is potable (comfortable to drink) [16] or not available (relaxed to swallow). Here is an outline of the characteristics normally observed in such datasets:



DATASET SIZE: 3276 ROWS & 10 COLUMNS

PH:

The size of the acidity or alkalinity of the water. PH values underneath 7 recommend acidity, at the equal time as values above 7 suggest alkalinity.

Hardness:

The focus of calcium and magnesium ions in the water, typically measured in milligrams in keeping with litre (mg/L) or elements in keeping with million (ppm).

Solids (Total Dissolved Solids - TDS):

The giant amount of dissolved solids in the water, consisting of salts, minerals, and natural depend variety, measured in mg/L.

Chloramines:

Principal
Samskruti College of Engg. & Technology
Kondapur (V), Ghatkesar (M), Medchal Dist.

ISSN: 2366-1313

The attention of chloramines inside the water, which may be disinfectant chemical substances often implemented in water remedy, measured in mg/L.

Sulphate:

The recognition of sulphate ions within the water, that can have an effect on taste and odour, measured in mg/L.

Conductivity:

The capability of water to behavior electric powered current, it in reality is delivered on with the aid of the presence of dissolved ions. It is generally measured in micro Siemens in step with centimetre (μS/cm) or mill Siemens regular with centimetre (mS/cm).

Organic Carbon:

The hobby of herbal carbon compounds within the water, measured in mg/L.

Trigonometrical (THMs):

The consciousness of trigonometrical compounds in the water, which may be common as via way of-merchandise of water disinfection techniques, measured in μg/L (micro grams regular with litre).

Turbidity:

The diploma of the cloudiness or haziness of the water, because of suspended particles, measured in NTU (Nephelometric Turbidity Units).

Portability:

The aim variable indicating whether or not or not the water is potable (secure for consumption) or non-potable (risky for intake). This variable is normally binary, with values of 1 indicating potable water and zero indicating non-potable water.

Datasets on water portability also can moreover embody extra attributes which include temperature, conductivity, and presence of particular contaminants like arsenic, fluoride, and nitrates, relying on the supply and scope of the facts collection. These attributes are vital for assessing water extremely good and ensuring its safety for human intake.

V Design

INPUT DESIGN

There are specs and development techniques for records schooling and the stairs required to enter transaction records proper right into a form that may be used just so processing may be carried out thru the usage of looking at a pc to test the data from a written or posted record or with the aid of way of getting humans enter records at once into the machine. Input Design took the following into consideration:

what records want to be supplied as enter?

σ� How need to the statistics be organized or coded?

σ� Dialog container to manual operational personnel in contribution.

OBJECTIVES

1. This format is useful to avoid errors in the data get entry to method and to reveal

Samskruti College of Engineering & Technology
Kondapur (V), Ghatkesar (M), Medchal Dist.

ISSN: 2366-1313

the proper route to the control to get the right records in the computerized tool.

2. It is utilized by developing suggests that may be used for data get admission to to deal with a big quantity of statistics. The motive of making entries is to make statistics entry less difficult and mistakes-free.

Three. Once the data is entered, its validity can be checked.

OUTPUT DESIGN

The proper very last consequences ought to be designed inside the path of the implementation of every very last effects object on this form of way that human beings take into account that the machine can be used effortlessly and efficiently. When reading the consequences of format computing, they need to come to be privy to the precise cease end result required to fulfill the necessities.

2. Choose facts presentation strategies.

Three. Create a record, report, or precise format containing tool-generated records.

The output sort of the information system ought to meet one or greater of the following objectives.

➜ Provide statistics on beyond popular overall overall performance, present day reputation or projections of.

➜ coming.

➜ Communicate essential occasions, opportunities, sports or warnings.

➜ Open a case.

➜ Confirm an event.Computing, they need to come to be privy to the proper quit end result required to satisfy the necessities.

2. Choose information presentation methods.

Three. Create a report, document, or first rate layout containing device-generated facts.

The output sort of the facts gadget have to meet one or more of the subsequent targets.

➜ Provide data on beyond everyday typical overall performance, current popularity or projections of.

➜ coming.

➜ Communicate essential events, opportunities, sports or warnings.

➜ Open a case.

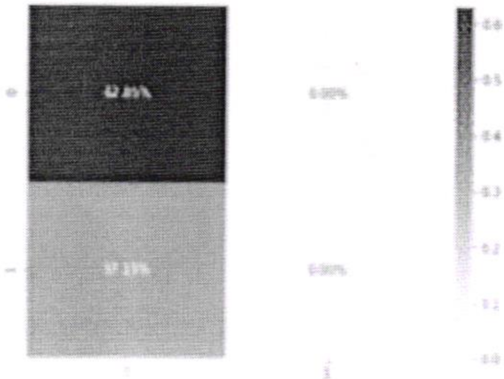
➜ Confirm an event.

VI ACCURACY TECHNIQUES

This can only be determined if the real values of the test facts are acknowledged. The matrix itself may be effortlessly understood, but the terminology associated with it may be confusing.

Principal
Samskruti College of Engg. & Technology
Kondapur (V), Ghatkesar (M), Medchal Dist.

ISSN: 2366-1313



True Positive (TP): The model has expected YES and the real rate also real.

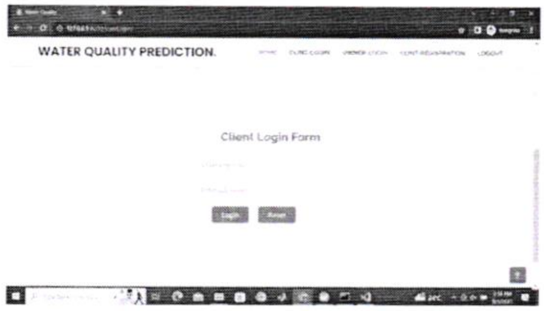
True Negative (TN): The version offers prediction NO the real or actual fee furthermore faux.

False Positive (FP): The version anticipated proper however the real or actual are predicting fake.

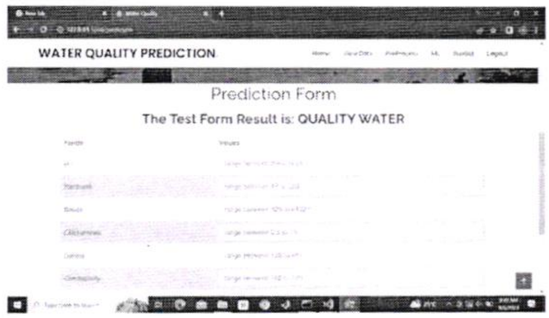
False Negative (FN): The model predicting False and the real or real charge also False.

User list:

User login:



Predication-output:



VII Conclusion

The ability to determine water quality is one of the most important resources for life. Traditionally, the first test of water requires careful observation and time spent testing. It is a real-time analysis tool for first-order water estimation using just a few simple water quality models.

For comparison, the advisor set up the monitoring tool and analysis algorithms were used. He must see the dangerous water before leaving it to collect it and report it to the authorities concerned. It is expected to reduce the number of people drinking unsafe water, thereby reducing the incidence of diseases such as typhoid and diarrhea. In this context, the use of knowledge in value-based management

Principal
Samskruti College of Engg. & Technology
Kondapur (V), Ghatkesar (M), Medchal Dist.

ISSN: 2366-1313

analysis will ensure the ability to guide choices and policy makers in the future.

REFERENCES

1. PCRWR. National Water Quality Monitoring Programme, Fifth Monitoring Report (2005–2006); Pakistan Council of Research in Water Resources Islamabad: Islamabad, Pakistan, 2007. (Accessed on 23 August 2019).

2. Kangabam, R.D.; Bhoominathan, S.D.; Kanagaraj, S.; Govindaraju, M. Development of a water quality index (WQI) for the Loktak Lake in India. Appl. Water Sci. 2017, 7, 2907–2918. [Cross Ref]

3. Thukral, A.; Bhardwaj, R.; Kaur, R. Water quality indices. Sat 2005, 1, 99.

4. Srivastava, G.; Kumar, P. Water quality index with missing parameters. Int. J. Res. Eng. Technol. 2013, 2, 609–614.

5. The Environmental and Protection Agency, "Parameters of water quality," Environ. Prot., p. 133, 2001.

6. Prasadu Peddi, and Dr. Akash Saxena. "studying data mining tools and techniques for predicting student performance" International Journal Of Advance Research And Innovative Ideas In Education Volume 2 Issue 2 2016 Page 1959-1967

Principal
Samskruti College of Engg. & Technology
Kondapur (V), Ghatkesar (M), Medchal Dist.

ISSN: 2366-1313

INSPECTING SOLAR PANELS THROUGH COMPUTER VISION AND DRONE TECHNOLOGY

[1]Mr. S. Vamshi Krushna, [2] Siripuram Keerthana,[3]Shaik Akheel,[4] Nomula Mani Charan, [5]Alimineti Madhu

[1] Assistant Professor, Dept. Of CSE, Samskruti College of Engineering & Technology, TS.

[2,3,4,5]B. Tech Student, Dept. Of CSE, Samskruti College of Engineering & Technology, TS.

Abstract: *This research provides a unique method for tracking large-scale grid-connected photovoltaic modules in solar power plants using the superior YOLO v5 state-of-the-art tracking algorithm and classic artistic ideas. We talked about the need for a fully automatic drone that flies over the sun while gaming and taking video. Next, We YOLOv5 who learned to cross clean and dirty signs can be seen here. The features are described for the selected website and will be implemented using Raspberry Pi. This system takes snapshots using drones, creates documents and sends them daily to the relevant department via email in order to avoid timely actions and safety of solar panels. The undertaking is simple, but it is different due to the use of threshold reduction technologies for the analysis of large solar power plants. The examination time for the same period increases to approximately one hundred and twenty hours, reduced to five minutes of which 99. Ninety-three percent of the time is saved by the vision and the powerful automation process.*

Keywords—Solar panels, Yolo V5, Computer Vision, Internet of Things, Raspberry Pi, Inspection, Monitoring, contours.

I INTRODUCTION

Pakistan, with a latitude of 24 ° to 27 ° N and a longitude of 61 ° to seventy-six ° E, in the Sun Belt. This means that the United States has a long period of sunshine during the year. In other words, America has a great ability to use the energy of the sun for practical purposes. More precisely, the u. S. A crisis of energy. can be overcome with the help of free solar energy products, especially in rural villages [1]. A recent estimate shows that there are 40,000 villages in Pakistan that do not need electricity.

ISSN: 2366-1313

According to the Alternative Energy Development Board (AEDB), ninety-five percent of the US population. S. the place receives the necessary sunlight. At sea level we have solar radiation of around 900 to 1000 w/m². Studies in collaboration with USAID related to solar panels prove that u. S.A. It has a capacity of two, nine million megawatts (MW) of electricity. More importantly, solar energy is widely recognized as a clean source of electricity generation worldwide.

Currently, Pakistan's electricity generation relies on a large number of power plants based on fossil fuels. These fossil fuel-based solutions are harmful to the environment and represent a huge burden on the US economy. Therefore, the trend of renewable energy is increasing in Pakistan. The fastest way to overcome the shortage of electricity protection is considered to be solar power generation [2]. In particular, solar energy is growing because it is easy,

more than sunlight and can be used from a distance. [2] Similarly, Pakistan has expanded the adoption of solar energy technology. From households to commercial establishments, people are installing photovoltaic (PV) panels on their roofs or vacant lots. Then, this reputation boosts the business of solar service providers and neighboring companies. This will benefit the United States and the people going there.

The first 178.08 kW on-grid solar project was commissioned by the Planning Commission and Engineering Council of Pakistan in 2010. A 2 MW machine was installed at the National Assembly of Pakistan Pakistan to generate electricity and add to the grid target [3] . The Pakistani parliament was the first forum in the industry to move to photovoltaic cells [4]. In 2015-16, a 1000 MW project came into operation, called Quad-e-Azam Solar Park in Bahawalpur [5]. Figure 1 below presents the concept of Quad-e-Azam solar park with a capacity of one thousand MW of energy. In order to promote the efficiency of solar technology, the government has issued a memorandum of understanding (LoS) and letter of intent (LoI) to several independent power producers (IPPs) and group [6].

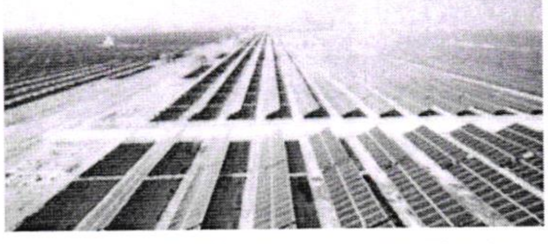


Fig. 1. Quaid-e-Azam Solar Park at Bahawalpur 1000 MW capacity

The growing demand for photovoltaic power plants adds to the need for their protection and monitoring. Photovoltaic

ISSN: 2366-1313

panels require good maintenance and cleaning to save your work worldwide. Dust damage affects panel performance [7]. Gaofa He, Chuande Zhou et al. [8] found that a dust layer of 4 g/square meter reduced efficiency by 40%. For small places it is easy to display and a simple situation is not easy, but it is far from the busy process for large areas. Although studies have been developed on waterless cleaning techniques [9], the main topic of this paper is the analysis of the photovoltaic panel site of the pharmaceutical industry in Karachi. This is done using aerial imagery from the drone era. The work is delivered in two contexts. In the first part of the work, clean panels are recognized and included using computer vision algorithms. The Raspberry Pi microcomputer is used

on site for emerging photographs taken from aerial images captured by drone. Second, the Internet of Things (IoT): the entire pipeline is created. It uses pandas and a simple mail transfer protocol that mechanically creates information from the output of our idea and prescient software and the email sent to the partner organization.

The format of this newsletter is as follows. In Part II, information related to methods used for solar module inspection is summarized. Section III shows the overall implementation of the mega solar device analysis method using YOLOv5 code. Section IV describes the simulation related to the proposed method. In the closing section, the conclusion of the product and future directions are drawn.

II Literature Review

In most cases, book review is enough to monitor small websites. However, large companies with mega-initiatives hire third party services to provide external services, including defect detection, maintenance, and inspection. Screening tests are necessary to ensure the full performance of renewable energy. Many researchers have suggested different methods for analyzing solar panels. In one paper, malfunctions in photovoltaic cells are detected by analyzing the energy production. Survey statistics are constantly reviewed to identify potential inefficiencies. The majority of outliers usually indicate defects and are attributed to a panel [9]. The method is increasingly used. However, at the same time, this is very difficult, weak and inconvenient for large websites. Some researchers also use string

Principal
Samskruti College of Engg. & Technology
Kondapur (V), Ghatkesar (M), Medchal Dist.

ISSN: 2366-1313

measuring gadgets to detect errors and lower performance [10]. This method is also related to the processing and analysis of data.

Hicham Tribak and Omar El Kadmiri et al. [12] propose a method that, first, a robot captures the image of the photovoltaic panel collected with a high definition (HD) camera. Then, they use the trellis method as constitutional coding, and the coding is accelerated with the spreading process. DCT discrete cosine reshaping is used for image watermarking. The pictures were made to look bright. All these steps are involved in photo stitching. The goal of the next level is to extract the points of interest from each captured image using the SURF algorithm. The final level is used to control the actual match points using RANSAC and homograph. Their systems also use Raspberry Pi microcomputers to implement devices.

Infrared tomography is an unnecessary time and space research activity [11][12]. Electric heating of various PV levels; then the thermal infrared camera can capture the following electromagnetic spectrum. Broken and damaged cells can be seen without problems using this method [13]. Different problems can be seen between thermal imaging and optical cameras. Since thermal weapons are transportable, third party service providers often perform this process manually with the help of their efforts. Workers go to each panel, in my opinion, with a hot gun in hand to monitor, and slowly cover the entire site. In the following stages, unmanned aerial vehicles (UAVs) are used with the same method as a thermal gun or an infrared thermal digital camera [14]. At the same time the work was included in the drone time so that all the heat measurements were released from the intervention guide. Now the error can be detected by the pressure and the temperature.

The technology of each photovoltaic cell can be analyzed to identify the problem. Due to the development of infrared thermal digital cameras and advances in drones, this method is attracting the attention of engineers and scientists. Drones provide a suitable solution for quickly inspecting photovoltaic products.

Álvaro Huerta Herraiz et.Al[17] used a deep learning technique based on R-CNN to determine the solar panel and the temperature location, using data that contains real-time images of solar power plant. If the R-CNN detects a hotspot area, then the data is connected using IR-UAV models that contain information such as height, direction, GPS 3 function, camera image angles and emotions and personality

ISSN: 2366-1313

are mixed with visual objects to create the final result. . The results help to find the fault in the power station.

The concept of IoT for panel analysis is discussed by HSNalamwar et al. [15]. In the studies provided, the authors use data acquisition modules, sensors and block data to take into account the received electrical parameters. A custom Io T-integrated software platform is provided for energy efficiency monitoring. With the help of the reporting framework, the difference between the power generation and the signals. Likewise, some researchers work on small solar facilities available

III METHODOLOGY

The presented method of PV analysis was adopted and used by a large pharmaceutical organization in Karachi. After that, the designs solved the reduction of the solar power plant with minimum additives to guarantee a good price. The brand has the most important items. Observation of solar cells from a height (about 2 hundred

250 feet) after using conventional computer thinking and prescient algorithms for contour tracing and classification.

A. Object detection using YOLO v5 algorithm

YOLOv5 has tools for creating feature pyramids. Model widespread product scaling using activities. This allows the gadget to fall on balanced objects in images taken at a specific height. The information obtained from the flight of the drone when creating a business website. We manually categorized all batches of solar cells using the open source labeling platform Robo flow. The set of panels consists of a set of four to eight panels connected to each other on the roof. The use of YOLOv5 is intended for panel search.

The detected objects are then seeded for similar computer vision models.

The first part of our functional diagram shown in Figure 2 concerns the operation of the machine. The drone will fly from per-works to our entire project site. All drone routes are per-programmed to avoid any misdirection or external interference. The idea is to fly over the building and capture the image from above. If the body is successfully captured, it will be sent to Raspberry Pi microcomputers via IoT. The image processing algorithms and our Tkinter software running on the Pi will analyze the captured image and add it to the Excel file using the pandas library.

ISSN: 2366-1313

Overall success is calculated with equal and dirty separation. After all the round, the daily data is sent to the participating organizations via the open Wi-Fi facility provided at the venue by the association. Likewise, it is not necessary to send Raspberry Pi microcomputers to drones. Raspberry Pi operates 24/7 on-site with Wi-Fi for data recognition, reflection, efficiency, and truth-telling.

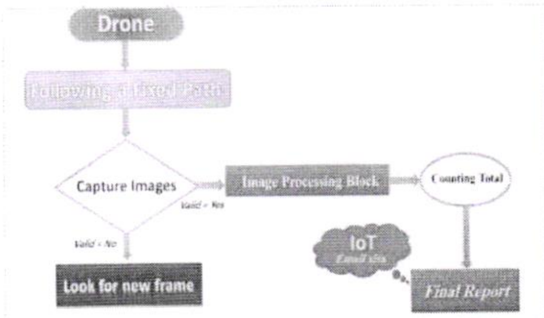


Fig. 2. Block Diagram of the automated process of Panels Inspection

Raspberry Pi microcomputer regularly works in headless mode for data processing. All the images captured by the drones are sent to the microcomputer immediately. It plays all the search rules and generates results. The data is transferred in automatic mode to the Raspberry Pi.

Now the point of interest is our image as a block in the image. The image processing block combines various photo processing techniques to calculate the numbers and check the smoothness of the panel.

The entire photography process is described in Figure 3. The step by step process by which we fulfill the requirement is explained.

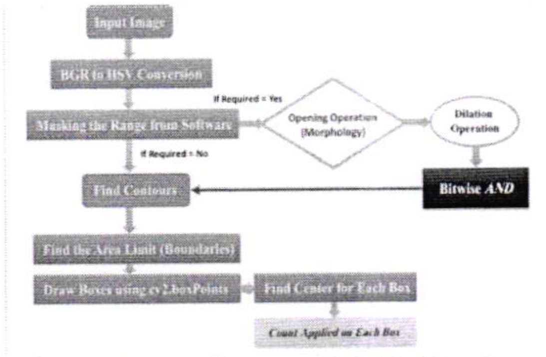


Fig. 3. Explanation of Image Processing Block of Panels Inspection

IV RESULTS AND DISCUSSIONS

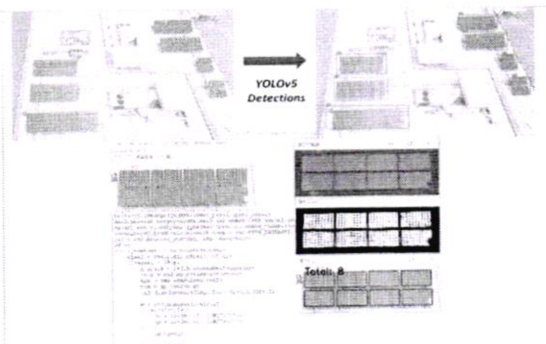


Fig.4. YOLOv5 Object Detection and Cropping with Traditional Image Processing Algorithms

vision algorithms defined in the methodology. The time can of processing and image capturing can be evaluated for mega project sites.

The complete process with complete calculation is shown in the image.

The block diagram specified in the procedure is applicable for real results using Python programming and Open CV library.

Principal
Samskruti College of Engg. & Technology
Kondapur (V), Ghatkesar (M), Medchal Dist

ISSN: 2366-1313

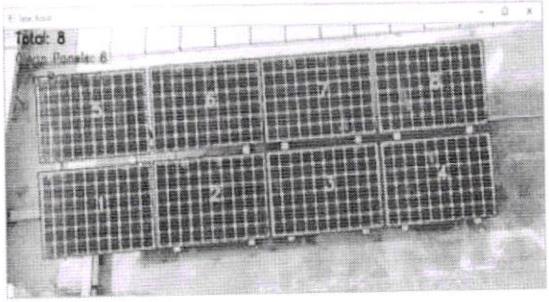


Fig. 5. Aerial Image one after Processing from Raspberry Pi

The second image is captured from a high altitude and is ideal for real-time applications.

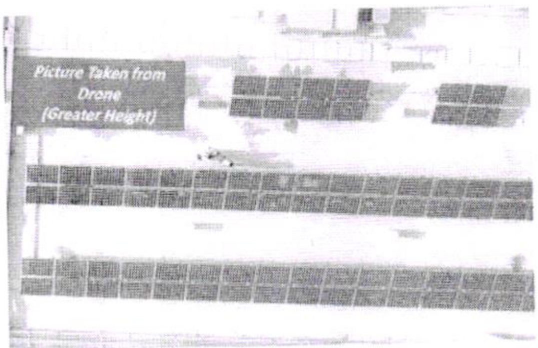


Fig. 6. Aerial Image Two captured from the drone

The processed output is also shown in Fig. 7. All the contours are formed successfully with the count on each solar panel.

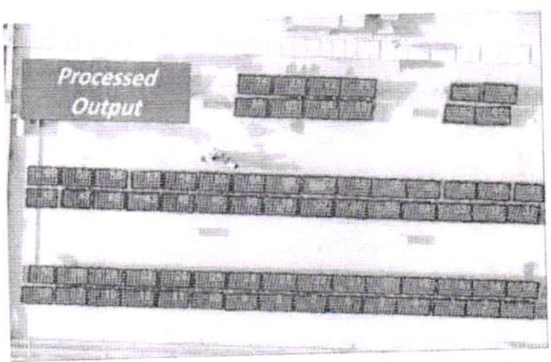


Fig. 7. Aerial Image two after processing from the Raspberry Pi

A. Quick measure for working on time

Through the advanced techniques set by the project manager, we can capture the image and see the number of seventy-four panels. Mathematically, this can be done as follows.

Total panels = 74 panels

Time required to fly, pull and make = 5 seconds A batch/frame of seventy-four panels = Total time is 5 seconds In 60 seconds = 12 batches can be included

All panels in 1 minute = 888 panels

B. Product search using YOLOv5 rules

We combine solar panel data from the net [19] and data collected from drones. We first organized the data and described it using the Rob flow device [20]. In the first step, we used 2.4k best images with clean and negative training for learning with 100 epochs. For per-testing and training, Google Col-lab is used to generate weighted data for the test. The results were tested in the video [21]. Some experimental results are shown in Figure 8.

Principal
Samskruti College of Engg. & Technology
Kondapur (V), Ghatkesar (M), Medchal Dist.

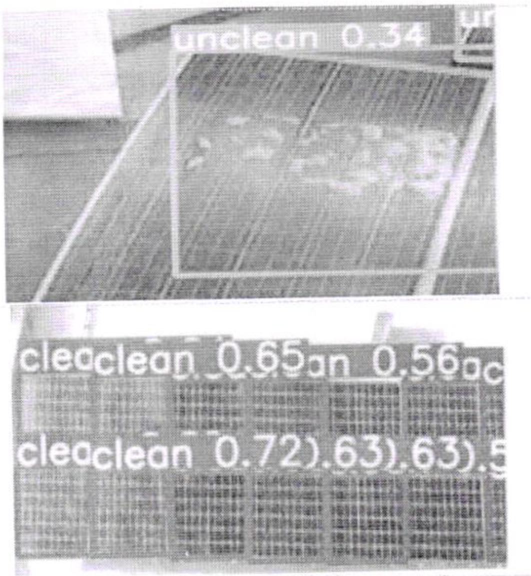


Fig. 8. Test result from trained YOLOv5 model

V CONCLUSION

The preparation process is very simple and robust to the test of time. This is a small part of our ongoing research. We also integrate a thermal infrared camera into the space, which works to find dirty things and find faults. Additionally, by using the calculation method, the use of GPS as in the old method can be eliminated.

The time count proves that our automated process will save sellers the prior effort of verification and monitoring. It's new, different and reliable for our application. This method can be further improved in the future by analyzing other aspects of the image, such as looking for illegal sunspots.

REFERENCES

1. Y. Higuchi and T. Babasaki, "Classification of causes of broken solar panels in solar power plant," INTELEC, Int. Telecommun. Energy Conf., vol. 2017-Octob, pp. 127–132, 2017, doi: 10.1109/INTLEC.2017.8214123.

2. Á. H. Herraiz, A. P. Marugán, and F. P. G. Márquez, A review on condition monitoring system for solar plants based on tomography. Elsevier Ltd., 2019. doi: 10.1016/B978-0-08- 101094-5.00007-1.

3. P. B. Quater, F. Grimaccia, S. Leva, M. Mussetta, and M. Aghaei, "Light Unmanned Aerial Vehicles (UAVs) for cooperative inspection of PV plants," IEEE J. Photovoltaic, vol. 4, no. 4, pp. 1107–1113, 2014, doi: 10.1109/JPHOTOV.2014.2323714.

4. I. S. Ramírez, A. P. Marugán, and F. P. G. Márquez, "Remotely Piloted Aircraft System and Engineering Management: A Real Case Study," 2019, pp. 1173–1185. doi: 10.1007/978-3-319-93351-1_92.

5. D. H. Lee and J. H. Park, "Developing inspection methodology of solar energy plants by thermal infrared sensor on board unmanned aerial vehicles," Energies, vol. 12, no. 15, 2019, doi: 10.3390/en12152928.

6. S. N. Kane, A. Mishra, and A. K. Dutta, "Preface: International Conference

ISSN: 2366-1313

on Recent Trends in Physics (ICRTP 2016)," J. Phys. Conf. Ser., vol. 755, no. 1, pp. 8–13, 2016, doi: 10.1088/1742-6596/755/1/011001.

7. N. Padmavathi and A. Chilambuchelvan, "Fault detection and identification of solar panels using Bluetooth," 2017 Int. Conf. Energy, Commun. Data Anal. Soft Comput. ICECDS 2017, pp. 3420–3426, 2018, doi: 10.1109/ICECDS.2017.8390096.

8. H. Denio, "Aerial solar Tomography and condition monitoring of photovoltaic systems," in Conference Record of the IEEE Photovoltaic Specialists Conference, 2012, pp. 613–618. doi: 10.1109/PVSC.2012.6317686.

9. P. Addabbo et al., "A UAV infrared measurement approach for defect detection in photovoltaic plants," in 4th IEEE International Workshop on Metro logy for Aerospace, Metro Aerospace 2017 - Proceedings, 2017, pp. 345–350. doi: 10.1109/Metro Aero Space.2017.7999594.

10. "Panel Data set", [Online]. Available: https://deep-solar- eye.git hub.io/

11. . Prasadu Peddi, and Dr. Akash Saxena. "studying data mining tools and techniques for predicting student performance" International Journal Of Advance Research And Innovative Ideas In Education Volume 2 Issue 2 2016 Page 1959-1967

12. D. annotation Tool, "No Title", [Online]. Available: https://robo flow.com/

Principal
Samskruti College of Engg. & Technology
Kondapur (V), Ghatkesar (M), Medchal Dist.

Recognition of American Sign Language Using Machine Learning and CNN

[1] R. SreeLakshmi, [2]Manpati Nandini, [3]Shanigarapu Rahul, [4]Pagilla Dheeraj Reddy, [5]Athinarapu Rajesh Sagar

[1] Assistant Professor, Dept. Of CSE, Samskruti College of Engineering & Technology, TS.

[2,3,4,5]B. Tech Student, Dept. Of CSE, Samskruti College of Engineering & Technology, TS.

Abstract: *Many human beings have disabilities, along with the deaf and tough of listening to, due to the fact they're no longer capable of talk with people. It is vital to discover a manner to resolve this problem. One viable answer is famous language (SLR), that may offer a form of authentication. In this article, device getting to know and deep analyzing are used to recognize and classify ASL, and only 24 English letters are recorded due to the fact the letters J and Z want to be fingered. Firstly, fundamental factor evaluation (PCA) and several algorithms are used to reduce the price of education and visualization. Second, many device gaining knowledge of strategies consist of Random Forest Classification (RFC), K-Nearest Neighbor (KNN), Gaussian Naive Bayes (GNB), Support Vector Machine (SVM), and Stochastic Gradient Descent (SGD).) to cut up the pattern. . Since SVM regulations have many parameters, this evaluation uses the grid seek technique to locate the hyper clusters without growing the precision. It has been argued that special buying and selling algorithms have a exceptional version of every estimation version, and it may be concluded that many methods are excellent for the trading set of rules most effective for KNN however not for unique estimation, and even extra so for PCA. No revel in. Beyond KNN used in device mastering algorithms similarly to KNN. Two deep evaluation techniques such as constitutional neural networks (CNN) and deep neural networks (DNN) are also used in the class and their accuracy is better than the algorithms cited above.*

Keywords- Sign Language Recognition; Manifold; Machine learning; CNN; Dimension reduction.

I. INTRODUCTION

According to the World Health Organization, 285 million humans are blind, 3 hundred million are deaf and 1 million are illiterate [1]. Many humans with disabilities need to find out strategies to speak approximately troubles with others. It is widely known that signal

Samskruti College of Engg. & Technology
Kondapur (V), Ghatkesar (M), Medchal Dist.

ISSN: 2366-1313

language is widely carried out in communique among deaf and hard of being attentive to people. Although there are numerous herbal language gaining knowledge of techniques utilized by listening to and blind people, there are few languages that are silent via using the usage of language for voice or communication with others.

Today, synthetic intelligence (AI) is significantly utilized in plenty of fields, specially in pictures. Therefore, this evaluation examines the plans to treatment this hassle, specially thru training and in-depth know-how.

In the arena of AI, many algorithms can be used to recognize the task of language popularity: constitutional neural community (CNN), that may be a form of synthetic neural network (ANN), can acquire the extraction and class of automation competencies. 2-4] one. Some researchers have proposed the usage of neural networks and K-Nearest Neighbor (KNN) lessons to classify languages [5]. Some researchers frequently use element evaluation (PCA) to extract talents to reduce data, which turns too many statistics into susceptible information [6]. In addition, part of the studies compares the multi layer proper judgment (MLP), radial basis feature (RBF), Mahala no-bis distance and least square expression vector (LS-SVM) concerning well-known language. [7]. Indeed, there are various category and dimensional cut rate strategies at the aspect of Random Forest and T-SNE to deal with information. However, it is proper that few researchers manage to provide a evidence of methods numerous algorithms paintings within the equal check. Therefore, the purpose of this paper is to offer an outline of the general standard performance of numerous algorithms in well-known language (SLR) and to provide reference statistics for researchers who choice to apply those algorithms. .

To summarize these strategies, unique techniques or strategies include PCA, Random Forest Classification (RFC), Deep Neural Network (DNN), CNN, Data Augmentation, Manifold Learning, KNN, Gaussian Naive Bayes (GNB), SVM and Stochastic Gradient. Distribution (SGD) is checked in this take a look at. And face their particular facts, errors, losses and essential questions, set the purpose of schooling. In addition, it's far difficult to surely examine the performance of algorithms based totally on specific data because of precise angles, mild, and so on. The photo is extracted from every records sheet, so the resources that would truly be created are restricted. Given the ones adjustments, it is vital to use random facts

Principal
Samskruti College of Engg. & Technology
Kondapur (V), Ghatkesar (M), Medchal Dist.

ISSN: 2366-1313

to test any algorithms to verify their overall performance.

II REVIEW OF LITERATURE

Previous researchers have targeted their paintings on guidance to help the listening to impaired use the subsequent era intelligently. Algorithms. Although tons studies has been achieved on SLR, a few barriers and enhancements are necessary to fulfill the needs of the deaf. This section offers a brief assessment of new research on SLR the usage of deep getting to know and deep visualization techniques. Analysis of the literature on the problem suggests that there are many methods to resolve the problem of viewing the outline in video using unique methods. In [1], the authors use Hidden Markov Models (HMM) to detect faces from videos with Bayesian network classifiers and Gaussian trees augmented with the aid of naive Bayesian classifiers. François et al. [2] additionally published a paper on human body recognition in films using 2D and three-D shape strategies. This paintings includes the usage of PCA to apprehend silhouettes from a static digital camera after the use of 3-D to model their target picture. This method incorporates its very own threat of slight orientation which could lead to conflicts within the formation and, therefore, a decrease in predictability. Let's speak approximately evaluating video segments using neural networks that encompass extracting visible records within the form of feature vectors. Neural networks are faced with issues of hand detection, segmentation of

Background and environmental research, light dimming, occlusion, movement and performance. The article by means of Nandy et al. [3] divide facts into segments, extract and classify the usage of Euclidean distance and K-Neighbors. Ten comparable works with the help of Kumud et al. [4] ways of know-how Indian symptoms. Publish snap shots extracted from video documents, per-analysis, extracting critical content material from data, with the assist of extracting unique functions, reputation and remaining refinement. Prepossessing is carried out via changing the video to RGB body level. Each photo has a size. Skin tone segmentation is used to extract pores and regions of the pores and skin, the use of HSV. The image is transformed to a binary format. Key frames are extracted through calculating the gradient of those frames. And the capacity is extracted from the key frame using an oriental histogram. The classification is finished the usage of Euclidean distance, Manhattan distance, chessboard distance and Maharanis distance.

Principal
Samskruti College of Engg. & Technolo
Kondapur (V), Ghatkesar (M), Medchal Dis

ISSN: 2366-1313

III METHOD

A. Description of data and values

The name of the document in this research is Note MNIST, which comes from Kaggle [8]. In the course of research, CSV files are often used, one of them is the total study statistics of 27,455 patients and the time is all based on identifying the of seven, 172 patients. There are 24 unique languages on this list (more with J and Z that want to move). Each map has 784 pixels, which represents a 28×28 pixel image. A pixel value represents a gray value and ranges from zero to 255. Figure 1 shows some examples in the MNIST statistical register [8].

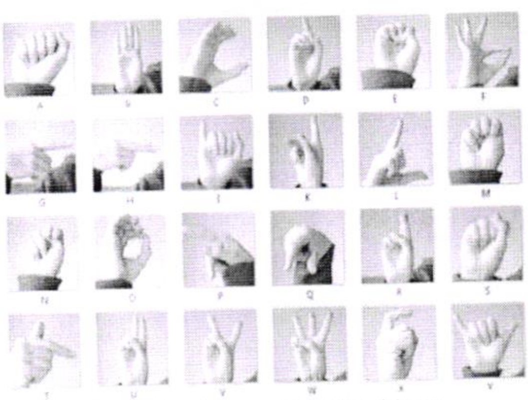


Figure 1. Sample images in the collected dataset.

After acting PCA, the wide variety of features is reduced from 786 to one hundred fifteen. And we choose the primary 4 pixels to analyze their dependence and distribution. As proven in Figure 2 beneath, on a non-diagonal role, it represents a factor cloud of each pixel relative to the opposite three pixels. Diagonally, it represents the distribution of each pixel. As we can see, every pixel approximates a ordinary distribution and each pixel is independent of different pixels.

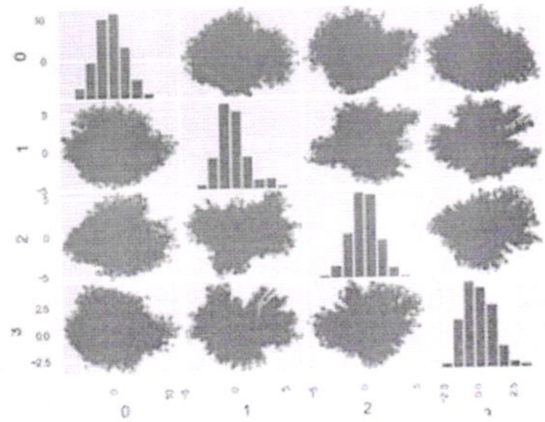


Figure 2. First four pixels distribution and independence.

The first step in data processing is normalization, which involves dividing each pixel by 255 to normalize the data (the value of each pixel goes from 0 to at least one).

Figure 3 from histogram drawing; It can be seen that all the gesture patterns in the school record appear on the same scale. In the test data, some expressions appear more often, including the frequency of labels 4 and 7, this represents approximately 14%. The frequency of tags 15 and 16 is estimated at five percent. It can be seen that the inconsistency of each label in the control data will cause a change in the measurement accuracy. For example, gestures with more test data can reduce the accuracy because the possibility

Principal
Samskruti College of Engg. & Technology
Kondapur (V), Ghatkesar (M), Medchal Dist.

ISSN: 2366-1313

of including gestures in a particular location is higher and more varied with the lighting conditions. will affect the image clarity. In addition, in order to save time in further processing of the tool to gain knowledge and a deeper understanding of the algorithms, principal component analysis (PCA) was used in this study in order to for reducing the scale of the paper. The design principle of PCA is to map high-dimensional data into low-dimensional areas while preserving as much variability as possible.

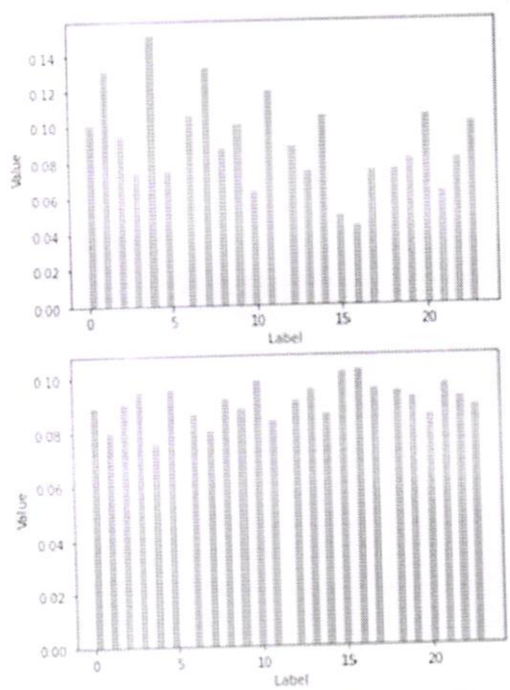


Figure 3. Distribution of gesture sample in the collected dataset.

In addition to PCA, more than one acquisition is likewise used to lessen the reality duration. Multiculturalism is a way to reduce poor results. This may be visible as an try to locate linear models like PCA to better understand nonlinear models in facts. The information received are vulnerable and are observed in 3 a couple of look at: MDS, T-SNE and ISOMAP. After comparing these 3 methods, it seems from the photographs that the end result of the usage of ISOMAP is ideal.

IV RESULTS

A. Performance for models

Table I-III indicates the performance of models in different conditions.

TABLE I. THE RESULTS OF DIFFERENT MACHINE LEARNING ALGORITHMS WITH ORIGINAL DATA.

Model Name	Evaluation Metric			
	test accuracy score	*test precision score*	*test recall score*	*test f1 score*
RFC	0.8161	0.80	0.81	0.80
KNN (K=1)	0.7817	0.8038	0.7817	0.7812
Gauss an NB	0.3898	0.4630	0.3898	0.3904
SVM	0.8419	0.8568	0.8419	0.8444
SGD	0.6602	0.7072	0.6602	0.6713

TABLE II. THE RESULTS OF DIFFERENT MACHINE LEARNING ALGORITHMS WITH DATA PROCESSED BY PCA.

Model Name	Evaluation Metric			
	test accuracy score	*test precision score*	*test recall score*	*test f1 score*
RFC	0.087	0.09	0.09	0.09
KNN (K=1)	0.8209	0.8402	0.8209	0.8225
Gaussia nn NB	0.5889	0.6692	0.5889	0.6091
SVM	0.8515	0.8638	0.8515	0.8532
SGD	0.6429	0.6670	0.6429	0.6451

TABLE III. THE RESULTS OF DIFFERENT MACHINE LEARNING ALGORITHMS WITH DATA PROCESSED BY ISOMAP

Model Name	Evaluation Metric			
	test accuracy score	*test precision score*	*test recall score*	*test f1 score*
RFC	0.1433	0.14	0.13	0.13
KNN (K=1)	0.9654	0.9659	0.9654	0.9654
Gaussi anNB	0.0400	0.0414	0.0400	0.0352
SVM	0.0349	0.0406	0.0349	0.0304
SGD	0.0380	0.0424	0.0380	0.0348

Only 24 letters are shown, because J and Z need to be moved, but if J and Z are used

ISSN: 2366-1313

to guess, the result depends on which letter is similar.

B. Events and Discussion for the RFC

In the RFC, we found that the accuracy is higher after reducing the value with ISOMAP than with PCA, because ISOMAP shows some advantages with PCA, but ISOMAP is easier to analyze in the context of training shows the size of non-multiple linear types [17] and will not exceed. Linear dating of pixels in three directions. However, ISOMAP is generally not better than PCA. In [18], the author reviews the overall performance of linear and nonlinear extraction algorithms. The method of feature extraction (FEA) can solve real statistical problems, including noise, complexity and sparsity [18]. Studies have shown that FEA nonlinear is higher in human work, but not always higher in real art, although nonlinear methods are proposed to overcome the shortcomings in [17]. Also, nonlinear FEAs are not always better than PC-As because they can be cursed [17]. As a result, ISOMAP and PCA have the first values for the curse, which makes PCA more accurate.

C. Results and discussion for KNN

Using KNN to express and consider the data, we found that the accuracy is higher even if K is small. In contrast, we choose K with the maximum. Then we use statistics whose dimensions are reduced by PCA and ISOMAP and decide that the accuracy is higher than before. And thanks to the use of ISOMAP, the accuracy is improved by more than ten ways.

D. Consequences and discussion for GNB

As confirmed above, after performing PCA, compared to the data alone, the accuracy increases by 20%. However, GNB does not work well in SLR.

According to our experts, GNB is widely used in spam detection, but little used in reputation models. Pixel independence and normal distribution can not be obtained in a certain way, but can be obtained after the PCA view. In direct mail, some words like "new" and "low" appear, which makes it look like it has not been sent. In addition, the ability to complete sentences does not affect other sentences, which means that it follows the concept of independence. Conversely, the idea that the value of a pixel does not affect others cannot be well defined. In addition, the value of 1 pixel can be easily avoided, because PCA is a straightforward form, each pixel can be bigger or smaller than others after PCA is done.

E. Definitions and instructions for SVM

Principal
Samskruti College of Engg. & Technology
Kondapur (V), Ghatkesar (M), Medchal Dist.

ISSN: 2366-1313

SVM performs better than any other special learning tool. The accuracy rate of the real data is almost the same as the accuracy score after performing PCA. But after completing PCA, the training time can be reduced by 10 mines.

We use Grid Search to find a great combination of hyper parameters. We examined several possible hyper parameter values, as identified in Table IV below.

TABLE IV. HYPERPARAMETERS FOR SVM.

Kernel	Hyper parameter Combination		
	linear	*poly*	*rbf**
C	0.1	1*	10
Degree (when kernel=poly)	2	3	4

*means the best value

F. Results and discussion for neural networks

To ensure the correctness and performance of the release, the neural network does not use actual background discounting. According to the DNN version, for the first time, it can be found that the accuracy of school teaching is higher than that of the test, and the loss rate is inconsistent. According to the analysis of educational data, the rate of loss continues to increase in these neuronal communities, which is a sign of competition.

Then decrease the number of neurons in each layer. However, the problem of overrun remains. As the width of neurons decreases, the accuracy of training and testing decreases. When the number of neurons is 24 in each layer, the accuracy of the training process is 0.758, the accuracy of the testing process is zero.4169, while the test loss is three.7469.

DNN is a simple version, its effect is not good. It is true that because the neurons will increase, the fact improves and decreases, but it is easy for health. The overall performance of CNN is better than that of DNN. The parameters impact the accuracy of the model. After changing the parameters, the accuracy is higher and the accuracy of the learning gadget is zero.9997 while in this check the value reaches zero.9387. What was once a problem is moving forward. CNN is more efficient than DNN, it can reduce the width of big data to small facts (currently without affecting the results) and preserve the ability to image, such as specific elements of human thought and philosophy. After data augmentation, the performance of the full version is constant. Truth keeping is divided into 0.9781, light sight loss decreases with the value of 1.

V CONCLUSION

In these pictures, the popularity of the language has been prepared, using many ideas to show the types of division and understand 24 hand gestures. Of the 26 letters, J and Z are ignored because they

Principal
Samskruti College of Engg. & Technology
Kondapur (V), Ghatkesar (M), Medchal Dist.

ZKG INTERNATIONAL

ISSN: 2366-1313

REAL-TIME CONTROLLABLE DENOISING FOR IMAGE AND VIDEO

[1] Mrs.R.Sreelakshmi, [2] Ravula Manohar,[3] Gayakwad Nikhitha,[4] B Venkata Satya Subramanyam, [5]Jakka Shanmukha Satya Sai

[1] Assistant Professor, Dept. Of CSE, Samskruti College of Engineering & Technology, TS.

[2,3,4,5]B. Tech Student, Dept. Of CSE, Samskruti College of Engineering & Technology, TS.

Abstract: *Manage photo denouncing ambitions to create uncluttered models with human perceptual advance and stability, sharpness, and smoothness. In standard filter-based denouncing techniques, this can be easily achieved using filter power. However, for all NN (Neural Network) based models, adjusting the final denouncing function requires tracking the network interaction every time, making real-time human interaction almost impossible. In this article, we introduce real-time controllable denouncing (RCD), the first deep image and video denouncing pipeline that provides users with full control to reliably change decision parameters in real-time with best-in-class results in one go. thoughts. Unlike current controllable denouncing techniques that require multiple noisemakers and grade, RCD replaces the last output layer (which typically generates a single sound map) of a current A CNN-based model with a lightweight module that produces multiple maps sound. We propose a noise decor relation technique to take advantage of the orthogonality of noise feature maps, allowing noise to be inferred from the noise in the interference map. This system is community independent and does not require networking. Our testing shows that the RCD can enable real-time image editing and video denouncing for a variety of today's heavy-duty models without sacrificing their overall performance.*

I INTRODUCTION

Image and video denouncing is an important problem in image computing and computer vision. With the development of deep neural networks [12, 26, 49, 59], pattern-based denouncing techniques have shown great success in creating simple images and videos. video with high level denouncing [4, 55.57]. However, it is worth mentioning that improvements in reconstruction accuracy (such as PSNR, SSIM) do not always follow improvements in visual quality,

Principal
Samskruti College of Engg. & Technology
Kondapur (V), Ghatkesar (M), Medchal Dist.

ISSN: 2366-1313

known as the Search-Distortion trade-off. [6]. In the normal denouncing process, we will adjust the level of denouncing by adjusting the control.

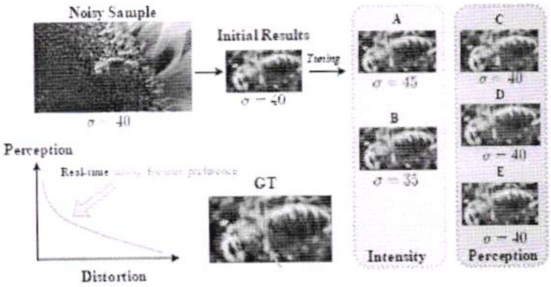


Figure 1. Real-time controllable denouncing allows users further tuning the restored results to achieve Perception-Distortion trade- off. **A-B**: tuning with changing denouncing intensity. **C-E**: tuning without changing denouncing intensity.

Settings and derivation we like to see. However, thoroughly and regularly, we can repair degraded image or best video for equipment hard and fast with previous recovery time.

In recent years, several modifications have been proposed to create an irreversible result in two steps before describing the denouncing. These techniques can be classified into the following types: interaction-based methods [17, 24, 50, 51], which use deep interaction methods, and community-important events like ideas, which import additional situations to conflicts [9, 25, 39] one. It is important to note that both methods are designed to follow the message that the benefits of network marketing continue with changing features/filters. This analysis allows for more in-depth control, but it also has several limitations. First, there is an inability to explain, because the relationship between control parameters (a means of changing characteristics) and control (how the network output is changed by exchange) is unclear [24]. This indicates that black operators (network protocols) should be used to encode them. Second, using network equipment-based control settings requires the entire network to expand with each control change, leading to inefficiency. Finally, the current reform process often requires a reduction in classroom learning, which is difficult to achieve in real-world models. As a result, the lease controllable denouncing method is the simplest and focuses on the

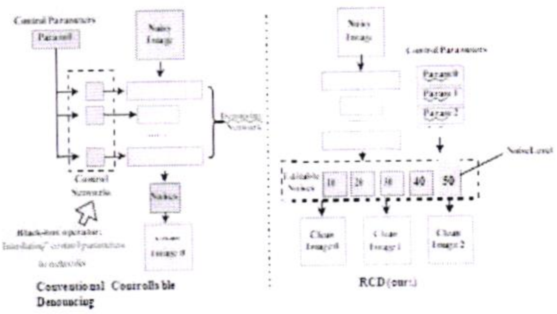


Figure 2. Comparison of pipelines between conventional controllable denouncing and our RCD. RCD achieves

Principal
Samskruti College of Engg. & Technology
Kondapur (V), Ghatkesar (M), Medchal Dist.

ISSN: 2366-1313

real-time noise control by manipulating editable noises directly.

Sound cues. In addition, methods based on interactions and those based on network conditions have their own disadvantages. Interpolation-based methods often require a lot of education, including training before two main standards (beginning degree and graduate). On the other hand, the method based on the network situation is difficult to integrate better the central network and the network situation.

In this paper, we study the problem: can we achieve a real-time control system that abandons the service organization and does not require network advertising to change the results again? Back from time? To this end, we recommend using the technique of real-time controlled denouncing (RCD), a deep pipeline that allows the rapid control of denouncing to achieve the sense- distortion balance (see Figure 1). Our RCD can be connected to any treatment based on noise [11, 46, 54, 55] with only a few additional calculations. In particular, we replace the closed layer of the existing denouncing community (which usually creates a noise map) with a light source that creates several noises with specific noises. We use a new noise algorithm to control the orthogonality of the noise of these noise maps during the study. As a result, we are able to get a rough decision by simple linear interpolation of these noises. Since this model does not require network communication, it allows users to interact in real time, even with heavy denouncing.

Figure 2 shows the main differences between our RCD technique and the control technique to avoid negative effects. Compared to the traditional methods of control of networks, RCD pipes produce noise changes of different frequency/level, allowing control from external parameters and to better time and no network connection. Real-time editing skills using RCD create new opportunities for many programs that previously could not be used using conventional techniques, including online video denouncing, even when to play (for example, the top part of the smartphone's video camera). for ISP tuning engineers), with the use of denouncing controls on partial gadgets and embedded models. Since the simplest level of RCD repair will be related to the pole

• We recommend RCD, a negative control pipeline that first makes it possible to control the denouncing in real time (speedup > 2000 compared to conventional control strategies) and to be able to control (over the ease of use) without some technical training [24] and auxiliary networks. [50].

Principal
Samskruti College of Engg. & Technology
Kondapur (V), Ghatkesar (M), Medchal Dist.

ISSN: 2366-1313

"RCD is the first method for contractility on a truly international scale.
"We propose a combination of noise to estimate the noise change.
"We achieve similar or even better results on widely used real image/art denouncing and video denouncing datasets with minimal additional cost.

II Related Work

Denial

Standard image and video denouncing methods are ten in number, based on assumptions that include small image prior [3, 15, 16, 20], not close to similar [7, 13, 14, 18]. , and different methods [22, 41, 52] one. However, with the recent development of deep learning networks, many learning-based strategies have been proposed and all successfully implemented. Early work [8] used multi layer perceptron (MLP) to achieve similar results with BM3D. In recent years, there has been rapid development of CNN-based comprehensive denouncing techniques [4, 10, 21, 47, 55, 57] and Transform-

according to the method [32, 42, 54, 59], which has started to dominate the image/video denouncing task. However, the above works specifically for the consciousness of creating new structures in society to improve poor performance and often produce a result. Their inability to adjust denouncing degree results based on customer feedback has limited their effective use in many real-world applications. Additionally, although techniques like pruning [33, 38, 60] and quantification [45, 61] can create a community of ideas based on all ideas, they are still cumbersome, which limits their usefulness for real-time management.

Controllable denouncing

Most in-depth knowledge of image/video denouncing methods can only produce the desired results with a selective level of restoration. Recently, some video/video denouncing techniques allow users to maintain good results without reprogramming the network. DNI [51] and Ada FM [24] used the claim that filters are learned from models that are trained with improved levels of refinement compared to visual models. DNI interpolated all the parameters of the network partners to achieve a clean and continuous result, while Ada FM implemented a standard filter after each layer. CFS Net [50] proposed a modified study of the use of interpolation coefficients for several potentials between the main building and maintenance facilities. Different from the interpolation-based method, several other techniques [9, 25, 39] have presented the adjustment based on the image recovery

Principal
Samskruti College of Engg. & Technology
Kondapur (V), Ghatkesar (M), Medchal Dist.

ISSN: 2366-1313

problem and follow the traditional training method. . CUGAN [9] proposed a GAN-based image retrieval framework to avoid the over cleaning problem, a common problem in SNR-oriented techniques. However, all of the control strategies above can be better learned with artificial devices, because they must be exposed to degradation steps during the learning process. When applied to the real world recording, as shown in [23], the blind additive white Gaussian noise (AWGN) method [35,55] will be over fitted and regularly exposed suffered from a big drop in performance. In addition to the real-world problem, these types of controls use network services and require network communication for all levels of treatment at different times, making them almost cannot be applied in time.

III Methodology

Deep denouncing

The deep denouncing technique completely outperforms conventional filter-based methods by using the robust and robust representation learning functionality of neural networks. Most current denouncing methods [11, 32, 46] consider the relationship between bright and loud images using regressive noise maps with a neural generator. In particular, provide popular images and templates

: RH × W × C RH × W × C, we will take the form of Ic by: Ic = In + (In), which the model

is up to date by reducing the gap between the final denouncing result Ic and the actual floor Igt. As we can see, the shape of this approach causes constant marriage to appear in the dark path, which makes it almost impossible to clearly determine the denouncing operation.

Pipeline Overview

In this section, we present real-time controllable denouncing (RCD), a comprehensive deep learning-based pipeline for real-time controllable denouncing. As shown in Figure 3, the RCD actually has three components: (1) A backbone network, i.e. b: RH × W × C RH × W × LC , generates more in-degree noise maps fixed, in which L is the number. sounds described previously (see (A) in Figure 3). (2) A noise decor-relation (ND) block that controls the fitting of the noise map (see (B) in figure three). (three) An automatic adjustment.

$$\mathbf{I}_c = \mathbf{I}_n + \sum_{i=1} \bar{c}_i \tilde{N}_i, \qquad (1)$$

Different from the previous managed denouncing method with implicit interpolation inside the network, we suggest to exactly interpolate the sound

Principal
Samskruti College of Engg. & Technology
Kondapur (V), Ghatkesar (M), Medchal Dist.

ISSN: 2366-1313

maps in Eqn. 3. By separating the noise interpolation and network inference, we RCD can attain the connection among humans in actual time.

However, the multi-level noise maps I get immediately from the constitutional system regularly have special effects, causing the problem of noise. In different phrases, the illustration of the sounds of different levels is bigoted, which means that that the wide variety of sounds of the specific sounds which are involved within the network inside the equation. 1 is implicitly decreased. There aren't any restrictions.

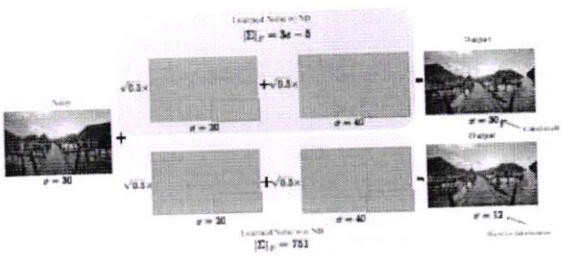


Figure 3. Demonstration of Noise Decor-relation's influence on noise editing. $\Sigma\ F$ denotes norms of the covariance matrix for corresponding learned noises and σ is noise intensity.

IV Experiments and Results

This section is organized as follows: first, we show the performance of our rcd plugin with the soya image denouncing method [11] in a specific scale of noisy data. then, in order to test the real-world data blinding ability, we conduct experiments on the famous international sided denouncing data set [1]. next, we implement our real-time controlled rcd pipeline of video denouncing services. in conclusion, we discuss some design concepts described in the previous section.

Single-frame Gaussian denouncing

test setup. to demonstrate the effectiveness of rcd, we choose the most common sota protocol, naf net [11] as the backbone. after [54], we first noised the behavior at different dimensions using shadow images (div2k [2], bsd400 [36], flickr2k [53] and water-

toilet ed [34]) with Gaussian white noise (σ $\in$ data using noise level cbsd68 [37], kodak24 [19], master [58] and urban100 [28] with noise levels σ(15), σ(15) and σ(50). the rcd is evaluated with denouncing effect using the auto tune $\bar{c}$ i outputs. as shown in tab. 1. please note that the naf net-rcd can produce similar results for the spine only using the auto tune outputs, and that overall performance can be further improved by auto correcting the control index (see sec. 3.6.) we add . show the overall performance of naf net-rd in figure 6. naf net-rd can recover additional information from some degraded images, which can benefit from the ability of the rcd carrier body to facilitate the integration of multiple sound cards.

ISSN: 2366-1313

slimmer model variants. in order to compare the accuracy and robustness of the rcd, we performed ablations using the rcd for different bone sizes. in particular, we reduce the width and number of blocks of naf net, introducing the design to make naf net-small.

(1×) and naf net-tiny (1×). tongue. we show the effects of [0, 60] a.). the length of the training patch is 128 × 128 and the batch size is sixty-four. we train our model with the adam optimizer [31] and learn the value 1e 3 for every 60,000 iterations. according to [11], the psnr loss is changed according to the loss characteristic. the base model (naf net) and its modified rcd (naf net-rcd) were studied from scratch. for the rcd configuration, we start from l = 12 and li = [5, 10, ..., 60] for learning synthetic denouncing.

complexity analysis. many changes to control parameters are often necessary to achieve a good result for the customer. healing time is therefore important rcd with flaking bones. it can be seen that the rcd versions can achieve comparable or even less effective results compared to their originals, which further shows the strength and performance of the rcd for one of the major bones.

Real denouncing of an image

Experimental set-up (real image) Unlike existing control denouncing methods [24,50] that consider synthetic models, we are the first to answer that continuous control parameters for the global SIDD datasets.

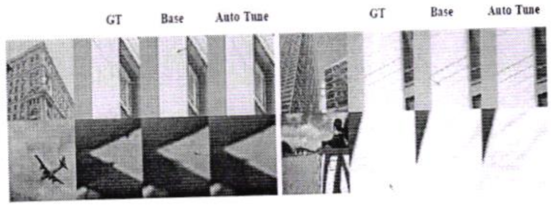


Figure 4. Visual comparison of RCD and their baseline results on $\sigma = 50$ denouncing. **GT**: Ground truth. **Base**: Baseline model without RCD. Auto Tune: RCD results by applying control parameters from Auto Tune module.

Table 1. Ablation of RCD on various backbone sizes

Method	CBSD68 $\sigma = 15$	CBSD68 $\sigma = 25$	CBSD68 $\sigma = 50$	Kodak24 $\sigma = 15$	Kodak24 $\sigma = 25$	Kodak24 $\sigma = 50$	Master $\sigma = 15$	Master $\sigma = 25$	Master $\sigma = 50$	Urban100 $\sigma = 15$	Urban100 $\sigma = 25$	Urban100 $\sigma = 50$
Nanette-tiny	33.58	30.91	27.62	34.33	31.84	28.63	33.85	31.61	28.55	32.96	30.37	26.92
Nanette-RCD-tiny	**33.71**	**31.06**	**27.68**	**34.46**	**31.98**	**28.65**	**34.07**	**31.78**	**28.61**	**33.22**	**30.66**	**27.18**
Nanette-small	33.84	31.18	27.91	34.68	32.18	29.01	34.68	32.18	29.01	33.61	31.10	27.68
Nanette-RCD-small	**33.96**	**31.31**	**28.05**	**34.83**	**32.32**	**29.14**	**34.71**	**32.40**	**29.26**	**33.92**	**31.46**	**28.08**
Nanette	34.11	31.49	28.27	35.14	32.70	29.68	35.07	32.82	29.79	34.41	32.09	29.00
Nanette-RCD	**34.13**	**31.49**	**28.26**	**35.15**	**32.72**	**29.69**	**35.11**	**32.84**	**29.81**	**34.45**	**32.12**	**29.02**

Table 2. Image denouncing results on SIDD. **Real noise**: results on real-world SIDD test sets. **Synthetic noise**: results on SIDD test set with additive Gaussian noise ($\sigma = 25$).

Method	Real noise PSNR	Real noise SSIM	Synthetic noise PSNR	Synthetic noise SSIM
NAFNet-tiny	**42.19**	**0.9796**	38.46	0.9551
NAFNet-RCD-tiny	41.86	0.9781	**38.60**	**0.9558**
NAFNet	**43.22**	**0.9818**	38.85	0.9481
NAFNet-RCD	42.91	0.9806	**39.14**	**0.9580**

SIDD includes noisy images captured on a smartphone with σ [0, 50]. Instead of using full SIDD elements, we select subsets of SIDDs with σ[0, 12] (nearly 70% of all

ISSN: 2366-1313

data) to show our RCD model, which starts with L = 4 and hence = [3, 6, 9, 12] one. The main reason is that there is not much precision in the levels in SIDD due to the assumption of an unreasonably long-tailed noise level distribution. In particular, the most popular images in SIDD are obtained in $\sigma < 12$ and the sample distribution is small when σ is very large. According to sec. 4.1, we adopt NAF Net (SOTA strategy for SIDD venture [11]) as the backbone of our scale (1, 16). NAF Net-RCD and the corresponding principles are studied on this site with the same educational facilities as in [11].

Results and analysis

We performed a blind test of SIDD with different RCD models to evaluate its adaptability to real-world data. As shown in Tab. 4 (left), our RCD (Automated Trigger) can be written very well and can control real-world denouncing in all settings. However, we have found that controlling the impedance with an RCD can also cause a slight effect in the output range (around 0.3 dB), which may be due to the end of the file not being equal to each subject and to the short noise of the program's language time (li+1 li , see more dialogue in Sec 4.4).

SIDD with noise. We performed a false positive test on SIDD to further reveal the relationship between RCD and SIDD datasets. After Dry. Fourth.1, we add random Gaussian noise $\sigma[0.60]$ to the SIDD training data, and each method is evaluated on $\sigma = 50$ SIDD test samples. As shown in Tab. Fourth (right), RCD modes barely complement their principles, demonstrating RCD's relationship with SIDD. Moreover, the final result can show that the overall RCD performance of the SIDD figure may also depend on the noise distribution and configuration of the RCD, not on the correction of the switching capacitance of the RCD for the SIDD data. See the appendix for additional results and visuals.

Experimental setup Following usual practice [32, 44, 46], we introduce our DAVIS training model and use DAVIS-view and Set-8 monitor for evaluation. As in [46], we download Gaussian noise with the difference between two-between five and 50 from the DAVIS eigenvalue for training. The DAVIS process includes 30 temporary shades of resolution 854,480, to be able to be cut into 128,128 patches at certain stages of the study. Other parameters and hyper parameters are recorded in the same way as [46] for a fair comparison.

Principal
Samskruti College of Engg. & Technology
Kondapur (V), Ghatkesar (M), Medchal Dist.

ISSN: 2366-1313

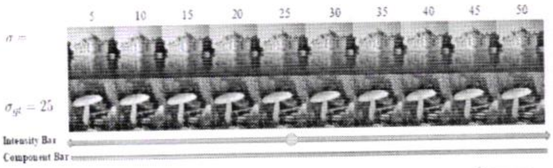


Figure 5. Illustration of RCD control logic. Users can retouch the denouncing level by tuning the Intensity bar ($\sigma = \sqrt{\sum_{i=1}^{k} c_i^2}$) and setup their perceptual preference at fixed level by tuning Component bar (changing $\{c_i\}$ while keeping σ).

Our model is simple. Although the recent methods [32,48] perform better than Fast DVD using usually 1-2 PSNR, they only show large samples and other heavy operations such as patch bundling [48] and body-to-body encapsulation - smart coating the body using optical float [. 32] (> is slower than Fast DVD).

Results and analysis. Like [44], we compared our video denouncing model with the idea of length of one body and 5 frames. We introduce the RCD model for video denouncing as "Fast DVD-RC" and examine their range of Auto Tune denouncing results for fast DVD benchmarks in Tab. Five. According to the previous sections, the initial adjustment of Fast DVD-RCD can show all the performance compared to the default Fast DVD, which means that our RCD can get the sound adjustment real time without losing the video status. Unlike previous power-limiting controls, our RCD timer can allow users to perform online video denouncing edits without latency.

Table 3. Video denouncing results.

Test set	σ	1 frame		5 frames	
		Fast DVD	Fast DVD-RCD	Fast DVD	Fast DVD-RCD
DAVIS	20	34.17	**34.21**	35.69	35.65
	30	32.45	**32.69**	34.06	34.04
	40	31.39	**31.60**	32.80	32.78
	50	30.26	**30.57**	31.83	**31.85**
Set 8	20	31.99	**32.01**	33.43	**33.46**
	30	30.61	**30.65**	31.62	**31.71**
	40	29.62	**29.83**	30.36	**30.42**
	50	28.61	**28.85**	29.41	**29.60**

V CONCLUSION

We present the RCD framework that allows noise to adjust time to control parameters. Unlike current denouncing techniques, RCD does not require multiple levels of training and cooperation. With the application of the Noise Decor relation module, the RCD transforms the denouncing control into a free operation, without the need to take control parameters from the network during the test, which allows reforming the times even if the modes of society are heavy. Various experiments using real image/drawing and video denouncing datasets show the power and effectiveness of our RCD.

REFERENCES

1. Abdelrahman Abdelhamed, Stephen Lin, and Michael S Brown. A high-quality denouncing data set for smartphone cameras. In *Proceedings of the IEEE Conference on Computer Vision and Pattern Recognition*, pages 1692–1700, 2018.

2. Eirikur Agustsson and Radu Oftentimes. Ntire 2017 challenge on single image super-resolution: Data set and study. In *Proceedings of the IEEE conference on computer vision and pat- tern recognition workshops*, pages 126–135, 2017.

3. Michal Aharon, Michael Elad, and Alfred Bruckstein. K- svd: An algorithm for designing over complete dictionaries for sparse representation. *IEEE Transactions on signal processing*, 54(11):4311–4322, 2006.

4. Saeed Anwar and Nick Barnes. Real image denouncing with feature attention. In *Proceedings of the IEEE/CVF international conference on computer vision*, pages 3155–3164, 2019.

5. Dario A Bini, Nicholas J Higham, and Beatrice Meini. Algorithms for the matrix pth root. *Numerical Algorithms*, 39(4):349–378, 2005.

6. Yochai Blau and Tomer Michaeli. The perception-distortion trade off. In *Proceedings of the IEEE conference on computer vision and pattern recognition*, pages 6228–6237, 2018.

7. Antoni Buades, Bartomeu Coll, and J-M Morel. A non-local algorithm for image denouncing. In *2005 IEEE computer socity conference on computer vision and pattern recognition (CVPR'05)*, volume 2, pages 60–65. Ieee, 2005.

8. Harold C Burger, Christian J Schuyler, and Stefan Harmeling. Image denouncing: Can plain neural networks compete with bm3d? In *2012 IEEE conference on computer vision and pattern recognition*, pages 2392–2399. IEEE, 2012.

9. Haoming Cai, Jingwen He, Yu Qiao, and Chao Dong. Toward interactive modulation for photo-realistic image restoration. In *Proceedings of the IEEE/CVF Conference on Computer Vision and Pattern Recognition*, pages 294–303, 2021.

10. Yuanhao Cai, Xiaowan Hu, Haoqian Wang, Yulun Zhang, Hanspeter Pfister, and Donglai Wei. Learning to generate realistic noisy images via pixel-level noise-aware adversarial training. *Advances in Neural Information Processing Systems*, 34:3259–3270, 2021.

11. . Prasadu Peddi, and Dr. Akash Saxena. "studying data mining tools and techniques for predicting student performance" International Journal Of Advance Research

Principal
Samskruti College of Engg. & Technology
Kondapur (V), Ghatkesar (M), Medchal Dist.

ZKG INTERNATIONAL

ISSN: 2366-1313

And Innovative Ideas In Education

Volume 2 Issue 2 2016 Page 1959-1967

Principal

Samskruti College of Engg. & Technology

Kondapur (V), Ghatkesar (M), Medchal Dist

ZKG INTERNATIONAL

UGC APPROVED | WEB OF SCIENCE INDEXED | ESTD Year: 1995

ISSN: 2366-1313 | web : http://www.zkginternational.com | e-mail : info@zkginternational.com

CERTIFICATION OF PUBLICATION

This is to certify that the paper entitled

"MACHINE LEARNING APROACHES FOR IDENTIFYING AND DEFENDING AGAINST RANSOMEWARE THREATS"

Authored by:

DR. MALLADI RAMAKANTH REDDY,JETPOL GOVIND SINGH,JUSHETTI SAIKUMAR,PERAM VISHNU VARDHAN, KANAPARTHI JAYANTH

From

Samskruti College of Engineering & Technology, TS, India, has been published in

ZKG INTERNATIONAL JOURNAL, VOLUME IX, ISSUE I, MAY 2024

UGC APPROVED JOURNAL

5.3

IMPACT FACTOR

Editor-In-Cheif **ZKG INTERNATIONAL**

Principal
Samskruti College of Engg. & Technology
Kondapur (V), Ghatkesar (M), Medchal Dist.

ZKG INTERNATIONAL

ISSN: 2366-1313

Benchmark Of Data Preprocessing Methods for Imbalanced Classification

[1]MR. V.Pranay, [2] Kankala Aravind,[3]Ragamshetty Ravi Teja,[4] Pasula Saikumar Reddy, [5]Sai Vishal Paka

[1] Assistant Professor, Dept. Of CSE, Samskruti College of Engineering & Technology, TS.

[2,3,4,5]B. Tech Student, Dept. Of CSE, Samskruti College of Engineering & Technology, TS.

Abstract: *The large elegance imbalance is one of the most important things that make it difficult to learn cybersecurity gadgets. Some of the rerecorded documents were introduced over time. This technique modifies the training data using oversampling, under sampling, or a combination of both to improve the overall performance of the classes encountered on that data. . Although these methods are used occasionally in cybersecurity, there is a lack of comprehensive, independent standards evaluating their effectiveness across a wide range of cybersecurity issues. This paper provides benchmarks of sixteen preliminary methods on six cybersecurity datasets as well as 17 public datasets from different sources. We test the following strategy in various hyper parameter settings and use the Auto ML gadget to train the class on a priori data, reducing the resources due to the specific choice of hyper parameters or classifiers. Special attention is also given to comparing strategies using comprehensive performance measures that are a true indicator of performance in today's global cybersecurity systems. The main conclusions of our study are: 1) Most of the time, there is a pre-teach that improves the course. 2) The simple do-nothing approach has achieved many of the strategic goals. Third) Oversampling techniques are often more effective than standard sampling. 4) The greatest overall performance has been added using the same old SMOTE algorithm and many complex strategies provide exceptional improvements at the cost of lower performance.*

Keywords: machine learning, cybersecurity, classification, imbalanced classification

I INTRODUCTION

A class of hassle is said to be unbalanced when the beauty before the appearance of at least one elegance, generally the elegance of pleasure, is less than the time

ISSN: 2366-1313

which passes by a certain beauty. Classroom distraction issues appear across the wide range of gadget mastery applications, including medicine [48], finance [47], [58], astronomy [32], and many others.

Particularly, in cybersecurity, to be honest, the most common classroom problems are unsustainable (e.g., cybersecurity [13], malware detection [18], phishing detection [21]). Furthermore, the greatest uncertainty is often too much, with the earliest of expressions of interest being 10-5 and decreasing [13] due to the fact that brutality and criminality are (fortunately) rare. For example, in network telemetry, most people recorded are related to regular (benign) visitors to the site, and only a small element is associated with bad activity. Interestingly, a class error in even a small portion of telemetry is associated with poor performance because the risk associated with poor activity and poor tracking is higher than the best of threats. more serious (for example, remote access to Trojan horses). ransomware, APT). The problem and importance of the class of unexpected vulnerabilities in cybersecurity was, to our knowledge, first mentioned by Axelsson [7] in 2000. Now, more than many years later, an incredible group is still one of the most important. which makes it difficult to acquire cybersecurity knowledge [5], [27].

Although the difference of a little elegance usually has no impact, as soon as it reaches the truth, the gadget has experienced class with the appropriate measurements that cannot be scientifically reliable from the data [31]. In this case, the classifiers will often turn out to be beasts for the greater part of the magnificence and neglect the underrepresented one, which makes the situation more correct, because the classifier predicts most of the people's elegance at all times. However, on the other hand, additional performance measures that reproduce the performance of each instruction are negative.

Over the years, this problem has attracted a lot of interest. Many specific techniques have been proposed to sequence all the important levels of machine learning design. These steps are [6]: 1) truth checking, 2) model training, and 3) model analysis. The practices in the first stage are formerly called data-level processes, while the process performed at the second level is called algorithm-level methods [34]. A number of literature reviews [15], [35], [54], [31], [34] documenting popular concepts and techniques in each phase have been published over time.

In this article, we note the statistical level approach required for the study

Principal
Samskruti College of Engg. & Technology
Kondapur (V), Ghatkesar (M), Medchal Dist

ISSN: 2366-1313

unbalanced in terms of sophistication. The idea behind this process is to focus on improving the distribution of educational materials to make it more unequal. This is done, in principle, either by oversampling the minority class or by sampling the magnificent population. Many such ideas have been published over the years, and each time their purpose has been controversial. The current situation regarding which strategies are appropriate to use at this time and which need not be difficult for little or no effect is uncertain. At worst, it can be hoped, the artistic process has been stopped with the help of the favorite field of less trouble or more usual. Our goal in this article is to develop information on the strengths, weaknesses, and various changes (all estimates and calculations) of many of the best-known degree ideas.

To achieve this, we carry out a quantitative analysis of the truth level approach of numerous documents through specialized software with particular dedication to the field of cybersecurity. We aim to evaluate ideas as objectively as possible on the ground, which we support.

II RELATED WORK

Over the years, many preliminary ideas suitable for intellectual conflicts have been published, but on the other hand, there is only a small amount of information that includes many of ideas and information. In general, every report introducing a new system has a test, but the resources of these tests are usually small. For example, a paper presents ADASYN [30] as a test on 5 data sets and compares the model only for SMOTE [16] and the simple selection tree root.

That said, there are already specialized classes that are needed to compare the prior methods, but most of them prefer to know which methods are more efficient than up sampling methods. Most of these studies [26], [3], [10] have also been conducted on large and small-scale datasets. An exception is the study by Kova'cs [36], which is voluminous in terms of comparing techniques and reference materials. However, it only focuses on the oversampling process and there are no tests in the field of cybersecurity. In addition, none of the above studies have done as well as researching the hyper parameters and the complete model as we do.

In the cybersecurity industry, Wheels et al. [59] compared several prior methods to the UNSW-NB15 data set [45]. Bagui and Li [9] compared five prior methods of six input networks to detect information and used a feed-forward neural network with a

Principal
Samskruti College of Engg. & Technology
Kondapur (V), Ghatkesar (M), Medchal Dist.

ISSN: 2366-1313

hidden layer for classification. Also, the maximum advance of known data Techniques are known and used in cybersecurity [1], [43], [2], [53], [8], but to our knowledge, larger comparative studies are not available.

Finally, previous research adds elements of individual processes into a multidimensional one. In general, this is the grade or average score of the process obtained across all the documents. In this article, we provide a density distribution plot instead of a single number. These charts show a more complete picture because the rankings tend to have high variance and overlapping data.

III BENCHMARKED METHODS

This step includes a set of predefined methods used in testing. For the sake of space, we refrain from reasoning and discuss with the real classes.

A. Oversampling methods

The oversampling method represents a useful way to solve the problem of randomness. The main objective of oversampling techniques is to modify the empirical distribution by increasing the value of the minority sample. Empirical distributions are modified by both copying existing models or creating new models until the desired parameters are satisfied. The most accurate method is called random oversampling, which, as it is called, randomly duplicates already present the sample in the data set.

One of the first and most widely used oversampling techniques that produces accurate samples is SMOTE [16]. He creates new synthetic models taking the lines of existing models starting from the less elegant ones. SMOTE considers, however, that all minimum standards are of equal importance. It does not include previous samples and does not take care of approximating the neighborhood of the sample. Various improvements have been proposed to overcome the shortcomings of the original SMOTE algorithm. We include 4 of these modifications in our evaluation, specifically Borderline SMOTE [28], SVM SMOTE [46], K stands for SMOTE [38].

Border SMOTE, unlike SMOTE, selects models of the smallest people with at least half of their neighbors who are public elegance. The idea behind this approach is that the few samples surrounded by the majority of samples are close to the so-called selection limit and are therefore important in the distribution.

Principal
Samskruti College of Engg. & Technology
Kondapur (V), Ghatkesar (M), Medchal Dist.

ISSN: 2366-1313

Offensive Language Detection on Social Media Based on Text Classification

[1] Mr.V.Pranay, [2]Vithanala Shravya, [3]Sunki Bhanuprakash, [4]Purugula Sai Suraj, [5]Perla Vinay Kumar

[1] Assistant Professor, Dept. Of CSE, Samskruti College of Engineering & Technology, TS.

[2,3,4,5]B. Tech Student, Dept. Of CSE, Samskruti College of Engineering & Technology, TS

Abstract: Poor communication has affected social media products. One of the unique answers to this problem is to use a computational method to perfectly separate the data. In addition, the user relationship is considered a commercial relationship. In this view, we present the class content which includes the domestic operation and tokenism model, 3 combinations and eight classes. Our tests show that it is useful for detecting suspicious messages on the data we receive from Twitter. Considering the hyper parameter optimization, our Ada Boost, SVM and MLP schemes have the best undifferentiated F1 among popular shared TF-IDF methods.

Keywords: cyber bullying; adolescent safety; offensive languages; social media.

I. INTRODUCTION

Textual elegance is the process of dividing information into pre-record sentences based on their content. The text is the objective characteristic of the natural text for the first class. The class is essentially a text content retrieval framework, which takes the text in the question of man or woman, to extract some information and statistics from content fabric know-how, which changes the text in many ways, including increasing the fabric, answering questions. . , select or delete files. Paper mining has become one of the most famous areas of the time that involve many research methods, especially in computer generation, information retrieval (IR), and statistical mining. Natural language processing (NLP) is used to extract insights from real-world data collected by human users. Text mining reads the unnecessary statistics to provide the appropriate sample in the shortest possible time [1]. Today, social networking sites are one of the most important businesses of the information age because most people around the world use these sites every day to keep everything safe. . Social network sites are developing new strategies to interact with people in the larger community [2]. Chatting allows customers to talk to people who show courtesy and

ISSN: 2366-1313

value. Websites provide a valuable context for human interaction, leading to collaborative knowledge and skills. In social media, it has become more common not to write a sentence with correct grammar and spelling. This exercise can also be confusing the truth, especially lexical, syntactic and semantic, and because of the form of statistics is not clear, it is very difficult to understand the truth. Therefore, extracting the hypothesis with the first-class data from the unnecessary recorded data is important for the evaluation time [3]. Community evaluations have been carried out in recent years due to the growing closeness to stakeholders in all aspects of society. Speech is made up of images and the fact of connection is used by a wide range that can be used for many purposes. The analysis of social media messages from the advice against the important time of social analysis. This treatment is quantitative, assisted by important researchers in this context that allows a good need for statistics in the study of social relations that share combining community strategies, algorithms of search patterns and content analysis in discussions [4]. With the advancement of social media, people get time and some information is available 24/7. Social media includes forums and blogs where people can easily join together. Social media in particular is described as "a cheaper and more advanced digital device that supports all physical aspects and at the same time allows access to the truth, cooperation and sharing join together, or form a meeting." A lot of research has been done on the site trying to better understand the size of the free content created by the users. Research areas of e-commerce, smart transportation, smart cities, cybercrime and more. There is no exception. However, it is difficult to extract valuable and actionable information from customer-generated content. Since each social media provider has its own privacy policy and restrictions. Advanced metrics are often used for computing and research [5]. As a result, social media posts are often short, informal, with hundreds of abbreviations, jargon and slang ending in inappropriate words. As the above mentioned the benefits of social media, social media has become an important part of our daily life.

II. REVIEW OF LITERATURE

Violative language detection

The analysis of cyberbully, violence, hate speech, toxic speech and negative comments in social media has long attracted the interest of the research community. There are many public facts

ISSN: 2366-1313

that need to be made public to show the breakdown to athletes. However, there is no comprehensive information or school teaching that can be combined to achieve a better machine. Kumar et al. (2018). The information provided includes 15,000 Face e-books that speak and comment in English and Hindi. The goal is to distinguish our words: no aggressiveness, hidden competition and aggressiveness. Chemistry Club's comments were criticized on Kaggle. Various methods were evaluated for this review of information, including users having a Wikipedia contribution. These words are divided into 6 types: chemical, chemical, obscene, random, insulting and hateful. Concerning the identification of hate speech, Davidson et al. (2017) provided data on modern hate speech with over 24,000 English tweets divided into 3 classes: non-offensive, hate speech, and hate speech. Mandl et al. (2019) discussed shared responsibility regarding speech violence when our data is extracted from Twitter and Facebook and made available in Hindi, German, and English. Furthermore, Zampieri et al., 2019, Zampieri et al., 2020 provide several results on the search for ambiguous words in specific words received by the group against Sem Eval.

Text in many languages

Multilingual textual content type is a phenomenon in textual content type. However, little or no work has been done in this area. First, Lee et al. (2006) proposed a method for categorizing multilingual textual contents using latent semantic indexing techniques. This method provides a multilingual presentation of English and Chinese datasets. In each different table, Prajapati et al. (2009) presented a process based on translating data into recognizable sentences and then creating classes. They documented the use of Word NET to map sentences to templates and then classify the points, using the Rocchio linear classifier and the probabilistic Naive Bayes and K-Nearest Neighbor (KNN) methods. Amini et al. (2010) studied MTC by combining semi-discovery techniques, including ensemble-based and consensus-based self-learning. They master the Reuters Corpus Volume 1 and a pair (RCV1/RCV2) in five languages: English, German, French, Italian and Spanish. The authors analyzed their strategies using six strategies: Boost, co-regularized boosting, boosting with self-learning, Support Vector Machine (SVM) with self-learning, co-regularization + self-education, and boosting with complete self-training. Training. Bentaallah and Malki (2014) compared global Word Net-based methods

Principal
Samskruti College of Engg. & Technology
Kondapur (V), Ghatkesar (M), Medchal Dist.

ISSN: 2366-1313

for classifying multilingual texts. Before relying on the translator, immediately enter Word Net and use the conflicting method to remember what most of the terms mean when used well. While the second one does not include Word Net translation and search related to all languages. Mittal and Dhyani (2015) discussed multilingual classroom learning based on N-gram technique. They watch MTC in Spanish, Italian and English. They are performed by predicting the language of the data and using Naïve Bayes in the cross section. Recently, Kapila and Satvika (2016) solved MTC problems in Hindi and English using special tools to recognize algorithms including SVM, KNN, decision tree, map identity, and genetic algorithms. They improve the accuracy of the method by using various options.

Recently, deep neural networks and context-aware embedding have been proposed in the context of English texts (Liu and Guo, 2019 and many others).

In the emergency, even if there is a lot of work in different languages, MTC is somehow poorly documented and little studied.

III. RESEARCH METHODOLOGY

In this analysis, we focus on a modular statistical delivery pipeline with a modular protection level and tokenism our integration strategy and 8 classifiers. The experiment conducted in this study is all based on Twitter and the data has been carefully edited. Although we do not guarantee that our framework can be effective on all relationships, it has the potential to provide future research for researchers and organizations. The broad implications of this article may be related to the investigation of online crime on social media. In addition, because of the individual characteristics of social media, it is impossible to generalize the model for all platforms. For example, this shows that training classes on Reddit is more difficult than Gab because of the average deployment time.

This section provides a brief description of the ladder as well as how to compete and collect data as well as complete the tests. Also, Figure 1 shows a diagram of this step, mentioned below.

A) Information preparation

Data preparation is the first step of learning binary classifiers. The training materials, which should be used carefully, are defined as follows:

- **Simple cleaning techniques:** We need to make the data smooth by (i) removing clear text from the file, removing duplicates and NaNs (ii) reproducing

Principal
Samskruti College of Engg. & Technology
Kondapur (V), Ghatkesar (M), Medchal Dist.

ISSN: 2366-1313

lowercase text (iii) expand the abbreviations.

� **Slangs:** Given the way blogs run on Twitter, the use of slangs is common. Slangs create problems for literary studies, especially for those that have appeared recently and, therefore, now there is no entry in a dictionary. We therefore plan to convert the text into the canonical form using the dictionary using 1 for slangs and abbreviations.

� **Removal techniques:** The use of hashtags, user profiles, hyperlinks and emojis is one of the most common forms of advertising. Therefore, data prepossessing and selective removal of standard templates are important to standardize the text.

� **TF-IDF:** A way to represent words in vectors takes into account the number of words found in the entire document. One of the disadvantages of this process is the importance of information in the literature. Compared to the word counting method, TF-IDF classifies the components of the sentence according to their relative frequency.

� **Word2Vec**: The word2vec approach takes a body of text as input and returns sentence vectors as output. It has two version architectures to make a distributed representation of the article. The non-stop bag-of-words (CBOW) architecture predicts regular sentences based on context (large window), and Cross-gram predicts surrounding words (set window) according to the peak words.

�.• **Fast Text:** Fast Text represents a low dimensional vector text that is generated by summing vectors corresponding to the words in the text. Neural Network is being used in Fast Text for word embedding. Fast Text model is often compared to other deep learning classifiers with a higher speed and accuracy for training and evaluation.

Principal
Samskruti College of Engg. & Technology
Kondapur (V), Ghatkesar (M), Medchal Dist.

ISSN: 2366-1313

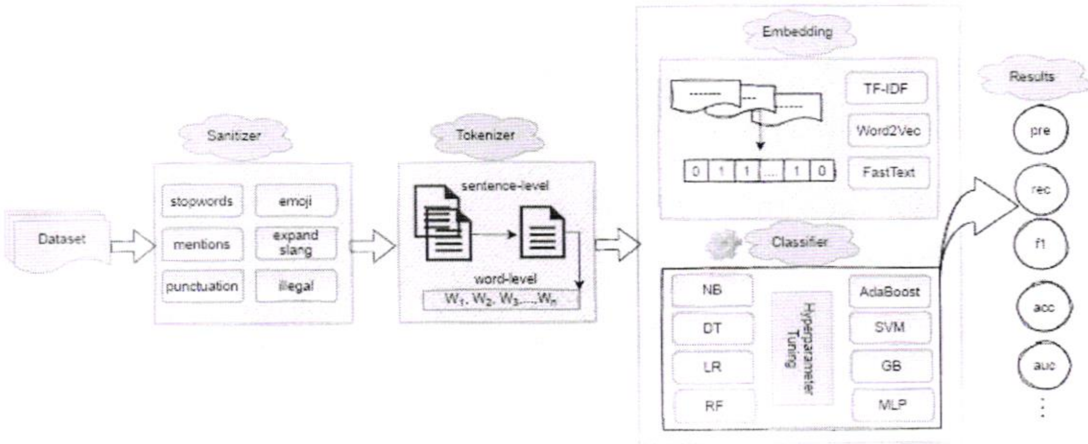


Fig.1 The modular experimental setting with the flow of data from data set to results.

A) Using Text Mining Techniques to Detect Online Offensive Contents

Identifying suspicious posts on social media is a difficult task because the content of surrounding posts is often poorly developed or even incorrect. When protection strategies with the advantages of social media are not enough today, researchers have learned smart strategies to choose offensive content using data mining techniques. Using word mining techniques to search data online requires the following levels: 1) data acquisition and prioritization, 2) feature extraction, and three) classes. The main influence of using paper mining to come across suspicious content depends on the selected feature which allows you to describe it in the following sections.

C) Language degree feature extraction

The content of the majority of information retrieval searches is equipped with several skills: lexical and syntactic skills. Lexical ability to treat each word and each word as a place. Language patterns combined with keyword occurrence and frequency are regularly used to mark language version. Early studies used Bag-of-Words (BoW) in crime detection. The BoW approach treats text as an incorrect set of content and ignores syntactic and semantic information. However, using my own Bow methods is not easy to report any truth in suspicious word finding, however, it still comes with the price of too many falsely pleasant arguments, defenses against arguments of others or discussions. close friends. The N-gram technique is considered a complex technique that takes the words closest to the correct content to the desired violation content. N-grams represent the sequence of

Principal
Samskruti College of Engg. & Technology
Kondapur (V), Ghatkesar (M), Medchal Dist.

ISSN: 2366-1313

N non-stop sentences in the text. Bi-gram and Tri-gram are the most famous N grams used in textual content mining. However, N-gram suffers from problems when searching for separate content using long chunks of text. Only increasing N can reduce the problem, but will gradually reduce the working rate of the tool and bring more false quality. Syntactic functions: Although lexical features are effective in detecting the attack, regardless of the structure of the entire sentence, they do not distinguish sentences containing the same word even though in the correct order. Therefore, to keep in mind the syntactic skills in the sentences, the natural language parser are made to analyze the sentences in the grammatical systems before the selection function. Setting up with an analyzer can help avoid choosing irrelevant keywords as crime detection performance.

D) User-level criminal investigation

Most current research on online hate speech shows an interest in phrase-level and phrase-level constructions. Since no detection method is 100% accurate, if customers connect to low-quality products (e.g. on online customers or websites), they depend on the constant uncertainty that affects the content of the attack. However, buyer-level discovery is more difficult and research related to review behavior is largely missing. There are certain restrictions on strength of character.

E) Machine control algorithms

Naive Bayes (NB) and SVM are used as classifiers, and a 10-fold pass validation is performed on this view. To examine all the benefits of the customer service clause (LSF), the ability to avoid, the capacity and the content of the product clearly for the customer to make wrong assumptions, we introduced them sequentially into the distribution and obtained the result in our image. The Weak Power method clearly uses complaints as a basis for researching customer complaints. Similarly, the "LSF" method of criminal sentencing is created using the LSF and is used as a character.

IV. EXPERIMENTAL RESULTS

This section describes the specific experiments we conducted to evaluate LSF in the search for complaints in social media. Data description The test data, taken from YouTube's comments on the forum, is the publication of advertisements in response to the top 18 films. Video clips include thirteen categories: Music, Cars, Entertainment, Education, Entertainment, Movies, Sports, Style, Documentary, Nonprofits, Animals, Technology Research, and Sports. Each level of advertising includes the buyer's personal information, time and content. User privacy includes

ISSN: 2366-1313

the author who posted the comment, the exact time the comment was converted into a post, and the content of the comment including the person's comment. agreed. The database includes reviews from 2,175,474 great customers.

Prepossessing Before passing the data set to the classifier, prepossessing automatically collects the sentences for everyone and breaks them into sentences. For each sentence in the sample data set, computerized spelling and spelling correction precedes the appearance of the sample data set for the classifier. Using the Word Net corpus and editing algorithm 2, correcting spelling and sentence errors in incomplete sentences, using tasks that include publishing content in sentences, removing leave unnecessary characters, department of long words, alternative text. . And make adjustments. Incorrect letters and missing letters in the message. Therefore, terms without letters, which include "spelling", are corrected to "spelling"; Incorrect sentences, which include "yes", are replaced with "of course". ▯� Place test in Sentence Crime The test compares 6 sentence predictions: a) Bag of Sentences (BoW): BoW method ignores grammar and orders and procedures by reviewing whether or not to include each buyer's information. Improper usage and instructions. This process is also done as a benchmark. B) 2 grams: The N-gram method shows the unsatisfied sentences using independent control of each part of n sentences in the sentence and examines whether the sentences include all the diagnostic sentences and terrible. . In this approach, N is the same as two; he also works as a diploma. C) three grams: N-gram approach, determine all parts of three words in a sentence. It also follows the pattern. D) 5-grams: N-grams gadget, each determines a part of 5 sentences in a sentence. It also follows the same vintage.

V. Evaluation Metrics

In our take a look at, the category standards inside the diagnostic analysis (e.g., precision, keep in mind, and f-score) are used to assess the overall performance of the LSF. The truth is especially capable of sharing records that can represent dangerous messages. Returns the overall fact of the class, which represents the percentage of diagnosed crime. The fake tremendous (FP) price represents the share of instructions that are not actual fake positives. The fake superb (FN) charge represents the share of actually dangerous messages that are not recognized. The F-rating is a weighted common among genuine and inverse, because of this:

Principal
Samskruti College of Engg. & Technolog
Kondapur (V), Ghatkesar (M), Medchal Dist

ISSN: 2366-1313

$$f - score = \frac{2(precision \times recall)}{precision + recall}$$

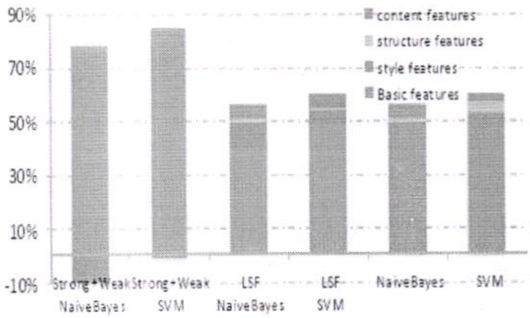


Fig.2 F-score for different feature sets using NB and SVM

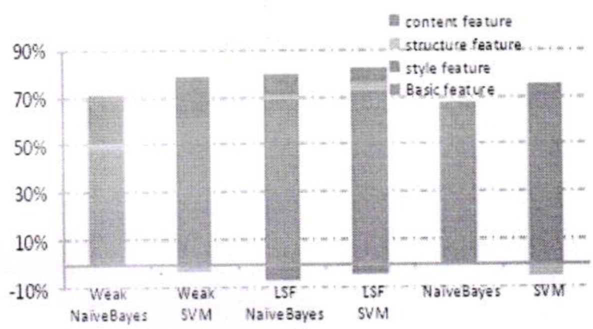


Fig.3F-score for contrary feature sets using NB and SVM (without weakly hit-and-run words)

V. CONCLUSION

In this analysis, we learn about modern content creation strategies to investigate suspicious content for the safety of young people online. In these images, we display the content of the video in the database of social networks, especially on Twitter. Our goal is to promote modular development that allows the smooth use of a combination of specific elements. This recording is very important if it provides new details of the pipeline to be evaluated by measuring the effectiveness. Quality, performance and quality are highlighted by the use of the new logo.

REFERENCES

1. P. Hajibabaee, F. Tourmaline-Anaraki, and M. Hariri Ardebili, "An empirical evaluation of the t-sne algorithm for data visualization in structural engineering," in 2021 IEEE International Conference on Machine Learning and Applications. IEEE, 2021.
2. S. Zad, M. Heidari, J. H. J. Jones, and O. Uzuner, "Emotion detection of textual data: An interdisciplinary survey," in 2021 IEEE World AI IoT Congress (AIIoT), 2021, pp. 0255–0261.
3. S. Zad, M. Heidari, J. H. Jones, and O. Uzuner, "A survey on concept-level sentiment analysis techniques of textual data," in 2021 IEEE World AI IoT Congress (AIIoT), 2021, pp. 0285–0291.
4. M. Heidari, S. Zad, B. Berlin, and S. Rafatirad, "Ontology creation model based on attention mechanism for a specific business domain," in 2021 IEEE International IOT, Electronics and Mechatronics Conference (IEMTRONICS), 2021, pp. 1–5.

ISSN: 2366-1313

5. M. Heidari, S. Zad, and S. Rafatirad, "Ensemble of super vised and unsupervised learning models to predict a prof table business decision," in 2021 IEEE International IOT, Electronics and Mechatronics Conference (IEMTRONICS), 2021, pp.
6. A. Esmaeilzadeh, M. Heidari, R. Abdolazimi, P. Ha jibabaee, and M. Malekzadeh, "Efficient large scale nlp feature engineering with Apache spark," in 2022 IEEE 12th Annual Computing and Communication Workshop and Conference (CCWC). IEEE, 2022.
7. R. Abdolazimi, M. Heidari, A. Esmaeilzadeh, and H. Naderi, "Map reduce processor of big graphs for rapid connected components detection," in 2022 IEEE 12th Annual Computing and Communication Workshop and Conference (CCWC). IEEE, 2022.
8. M. Malekzadeh, P. Hajibabaee, M. Heidari, and B. Berlin, "Review of deep learning methods for automated sleep staging," in 2022 IEEE 12th Annual Computing and Com munication Workshop and Conference (CCWC). IEEE, 2022.
9. A. Razavi, D. Inkpen, S. Uritsky, and S. Matwin, "Offensive language detection using multi-level classification," Advances in Artificial Intelligence, vol. 6085/2010, pp. 16-27, 2010.
10. Mahmud, Ahmed, Kazi Zubair, and Khan, Mumit "Detecting flames and insults in text," in Proc. of 6th International Conference on Natural Language Processing (ICON' 08), 2008.
11. D. Yin, Z. Xue, L. Hong, and B. Davison, "Detection of harassment on Web 2.0," in the Content Analysis in the Web 2.0 Workshop, 2009.
12. Z. Xu and S. Zhu, "Filtering offensive language in online communities using grammatical relations," in Proceedings of The Seventh Annual Collaboration, Electronic messaging, Anti-Abuse and Spam Conference (CEAS'10), 2010
13. Prasadu Peddi, and Dr. Akash Saxena. "studying data mining tools and techniques for predicting student performance" International Journal Of Advance Research And Innovative Ideas In Education Volume 2 Issue 2 2016 Page 1959-1967

Principal
Samskruti College of Engg. & Technology
Kondapur (V), Ghatkesar (M), Medchal Dist.

ISSN: 2366-1313

An Enhanced Stress Based Hair Fall Detection and Prevention Using KNN and Machine Learning

[1] Mr.B.Laxmipathi, [2]Bommu Akhil, [3]Khaja Naseeruddin Mubashir, [4]Basaraveni Suresh

[1] Assistant Professor, Dept. Of CSE, Samskruti College of Engineering & Technology, TS.

[2,3,4]B. Tech Student, Dept. Of CSE, Samskruti College of Engineering & Technology, TS

Abstract: *Many matters can have an effect on some human's mood, causing hair loss. Due to the variations in worker development, disturbing methods and overwork, the risk is better than other personnel in the IT area. Depression, tension, dependency and illness are simply a number of the cognitive problems that result in despair and demise. Therefore, it's miles important to recognize the human mind in the early ranges so that appropriate treatment and stress can be reduced. Many studies were done on high estimates. By increasing the pores and skin, hair turns into a part of someone's beautiful face. The outcomes of some artificial intelligence, which include KNN, are better. Other intelligent techniques, including ML algorithms, can be used to discover insects.*

Key Words- Machine learning, K-Nearest Neighbour Algorithm, Hair fall detection, Stress, Pressure.

I. INTRODUCTION

Hair, a protein made of keratin, is associated with masculinity and beauty. There are approximately five million hair follicles in the human body. Hair on the scalp regulates temperature and protects the brain from overheating. A healthy person has one hundred thousand hairs on their head and most lose between 50 and 100 hairs every day. Hair is no longer a problem. However, in different situations, hair and scalp problems receive more attention due to autoimmune diseases, hormonal imbalances, environmental pollution, changes in flowers in the stomach and liver, of body and mind. Seasonal changes, unsafe vitamins, loss of micro nutrients, genetic susceptibility and adverse reactions all contribute to stress in the natural environment. Although the conditions cause hair loss in unmarried areas, few can walk. Hair transplants and antibiotics are important in some cases. Some infections require the use of antibiotics because they can be caused by bacteria or fungi. Some conditions that cause hair loss include diverticulitis and psoriasis. Regular hair loss is based on the characteristic, which leads to baldness that covers the entire scalp. Sporadic hair loss

ISSN: 2366-1313

for specific reasons can be caused by various diseases. "A lot of hair loss" is the definition of hair loss [1]. Autoimmune diseases are known to cause hair loss in patches covering the entire scalp and targeting hair loss [2, 3]. Millions of people in the business world keep a low profile with this example [4]. Especially people with a circle of relative information on specific areas ta [5]. The process began to evolve and intensify when the immune system began to evolve to attack hair follicles, affecting their daily characteristics and recently stopping hair growth, which causes baldness. Tracheotomies and biopsies must be regular because there are many causes of hair loss, making a special analysis almost impossible. However, one of the drawbacks of these tests is the uncertainty of the large number of measurements necessary for an adequate evaluation. Therefore, it is necessary to search for new strategies for the expansion and diagnosis of specific domains [6]. Many conditions and conditions can be successfully recorded and predicted using research tools[7].

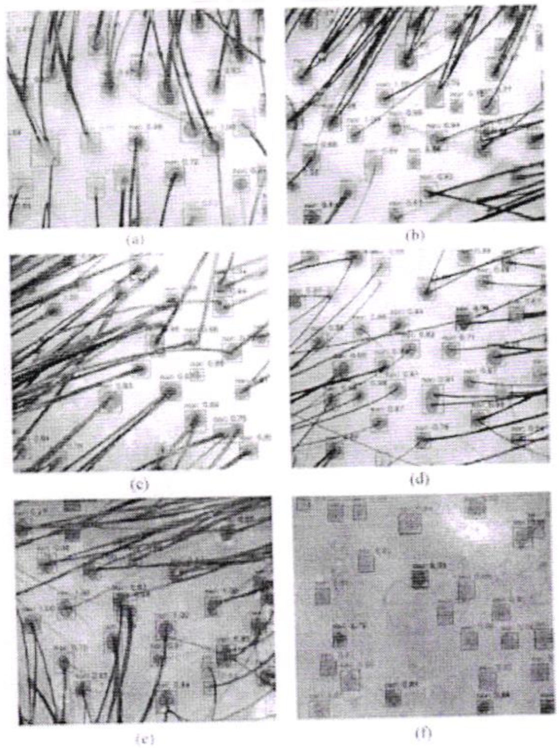


FIG 1.1 HAIR FOLLICLE CLASSIFICATION[21]

II LITERATURE SURVEY

Determine the degree of hair loss from the face photo and use the connection with achieve. [1] It has been claimed that human being's shallowness and morals are affected by hair loss. The possibility to take away issues and comprehend them is far away. This evaluation evaluates the usage of a strategy to degree hair loss in guys the usage of facial imaging. A matching technique is generally encouraged to proportion the face image [2] in keeping with the economic commercial organization beauty table for male sample baldness. It is thought that generations divide wholesome hair and certain areas. [3] Using hair snap shots with

ISSN: 2366-1313

extraordinary colors, textures and shapes, K-nearest pals and a help vector gadget have been used for this assessment to create layers. Fashionable categorization for particular areas and healthful hair. From the evaluation in the strive, the hair and scalp strength from the check tool, diverticulitis, dandruff, oily hair and hair loss are a number of hair and hair issues in guys who've many people. Because of the horrific each day normal, bad eating regimen, loss of strain and pollution inside the surroundings. Recently, precise treatments which include scalp hair physiotherapy have been achieved to solve scalp problems. [5] Control systems are used regularly in research to elevate awareness of hair problems inside the Bangladeshi financial system. Men and ladies' beauty is represented by means of way in their hair. Due to mistakes or irregularities, we begin losing our hair early. Hair loss influences many men and women across the area, and masses of women experience it each year. Dandruff, allergic reactions and infections are the number one motives of hair loss.[6] By the usage of hair pictures with features, that is additionally speculated to provide a categorization model for people.

Healthy hair round vector gadgets (SVM), neighbor extract and watermark (KNN) image, color and texture algorithms are used. The guide vector machine the use of SVM and neighbor (KNN) accuracy is 91.4%. This facts set shows the effectiveness of the goals and reliability for categorizing the content material of the hair. However, destiny research on the use of deep analyzing strategies, which consist of neural networks (CNN), can be completed and integrated into the techniques present day.[7] Hair loss is aimed toward the usage of the deep enjoy with Face Pix. To take gain of this, we created a chart based on the Hamilton-Nor wood categorization machine for hair loss. In this situation, the statistics had been converted proper right into a picture via manually annotating the face image. This reality is also strongly designed the use of a few storage strategies to lessen the effect of failure. Tests have been performed to reveal that with quite some use it is feasible to assume hair loss from the face form.[8] Future research can compare the segmentation of immoderate-granularity focused face pics based on statistical augmentation techniques (head cropping). Future research might also even consist of integrating the diagnostic standards at the equal time as optimizing the overall performance of each.[9] For scalp remedy software software, it is often recommended to apply Scalp Eye, a tool that uses deep mastering to hit upon and examine hair.

ISSN: 2366-1313

The use of digital devices, small hair and unique gadget make this tool the best. The improvement of medicine that have an impact on everybody and target all of the hair loss in place of a unmarried hair loss, which incorporates hormones, is the wish for hair remedy. This will assist to ensure that there can be a nice effect at the research.

III METHODOLOGY

A. Existing system

The situation of the hair and scalp may be unpleasant. In a few cases, the affected man or woman can't distinguish between ordinary and irregular hair [1,19]. It takes time to evaluate hair problems due to the fact dermatologists want to examine the frame and medicinal drugs. Therefore, no longer all tests are done in a well timed way, on the way to increase the severity of ache. To prevent life-threatening illnesses like most cancers and tumors, responses primarily based on complete neuronal companies have been used in many industries, consisting of health and well-being inside the meals enterprise [12]. One hundred and fifty photos have been amassed from one of a kind gadgets and processed to reduce errors through discarding, measuring, balancing and improving statistical pictures. These equipment percentage information and sufferers while offering advanced symptom know-how. The 3 primary varieties of hair loss and scalp conditions that we neglect to keep in mind in this context are particularly psoriasis and diverticulitis. The attempt, however, have become tough due to the shortage of studies at the problem, lack of proper records, and the extent of different pix of the damaged image for the duration of the community.

Areas: Stereoscopic strategies, which encompass removal of incompetent hairs from scalp pix, are proposed; but, the prediction appears invisible whilst the use of snap shots.

 At the technology level, it's far a brand new assessment of a selected area the usage of the mixture of laptop vision, foreknowledge and imaging techniques.

In one of the first research, neural networks had been located to be an automatic categorization system for early detection and precise treatment. Based on the scalp characteristics, the input photo is used by the tool to categorize the scalp photo.

 Eighty-5 percentage of switch training skip. In one particular view, the unique device weighting technique became used to measure scalp snapshots.

 Sight is allowed to look for thick hair.

Principal
Samskruti College of Engg. & Technology
Kondapur (V), Ghatkesar (M), Medchal Dist.

ISSN: 2366-1313

KNN

This attempt benefited from the diagram supplied in ref [8]. It especially handles the categorization and forecasting of call for situations in the commercial enterprise surroundings. KNN satisfies both conditions and can be used [9].

Because it now not memorizes data, KNN is a bad set of rules [10]. The K-maximum method (KNN) estimates the cost of recent facts the usage of "characteristic similarity," which additionally indicates how to pay attention to new products in addition to others. Language at faculty. [11]

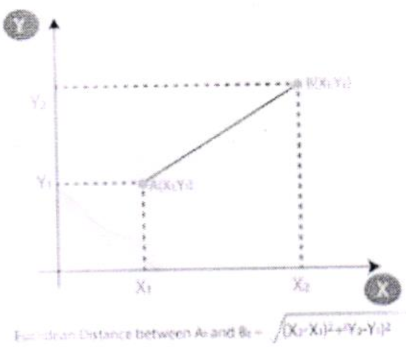


FIG 2 K-NEAREST NEIGHBOR ALGORITHMFOR MACHINE LEARNING

B. Working of KNN Algorithm:

Using the K-Nearest Neighbors (KNN) approach to estimate the importance of new information factors the use of "feature similarity", similarly indicating that the rate assigned to new records will depend upon how it appears in terms of schooling.

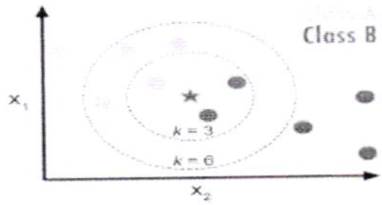


FIG 3. DATASET COLLECTION FOR KNN

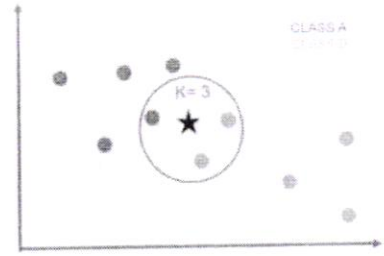


FIG 4 PLOTTING POINTD TO THE ACCURACY

C. Proposed System

In these research, the extent of hair loss is envisioned using distinctive attributes. ML turned into used to check this color.

➲�In general, 60% of the facts are used for education, 20% for validation, and 20% greater for neural network mastering [13] Many studying algorithms are used for this motive.

The effects of using these algorithms had been blended. It seems that neural networks are effective in predicting hair loss [14]. A bendy and wearable environment with advanced surroundings is Anthony

It become designed to offer a lightweight, compact, and low-fee improvement surroundings (IDE).

➲� Thorny best calls for GTK2 gear, that is why you best want the GTK2 runtime

Principal
Samskruti College of Engg. & Technology
Kondapur (V), Ghatkesar (M), Medchal Dist

ISSN: 2366-1313

libraries hooked up for the cause of running it.

This is because all different goals have end up as impartial as possible from a specific surroundings together with KDE or GNOME.

We have statistical techniques that may be organized under.

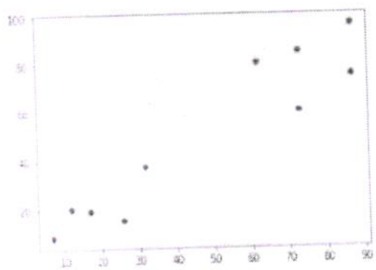


FIG 5 IT SHOWS THE NEW DATAS WITH RED AND THE LEVELS OF HAIRFALL.

D.Module and discussion

Step 1: Data set Collection

Every implementation of an set of guidelines requires records. Therefore, in some unspecified time in the future in the essential segment of KNN. [18]. KNN makes use of the entire information series when classified for gaining knowledge of capabilities in preference to unique capabilities, making it a lazy learner. Because it loses the mindset of the underlying fact, KNN is likewise a fixed of debatable research.

Step 2: Training

Use one of the techniques mentioned in [15] to decide the area of every row of faculty statistics and overview the information. Hamming, Manhattan or Euclidean distance. Now arrange them steady with the distinction rate in ascending order. The first K row of the guide desk is selected inside the next section. Now it'll assign a rank to the index based totally on the very pleasant common of those lines.

Step 3: KNN Testing

Calculate the similarity a number of the input model and each getting to know instance to generate predictions in actual time [16]. To healthy the shape of your enter statistics, one of a type distances must be measured. The effects are taken into consideration and the kind is finished [17].

Step 4: Repair

Provide solutions for hair loss as wanted.

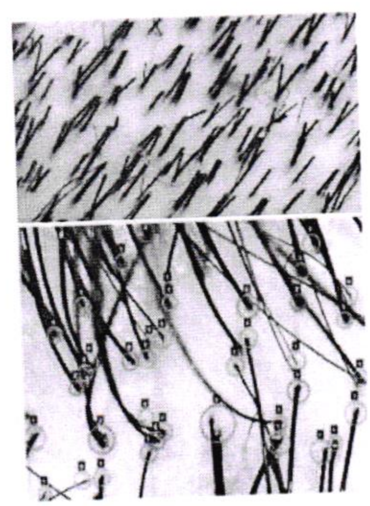


FIG 6 HAIR FOLLICLE CLASSIFICATION IN

IV RESULTS

Principal
Samskruti College of Engg. & Technology
Kondapur (V), Ghatkesar (M), Medchal Dist.

ISSN: 2366-1313

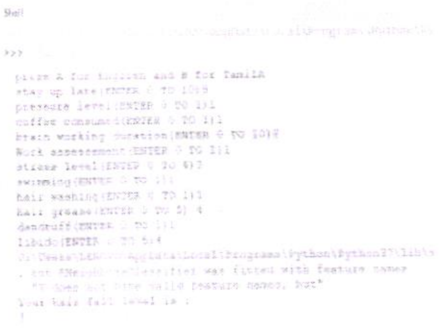


FIG 7 THE QUESTIONS ARE ASKED IN ENGLISH AND DEMONSTRATES THE INDIVIDUAL RESULT.

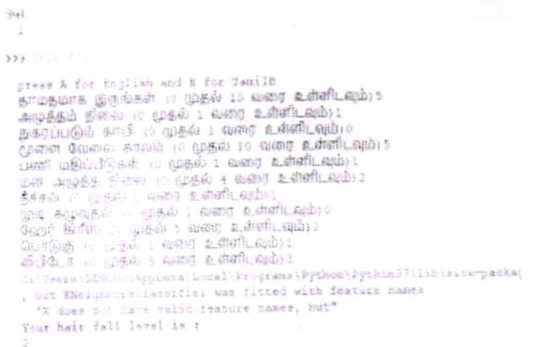


FIG 8 QUESTIONS ARE ASKED IN TAM IL ANDTESTED THE VALEUES FOR PREDICTING THE RESULTS FRPM AFFECTED PEOPLE.

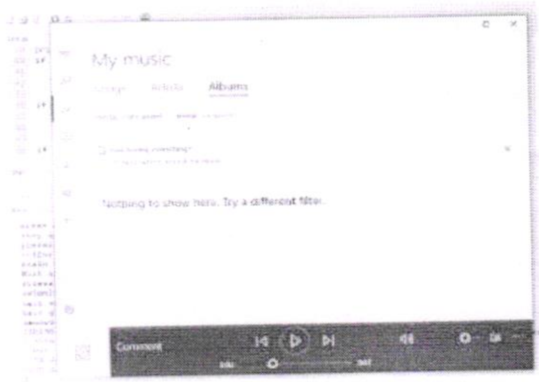


FIG 9 SUGGESTIONS ARE GIVEN BY MP3PLAYER.

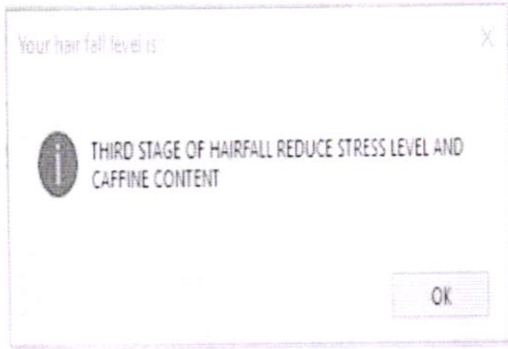


FIG 10 SUGGESTIONS ARE GIVEN IN TEXT FORMAT, THIS TEXT DEMONSTRATED THESTAGE OF HAIR LOSS AND CURE.

V Conclusion

Although early detection of hair fall and scalp problems is critical inside the recovery method. Hair loss and scalp issues are often misdiagnosed because of lack of information and lack of facts. An AI-primarily based approach can assist hit upon illnesses at an early diploma. In this work, a tool learning technique becomes advanced to make sure that 3 hair types are expected. Evidence also may be sought the usage of this approach. Through the proposed system, maximum human beings with hair and scalp troubles will advantage from early remedy alternatives and a higher expertise of the way conditions are labeled via using docs and sufferers. Therefore, the usage of hair image, hair kind for healthful hair and especial region ta is proposed. K-nearest is used to extract attributes from pix which includes coloration, texture and shape. The

ISSN: 2366-1313

accuracy of utilizing the guide vector tool is 91.Four%. These results certainly display that the beauty device is robust and dependable in classifying companies of hair photos.

REFERENCES

1. Halim Benhabiles, Karim Hammoudi, Ziheng Yang, Feryal Windal, Mahmoud Melkemi, Fadi Dornaika, and Ignacio Arganda-Carreras, "Deep Learning based Detection of Hair Loss Levels from Face Pictures", 2019 Eighth International Conference on Image Processing Theory Tools and Applications (IPTA).

2. Xin Zhang, Ruonan Zheng, Jinwen Lin, Yanru Zeng, and Yuming Zheng, Development of AI Hair Follicle Detection System and Associated Biomedical Goods, 2021 International Conference on Networking Systems of AI (INSAI).

3. Farhana Khatun, Moshfiqur Rahman Ajmain, Sharun Akter Khushbu, Nushrat Jahan Ria, and Sheak Rashed Haider Noori, "Survey-based Machine Learning approaches to diagnosis of hair fall disorder in Bangladeshi Community," 2022 13th International Conference on Computing Communication and Networking Technologies (ICCCNT).

4. Farhana Khatun, Moshfiqur Rahman Ajmain, Sharun Akter Khushbu, Nushrat Jahan Ria, and Sheak Rashed Haider Noori, A Deep Learning-Based Scalp Hair Inspection and Diagnostic System for Scalp Health, IEEE Access "Survey-based Machine Learning approaches to diagnosis of hair fall disorder in Bangladeshi Community," 2022 13th International Conference on Computing Communication and Networking Technologies (ICCCNT).

5. S Aditya, Sanah Sidhu, and M Kanchana, Prediction of Alopecia Areata Using Machine Learning Approaches, 2022 IEEE International Conference on Data Science and Information System, (ICDSIS)

6. Jian-Ping Su, Liang-Bi Chen, Chia-Hao Hsu, Wei- Chien Wang, Cheng-Chin Kuo, Wan-Jung Chang, Wei-Wen Hu, and Da-Huei Lee, An Intelligent Scalp Inspection and Diagnosis System for Caring for Hairy Scalp Health, 2018 IEEE 7th Global Conference on Consumer Electronics (GCCE)

ISSN: 2366-1313

7. Hasanzadeh H, Nasrollahi S, Halavati N, Saberi M, and Firooz A. Male pattern hair loss treatment using 5% minoxidil topical foam: effectiveness, safety, and patient satisfaction. 2016; 25(3):41-44. Acta Dermatological Alp Pannonica Adriat.

8. Avital Y, Morvay M, Gaaland M, Kemny L, Investigation of the international epidemiology of and rogenetic alopecia in young Caucasian men using images from the Internet,. Indian Journal of Dermatology. 2015; 60(4):419.

9. Prasadu Peddi, and Dr. Akash Saxena. "studying data mining tools and techniques for predicting student performance" International Journal Of Advance Research And Innovative Ideas In Education Volume 2 Issue 2 2016 Page 1959-1967

Principal
Samskruti College of Engg. & Technology
Kondapur (V), Ghatkesar (M), Medchal Dist.

ZKG INTERNATIONAL
ISSN: 2366-1313

Agriculture Soil Analysis, Classification and Crop Suitability Recommendation Using Machine Learning

[1]Mr.B.Laxmipathi, [2] Bodakuntla Ganesh,[3]Siripangi Shivaji,[4] Pinjari Fayza, [5]Yeddula Tejashwar Reddy

[1] Assistant Professor, Dept. Of CSE, Samskruti College of Engineering & Technology, TS.

[2,3,4,5]B. Tech Student, Dept. Of CSE, Samskruti College of Engineering & Technology, TS.

Abstract: *It can be very important to increase the crop to meet the needs of the growing population. Indian farmers often have fragmented crops and their productivity depends on many factors such as soil quality, rainfall and environment. The average annual soil loss in India is 5.3 billion tonnes. Degraded soils lose their ability to produce sufficient crops. Agriculture in India is conditioned by poor soil fertility, which depends on its vitamin level; in the same way the land will be suitable for plants and give a very good production when it is limited to some other plants. The physical, chemical and characteristics of the soil are useful for measuring its fertility, creating a planting plan and expecting the crops to be produced.*

Keywords—Soil analysis, crop suitability, machine learning, supervised learning, classification.

I INTRODUCTION

Agriculture is the backbone of the Indian financial system. In 2011, India devoted 60.5% of its land to agriculture, divided between arable land (fifty-two.8%), land with permanent vegetation (4.2%) and pastureland (3.5%). The distribution of agriculture and allied sports became 17.1% of the gross domestic product (GDP) in 2017-18 and its expenditure roughly accounts for 42% of all employment in the country. S. A.. Data from the Director of Business and Statistics (2015) shows that in 2013-2014, the cultivation area of main plants is 15 and 57 million hectares for Kharif and Rabi seasons respectively.

Many farmers recently collected soil samples at the Krishi Vigyan Kendra (KVK) center and were tested to understand the presence of vitamins in the soil and their respective values. Soil testing is the analysis of soil samples to determine its nutrients, composition, and

Principal
Samskruti College of Engg. & Technology
Kondapur (V), Ghatkesar (M), Medchal Dist.

ISSN: 2366-1313

other characteristics. Tests are usually performed on fertility levels and indicate deficiencies that need to be corrected. The Health Certificate (CSS) collects control information, but the statistics they get from it cannot immediately help them decide which crops should get the most profit from their crops.

SHCs certainly help identify better soil quality, but decisions about crops, fertilizers and the efficiency of their distribution are still primarily driven by interest and past discussions with neighboring farmers - the overall process still depends of the group's know-how. This training turned out to be long and has certain advantages. But this raises many medium and large problems such as soil degradation due to excess fertilizer, low yield over time and its consequences on people and the ecosystem as a whole.

At the same time, the calculation and statistical knowledge of educational knowledge were unexpected. We are witnessing unprecedented digitization in all areas of life, including agriculture. Land maps are digitized; We have ever-improving satellite images and topography. The size of datasets capturing soil vitamin composition should be available. Farmers also have access to all kinds of mobile computing and social networks (for example, farmers can register for SHC applications mobile phones).

II LITERATURE REVIEW

Many efforts have been made in this discipline. Generally speaking, there are two main ways to arrive at land allocation, generally as follows:

Soil biochemical composition such as temperature, pH value, NPK (nitrogen, phosphorus and potassium) content, etc.

� Use early detection radiography for PC imaging and ground imaging studies

The studies mentioned below relate to the first category, for example, the analysis of soil composition:

"Recommended agricultural agreement" by S. Pudumalar et al. [1] use data mining as a method that uses scientific data on the characteristics of soil, soil type, crop data and informs farmers of suitable crops as featured on their website. This reduces the negative selection of crops and increases productivity. In this form, the issue was resolved by advice in combination with random tree using the random tree, naive bay meet the people New to introduce the crop for the inconvenience of the website with too much. precision. and work.

Principal
Samskruti College of Engg. & Technology
Kondapur (V), Ghatkesar (M), Medchal Dist

ISSN: 2366-1313

"A machine learning approach to evaluate crop specific for small/marginal scale croplands" reference Bhimanpallewar R et al. [2] shows the control method that the input is not: there are additives in the soil, the environment is not around the decision crop and yield or the level of fitness for crops. This tool allows the decision to make a way to improve the suitability of the land or to make the land free for the time, because it is no longer working.

"Using a sample of random forest area equations to estimate land suitable for agriculture" of Senagi K et al. [3] used the best machine learning (ML) technique to estimate the suitability of land for sorghum cultivation, based on the actual soil conditions. It carries out experiments using Parallel Random Forest (PRF), Linear Regression (LR), Linear Discriminant Analysis (LDA), KNN, Gaussian Naive Bayesian (GNB), and Support Vector Machine (SVM).

� There is a further effort to distribute the soil often as it's composition. These include: "Evaluation of Agricultural Soils Using Data Mining Techniques" using Ramesh Babu, Rajesh Reddy [4], "Behavioral Analysis and Analysis of Statistical Analysis using data mining" of Supriya D [5], "Distribution of Non-agricultural land in India" of Sirsat M et al. [6], "Plant recommendation using neural networks" [7], "Using machine learning for appropriate soil allocation" [8].

Research from early warning satellite imagery and ground imagery is: "In-depth study of land cover and crop types using remote sensing data" of Kussul N et al. [9] used a multi-level deep learning (DL) objective that focused on land cover and crop types from multi-location, multi-time satellite imagery. The core of the framework is an unsupervised neural network (NN) used for optical image segmentation and no clinical information due to cloud and shadow, as well as layers standard care NNs. As an easy-to-maintain NN model, it uses a conventional multi-layer perceptron (MLP) and advanced algorithms that are often used in the early days.

(RS) - random forests and measure them with constitutional NNs (CNN).

"Crop type development with panoramic stratification mainly based on MODIS recording time" with the help of Dries sen B et al. [10] evaluated whether the stratification based on high-resolution MODIS images can be used as an alternative stratification method based mostly on specific soil and elevation maps. It uses the concept of area stratification in

Principal
Samskruti College of Engg. & Technology
Kondapur (V), Ghatkesar (M), Medchal Dist.

ISSN: 2366-1313

which an area to be monitored is divided into units for effective monitoring. Classification was done using various algorithms (RF, SVM, ML, OK-NN and multinational logistic regression) at the school.

"3D convolution neural networks for crop classification with tiled images

III Proposed Framework

This opens up a new way of assessing soil, its classes and similarities in planting levels that may be suitable for certain plants. The proposed gadget should be capable of developing and confirming the process of enabling the device to know, read big data and benefit from the ever-increasing power of the cloud-based GPU processing farm. The proposed machine strategy will be used for this in 2 steps:

Level 1: the system that divides soil based on fertility level, vitamins and other factors.

Phase 2: find the relationship between the desired crops and the soil organization found in the previous section; This will be done using groups of plants with comparable soil properties and fertility needs in the land register.

The equipment is prepared to study the soil based on the following statistics:

The biochemical composition of the soil

Ground images

Satellite terrestrial images and remote sensing recordings (all sites must be available and accessible)

To draw plants for soil distribution, we will look at features such as:

Macro and micro vitamin requirements of crops

The pH level of the soil

Water retention capacity and electrical conductivity of the soil

The proposed machine strategy uses a combination of one or more of the following methods:

Classification based on decision trees, deep learning using NN (Neural Networks), SVM (Support Vector Machine), etc.

� Statistical tools such as - Bayes distribution, regression

IV Gaps and Suggested Solution

1. All previous attacks and efforts in this regard are both based on a) evaluation and classification of soil composition or b) measurement and classification, without hearing musical images or images on the ground.

2. If you want to come to a solution to the problem, we can gather and evaluate the first cost of both methods. By being able to classify soil photos based on soil

Principal
Samskruti College of Engg. & Technology
Ghatkesar (M), Medchal Dist.

ISSN: 2366-1313

composition category, it can significantly reduce time and cost.

3. Previous research and responses were limited to soil types or crop recommendations; we need an end-to-end streamlined field that advocates plant relevance that leverages the land distribution/labeling done in the first section.

4. The solution uses supervised machine learning (ML) techniques for soil classification and crop recommendations, which are effective experts in identifying and classifying new soil models and crops suitable for balance.

5. Overall, the response is expected to result in higher yields and better economics for farmers.

V CONCLUSION

The goal is to provide a precise soil class based on the biochemical and/or digital images provided. According to land registration, there will be a way to know the suitability of the crop and thus achieve the best crop. Modern IT techniques such as machine learning and data science will help bring more reality to the process. This will ensure that there is no loss or degradation of the soil, prevent excessive cultivation of one crop and help to restore the nutrients lost in the soil.

The proposed system should attempt to achieve the following goals:

Analyze soil based on biochemical and environmental composition and/or digital images.

Divide the soil into appropriate groups based on factors such as fertility, nutrients, water holding capacity and many more.

� Recommended for the appropriateness of plants for categorized land associations.

� Help reduce soil degradation and eliminate soil loss.

� By helping to bring plants into the soil, preventing over-growing of one crop and thus reducing fertility.

� Improve crops and get a better return on investment.

REFERENCES

1. S. Pudumalar, E. Ramanujam, R. Harine Rajashree, C. Kavya, T. Kiruthika, J. Nisha., "Crop recommendation system for precision agriculture," *IEEE Electron Device Lett,* June, 2017. https://ieeexplore.ieee.org/document/7951740.

Principal
Samskruti College of Engg. & Technology
Kondapur (V), Ghatkesar (M), Medchal Dist.

ISSN: 2366-1313

2. Bhimanpallewar R et al., "A Machine Learning Approach to Assess Crop Specific Suitability for Small/Marginal Scale Croplands" *International Journal of Applied Engineering Research,* ISSN 0973- 4562 Volume 12, Number 23 (2017) pp. 13966-13973. http://www.ripublication.com

3. Senagi K et al., "Using parallel random forest classifier in predicting land suitability for crop production", *Journal of Agricultural Informatics* (ISSN 2061-862X) 2017 Vol. 8, No. 3:23-32.

4. Ramesh Babu, Rajesh Reddy, "An Analysis of Agricultural Soils by using Data Mining Techniques" *IJESC,* 2017, Volume 7 Issue No.10.

5. Supriya D., "Analysis of Soil Behavior and Prediction of Crop Yield using Data Mining Approach", *International Journal of Innovative Research in Computer and Communication Engineering*, Vol. 5, Issue 5, May 2017, DOI: 10.15680/IJIRCCE.2017. 0505067.

6. Sirsat M et al., "Classification of agricultural soil parameters in India" Article in *Computers and Electronics in Agriculture*, April 2017.

7. B. Tanmay et al., "Crop Recommendation System Using Neural Networks", *International Research Journal of Engineering and Technology (IRJET)*, Volume: 05 Issue: 05, May-2018.

8. M. Mokarram, et al., "Using Machine Learning for Land Suitability Classification".

9. Kussul N et al., "Deep Learning Classification of Land Cover and Crop Types Using Remote Sensing Data" https://ieeexplore.ieee.org/document/7891032

10. Dries sen B et al., "Improving crop classification with landscape stratification based on MIDIS-time series", *Laboratory of Geo- Information Science and Remote Sensing*, Wageningen University and Research Centre, The Netherlands.

11. Ji S et al., "3D Constitutional Neural Networks for Crop Classification with Multi-Temporal Remote Sensing Images", Remote Sensing. 2018, 10, 75; doi:10.3390/rs10010075 www.mdpi.com/journal/remotesensing

Principal
Samskruti College of Engg. & Technology
Kondapur (V), Ghatkesar (M), Medchal Dist.

ISSN: 2366-1313

12. Rose M. Rusticity, “Crop Classification with Multi-Temporal Satellite Imagery”, Stanford University, CA, USA.

13. Prasadu Peddi, and Dr. Akash Saxena. "studying data mining tools and techniques for predicting student performance" International Journal Of Advance Research And Innovative Ideas In Education Volume 2 Issue 2 2016 Page 1959-1967

Principal
Samskruti College of Engg. & Technolo
Kondapur (V), Ghatkesar (M), Medchal Dis

IMAGE CAPTION GENERATOR USING DEEP LEARNING

[1]Mr. K. Vamshee Krishna, [2]P. Poojitha, [3]CH. Karthik, [4]V. Agasthya, [5]M. Ajay Kumar

[1]Assistant Professor, Department of Computer Science and Engineering, Samskruti College of Engineering and Technology, Kondapur

[2,3,4,5] B. Tech Scholar, Department of Computer Science and Engineering (Data Science), Samskruti College of Engineering and Technology, Kondapur

Abstract: In today's era, image captioning has become an essential tool, with built-in applications utilizing deep neural network models to generate captions for images. Image captioning involves generating descriptions of images by identifying important objects, their attributes, and the relationships between them. The process aims to produce syntactically and semantically accurate sentences. This paper introduces a deep learning model that utilizes computer vision and machine translation to describe images and generate captions. The goal is to detect objects in images, recognize their relationships, and generate captions accordingly. The dataset utilized is Flickr8k, and the implementation is done in Python3, incorporating Transfer Learning with the Xception model for the proposed experiment. The paper also explores the functions and structure of various neural networks involved in the process. Image caption generators play a significant role in Computer Vision and Natural Language Processing, with potential applications in image segmentation, as seen in platforms like Facebook and Google Photos. Furthermore, their utility extends to video frames, offering automation for image interpretation tasks and providing valuable assistance to visually impaired individuals.

Keywords: Image, Caption, CNN, Xception, RNN, LSTM, Neural Networks

I. INTRODUCTION

Detecting objects in images and describing them using Natural Language Processing (NLP) has long been a challenging task in Artificial Intelligence. Historically, computer vision researchers considered this task impossible. However, with the advancements in Deep Learning techniques, the availability of vast datasets, and increased computational power, models have emerged that can generate captions for images. Image caption generation involves combining concepts from both image processing and natural language processing to understand the context of an image and describe it in a human-like language such as English. While humans can perform this task effortlessly, it requires a robust algorithm and significant computational resources for a computer system to achieve the same. Various approaches have been attempted to simplify this complex problem, including object detection, image classification, and text generation. Computer systems process input images as two-dimensional arrays and utilize mapping techniques to analyze and interpret them.

Principal
Samskruti College of Engg. & Technology
Kondapur (V), Ghatkesar (M), Medchal Dist.

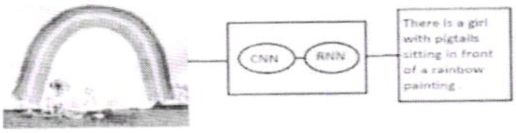


Fig. 1: Our model is based on a deep learning neural network

Generating complete sentences as output captions or descriptive sentences has garnered significant attention in recent years. While new datasets drive innovation, benchmark datasets also necessitate fast, accurate, and competitive evaluation metrics to facilitate rapid progress. Automatically describing the content of images with properly formed English sentences is a challenging task, but it holds immense potential, particularly in aiding visually impaired individuals in comprehending online image content. This task presents greater difficulty compared to well-studied image classification methods.Deep learning techniques, which are a primary focus in the computer vision field, have shown remarkable results in caption generation tasks. What sets these methods apart is their ability to define an end-to-end model that predicts captions directly from photographs, eliminating the need for intricate data preparation or a pipeline of specialized models. Deep learning has garnered significant attention due to its effectiveness in learning from unlabeled or unstructured data, offering immense potential for real-world applications. This capability to derive insights from diverse data sources is particularly valuable for practical applications.

II. LITERATURE SURVEY

An Overview of Image Caption Generation Methods

In recent years, the rapid development of artificial intelligence has brought significant attention to image captioning, making it an intriguing yet challenging task for researchers. Image captioning involves automatically generating natural language descriptions based on the content of an image, integrating knowledge from both computer vision and natural language processing. This task is crucial for scene understanding and has extensive applications, such as enhancing human-computer interaction. This paper summarizes various methods related to image captioning, with a particular focus on the attention mechanism, which is widely used and plays a vital role in these tasks. Additionally, it discusses the advantages and shortcomings of these methods, providing an overview of commonly used datasets and evaluation criteria in this field. Finally, the paper highlights several open challenges in image captioning.

Image Caption Generator Using Deep Learning

Automatically describing the content of photographs using natural language is a fundamental and challenging task with significant potential. For instance, it can help visually impaired individuals understand web images and provide more accurate and concise image or video information in contexts like social media sharing or video surveillance systems. This approach typically involves using a convolutional neural network (CNN) followed by a recurrent neural network (RNN). By learning from pairs of images and captions, this method generates captions that are usually semantically meaningful and grammatically correct. Humans use natural language to describe scenes because it is brief and compact, while machine vision systems characterize scenes by capturing images as two-dimensional arrays. The idea is to integrate images and captions into a unified framework and learn a mapping from visual data to textual descriptions.

A Comprehensive Survey of Deep Learning for Image Captioning

Image captioning refers to the process of generating a description for an image, which involves recognizing the significant objects, their attributes, and their relationships within the image. Additionally, it requires generating sentences that are both syntactically and semantically correct. Deep learning techniques have demonstrated capability in addressing the complexities and challenges associated with image captioning. In this survey paper, we explore the topic of image captioning.

Visual Image Caption Generator Using Deep Learning

The study of image caption generation has long fascinated researchers in the field of Artificial Intelligence. The ability to program machines to describe images or environments akin to humans holds significant implications in fields such as robotic vision and business. However, achieving this capability has posed a persistent challenge in artificial intelligence research. In this paper, we explore various image caption generating models based on deep neural networks, with a specific focus on different recurrent neural network (RNN) techniques and their impact on sentence generation. Additionally, we conduct experiments by generating captions for sample images and comparing the performance of different feature extraction and encoder models to determine which yields better accuracy and desired outcomes.

III. METHODOLOGY

The task involves developing a system that takes an image input as a dimensional array and generates an output in the form of a sentence that accurately describes the image, ensuring it is both syntactically and grammatically correct. The encoder uses a CNN-LSTM architecture to process an input image, converting it into a sequence of hidden states. These hidden states are passed to the decoder, which generates a sequence of words to form the final image caption. The input image is preprocessed by resizing it to 224x224 pixels and normalizing the pixel values. The preprocessed image is then passed through the CNN part of the encoder, resulting in a 5D tensor. This tensor is fed through the LSTM part of the encoder, producing a set of hidden states that serve as input to the decoder. The decoder iteratively samples from a probability distribution over the vocabulary to generate a sequence of words, forming the final image caption.

To encode the input string, tokenize it into words using a pre-trained tokenizer like Word Piece or Sentence Piece, converting the text into a sequence of integers. Use a pre-trained model like VGG16 or ResNet50

Principal
Samskruti College of Engg. & Technology
Kondapur (V), Ghatkesar (M), Medchal Dist.

to convert the input image into a fixed-length feature vector. With both the image features and input text, the encoder-decoder model can generate a sequence of words to form the final image caption. Evaluate the quality of the generated captions using metrics like BLEU (Bilingual Evaluation Understudy) or CIDEr (Consensus-Based Image Description Evaluation), which compute scores based on the similarity between the generated caption and the ground truth caption.

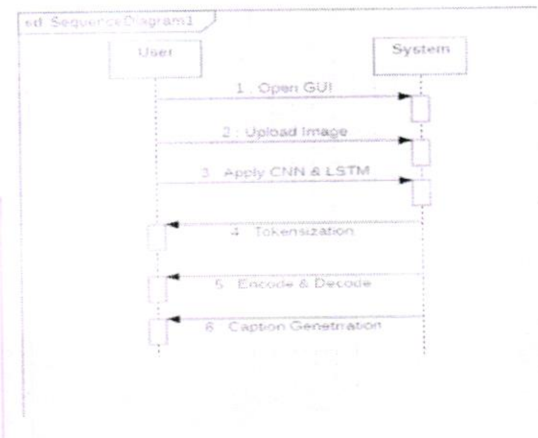


Fig. 2: Sequence Diagram

We utilized the Flickr 8K dataset as our corpus, which contains 8,000 images, each accompanied by 5 captions. These multiple captions per image help in understanding various possible scenarios. The dataset is divided into a predefined training set (Flickr_8k.trainImages.txt) with 6,000 images, a development set (Flickr_8k.devImages.txt) with 1,000 images, and a test set (Flickr_8k.testImages.txt) with 1,000 images. The images are selected from six different Flickr groups and do not feature any well-known personalities or places; they are manually chosen to represent a variety of scenes. The entire dataset (1GB in size) can be directly downloaded from the provided links, thanks to Jason Brownlee.

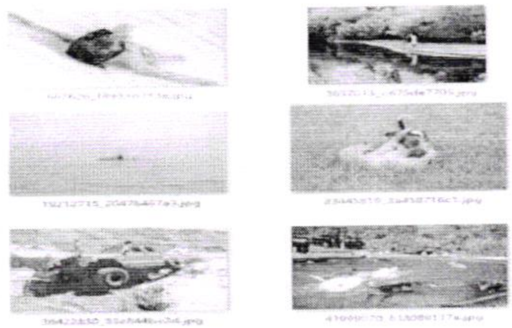


Fig. 3: Glimpse of the Flickr8k Image Dataset

Data preprocessing is conducted in two stages: separately cleaning and pre-processing the images and their corresponding captions. For image preprocessing, the input data is fed into the Xception application from the Keras API, which runs on top of Tensor Flow. Xception, pre-trained on Image Net, facilitates faster image training through transfer learning. The descriptions are cleaned using the Keras tokenizer class, which vectorizes the text corpus and stores it in a separate dictionary. Each word in the vocabulary is then mapped to a unique index value. Data preprocessing is conducted in two stages: separately cleaning and pre-processing the images and their corresponding captions. For image preprocessing, the input data is fed into the Xception application from the Keras API, which runs on top of Tensor Flow. Xception, pre-trained on Image Net, facilitates faster image training through transfer learning. The descriptions are cleaned using the Keras tokenizer class,

Principal
Samskruti College of Engg. & Technology
Kondapur (V), Ghatkesar (M), Medchal Dist.

which vectorizes the text corpus and stores it in a separate dictionary. Each word in the vocabulary is then mapped to a unique index value. Deep learning facilitates the machine learning process through an artificial neural network composed of multiple hierarchical levels. The model relies on deep networks, where information flow begins at the initial level. Here, the model learns something simple, then passes the output to the next layer, combining inputs into more complex representations, and continues this process through successive layers. Each level in the network produces increasingly complex outputs based on the input from the previous layer. Convolutional Neural Networks (CNNs) are specialized deep neural networks designed to process data with a 2D matrix input shape, making them ideal for image processing. CNNs take an image as input, assign importance (weights and biases) to various aspects of the image, and distinguish different objects. They use filters (kernels) for feature learning, detecting abstract concepts such as blurring, edge detection, and sharpening, similar to how the human brain identifies objects in time and space. The architecture of CNNs fits image datasets more effectively by reducing the number of parameters (from 2048 to 256) and reusing weights.

Recurrent Neural Networks (RNN)

The human brain is evolved to remember previous words and use them to generate subsequent words, forming coherent sentences. Basic neural networks lack this capability. However, advancements in recurrent neural networks (RNNs) address this limitation. RNNs have loops that allow information to persist by utilizing their internal states, thereby creating a feedback loop. Long Short-Term Memory networks, commonly referred to as "LSTMs," represent a specialized type of recurrent neural network (RNN) that excels at learning long-term dependencies. Their default behavior involves retaining information over extended periods, regulated by "gates." Unlike traditional RNNs, which process individual data points, LSTMs can handle entire sequences. Moreover, they have the ability to discern the significance of specific data points, determining which should be retained or discarded. This ensures that only pertinent information is forwarded to subsequent layers. LSTMs incorporate three primary gates: the input gate, output gate, and forget gate. These gates control the management of current cell values, determining whether to forget, read, or output the cell's value. Additionally, hidden states are crucial, as they pass previous state information to subsequent sequence steps. Serving as the neural network's memory, hidden states store past data, allowing the network to operate akin to the human brain in sentence formation. In our architecture, we employ a combination of Convolutional Neural Network (CNN) and Long Short-Term Memory (LSTM) networks to process an image input and produce a corresponding caption. Initially, an "encoder" recurrent neural network (RNN) is utilized to map the source sentence, which may vary in length, into a fixed-length vector representation. This vector representation serves as the initial hidden state for a "decoder" RNN, which subsequently generates the final meaningful sentence prediction.

Principal
Samskruti College of Engg. & Technology
Kondapur (V), Ghatkesar (M), Medchal

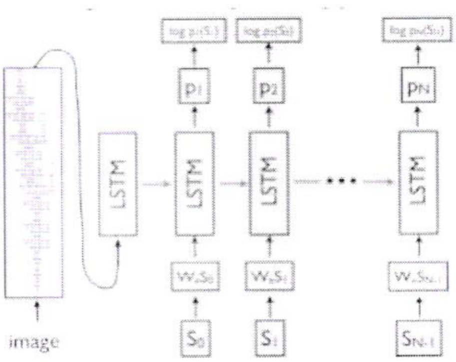


Fig. 4: CNN-LSTM structure

However, we will replace the RNN with a deep CNN, as it can produce a rich representation of the input image by embedding it into a fixed-length vector. We achieve this by first pre-training the CNN for an image classification task and then using the last hidden layer as input to the RNN decoder, which generates the sentences.

IV. RESULTS

For simplicity, only three images have been subjected to testing, and the results can be seen in the following images: 1.Path of Img 1:Flicker8k_ Dataset/ 111537 222_07e56d 5a30.jpg

Output:

Fig. 5: Caption generated using deep neural network for input

Path of Img 2: Flicker8k_Dataset/256085101_2c2617c5d0. jpg

Output:

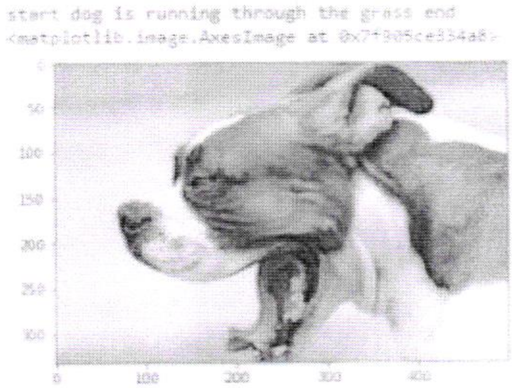


Fig. 6: Caption generated using deep neural network for input Image 2

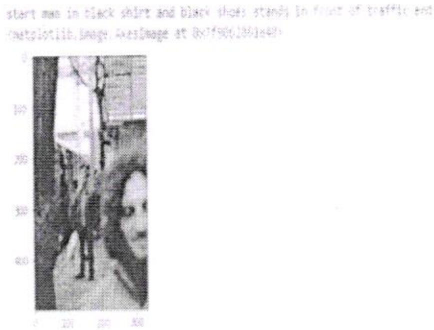


Fig. 7: Caption generated using deep neural network for input Image 3

V. CONCLUSION

The results demonstrate that the deep learning methodology used here yielded successful outcomes. The CNN and LSTM worked in synchronization to identify relationships between objects in images. To evaluate the accuracy of the predicted captions, we compared them with target captions in the Flickr8k test dataset using the BLEU (Bilingual Evaluation

Understudy) score. BLEU scores, commonly used in text translation, evaluate translated text against one or more reference translations. Over the years, various neural network technologies have been employed to create hybrid image caption generators similar to the one proposed here, such as using the VGG16 model instead of the Xception model or the GRU model instead of the LSTM model. BLEU scores can be used to compare these models and determine which one provides the highest accuracy. This paper introduces several new developments in machine learning and AI, highlighting the vastness of the field. Many topics within this paper are open to further research and development, while the paper itself covers the essential basics needed to create an image caption generator.

VI. REFERENCES

1. HaoranWang , Yue Zhang, and Xiaosheng Yu, "An Overview of Image Caption Generation Methods", (CIN-2020)

2. B.Krishnakumar, K.Kousalya, S.Gokul, R.Karthikeyan, and D.Kaviyarasu, "IMAGE CAPTION GENERATOR USING DEEP LEARNING", (international Journal of Advanced Science and Technology- 2020)

3. MD. Zakir Hossain, Ferdous Sohel, Mohd Fairuz Shiratuddin, and Hamid Laga, "A Comprehensive Survey of Deep Learning for Image Captioning" ,(ACM-2019)

4. Rehab Alahmadi, Chung Hyuk Park, and James Hahn, "Sequence-tosequence image caption generator", (ICMV-2018)

5. Oriol Vinyals, Alexander Toshev, SamyBengio, and Dumitru Erhan, "Show and Tell: A Neural Image Caption Generator", (CVPR 1, 2- 2015)

6. Priyanka Kalena, Nishi Malde, Aromal Nair, Saurabh Parkar, and Grishma Sharma, "Visual Image Caption Generator Using Deep Learning", (ICAST-2019)

7. Pranay Mathur, Aman Gill, Aayush Yadav, Anurag Mishra, and Nand Kumar Bansode, "Camera2Caption: A Real-Time Image Caption Generator", International Conference on Computational Intelligence in Data Science (ICCIDS) - 2017

8. K. Xu, J. Ba, R. Kiros, K. Cho, A. Courville, R. Salakhutdinov, et al., "Show, attend and tell: Neural image caption generation with visual attention", Proceedings of the International Conference on Machine Learning (ICML), 2015.

9. J. Redmon, S. Divvala, Girshick and A. Farhadi, "You only look once: Unified real-time object detection", Proceedings of the IEEE Conference on Computer Vision and Pattern Recognition (CVPR), 2016

INAPPROPRIATE CONTENT DETECTION OF YOUTUBE VIDEO USING DEEP LEARNING

[1]Mr. K. Vamshee krishna, [2]P.Jayanthi , [3]K. Jeevithesh , [4]SK. Shaik shavali baba
[1] Assistant Professor, Department of Computer Science and Engineering (AI&ML), Samskruti College of Engineering and Technology, Kondapur, ghatkesar, TG, India
[234]B.Tech Scholar, Department of Computer Science and Engineering (AI&ML), Samskruti College of Engineering and Technology, Kondapur, ghatkesar, TG, India

Abstract: The exponential growth of YouTube videos has attracted billions of viewers, with a significant portion being young people. Unfortunately, malicious users exploit this platform to spread disturbing content, often disguising inappropriate material within animated cartoon videos targeted at children. To counteract this, it is crucial to implement an automatic real-time video content filtering system on social media platforms. This study proposes a novel deep learning-based architecture for detecting and classifying inappropriate content in videos. The framework utilizes an ImageNet pre-trained convolutional neural network (CNN) model, EfficientNet-B7, to extract video descriptors, which are then processed by a bidirectional long short-term memory (BiLSTM) network to learn effective video representations and perform multiclass video classification. Additionally, an attention mechanism is incorporated after the BiLSTM to enhance the model's focus on relevant features. The models were tested on a manually annotated dataset of 111,156 cartoon clips collected from YouTube. Experimental results showed that the EfficientNet-BiLSTM model (accuracy = 95.66%) outperformed the version with an added attention mechanism (accuracy = 95.30%). Moreover, traditional machine learning classifiers were found to be less effective compared to deep learning classifiers. Overall, the combination of EfficientNet and BiLSTM with 128 hidden units achieved state-of-the-art performance, with an F1 score of 0.9267. The comparison with existing state-of-the-art methods confirmed that BiLSTM on top of CNN architecture captures contextual information of video descriptors more effectively, leading to better results in detecting and classifying inappropriate content in videos aimed at children.

Keywords: Deep learning, social media analysis, video classification, bidirectional LSTM, CNN, EfficientNet.

I. INTRODUCTION

Over recent years, there has been a significant surge in the creation and consumption of videos across social media platforms. YouTube, in particular, stands out as a dominant platform for sharing videos, boasting a vast array of content across various categories. Statistics from YouTube indicate a global user base exceeding 2 billion registered users, with more than 500 hours of video content being uploaded every minute. As a result, an immense volume of videos is readily available, offering users of all demographics access to both general and personalized content. However, the sheer scale of this crowdsourced database poses significant challenges in monitoring and enforcing platform guidelines for uploaded content. This creates opportunities for malicious users to engage in spamming activities, deceiving audiences with falsely advertised content across various media formats. Particularly concerning is the potential exposure of young audiences to inappropriate or disturbing content, often masked as suitable for them. With children increasingly spending a significant amount of time online, platforms like YouTube have become prominent alternatives to traditional media outlets such as television. YouTube's own press releases corroborate its popularity among younger demographics, attributed in part to fewer content restrictions compared to other age groups.

In contrast to television, the internet lacks stringent regulations, allowing children unrestricted access to various types of content. Exposure to disturbing material online is recognized as a significant internet safety concern, alongside issues like cyberbullying, cyber predators, and hate speech. Research by Bushman and Huesmann indicates that frequent exposure to disturbing videos can impact children's behavior, emotions, and cognitive development in both the short and long term. Instances of inappropriate content distribution in children's videos have garnered attention, particularly following the Elsagate controversy, where YouTube hosted videos featuring popular cartoon characters engaged in unsettling activities such as mild violence, theft, alcohol consumption, and nudity. Efforts to create a safer online environment include legislation like the Children's Online Privacy Protection Act (COPPA), which imposes requirements on websites regarding safety measures for children under 13. YouTube has introduced features like "safety mode" and the YouTube Kids app to filter out potentially harmful content and provide parental controls. Despite these efforts, disturbing videos occasionally slip through, even on platforms like YouTube Kids, due to the challenges in accurately identifying such content. The sheer volume of videos uploaded to YouTube every minute presents a challenge, compounded by the platform's reliance on video metadata and community flagging, which may not always effectively ensure children's safety.

Numerous instances have been documented on YouTube where misleading video titles and thumbnails are used to disguise disturbing content, deceiving both children and parents. Another prevalent tactic employed by malicious uploaders involves sparsely incorporating inappropriate content within videos that otherwise appear safe for children. An illustrative example showcases how seemingly child-friendly video titles and clips conceal inappropriate scenes, despite accumulating millions of views and likes over several years. Similar cases reveal that this issue persists across both popular and lesser-known channels, indicating its widespread nature. Additionally, YouTube's decision to disable the dislike feature on videos has hindered viewers' ability to gauge content quality indirectly through statistics. Given the ease with which YouTube metadata can be manipulated, there's a growing consensus on the importance of prioritizing video features over metadata for content detection. While traditional approaches have relied on hand-crafted features for identifying disturbing content like violence or pornography, recent advancements in deep learning have led researchers to explore convolutional neural networks (CNNs) for image and video classification tasks. Moreover, the long-short term memory (LSTM), a variant of recurrent neural networks (RNNs), has emerged as a powerful model for analyzing time-series data. Consequently, this study aims to address the multiclass video classification challenge on YouTube by leveraging CNNs and LSTMs to learn effective representations for detecting and categorizing inappropriate content. Specifically, the study focuses on two types of objectionable content aimed at young viewers: violence and sexual nudity connotations.

The main contributions of this study are threefold:

Principal
Samskruti College of Engg. & Technology
Kondapur (V), Ghatkesar (M), Medchal Dist.

ISSN NO: 0022-1945

1. A novel deep learning framework, combining a CNN (EfficientNet-B7) and BiLSTM, is proposed for the detection and classification of inappropriate video content.

2. A meticulously annotated ground truth video dataset, comprising 1860 minutes (111,561 seconds) of cartoon videos tailored for children under the age of 13, is introduced. These videos, sourced from YouTube using popular cartoon names as search terms, are manually labeled as safe or unsafe based on the presence of fantasy violence or explicit sexual content. The intention is to make this dataset publicly accessible to the research community.

3. The performance of the CNN-BiLSTM framework is assessed, revealing a validation accuracy of 95.66% for the multiclass video classifier. Additionally, various state-of-the-art machine learning and deep learning architectures are scrutinized and compared in the context of inappropriate video content detection.

II. LITERATURE SURVEY

The research paper titled "Efficient Video Classification Using Fewer Frames" introduces the concept of fewer frames, which involves dividing the entire video into frames within specific time slots. It compares two datasets using different algorithms and mathematical calculations aimed at reducing the processing time for each frame. The paper proposes a novel approach that utilizes distillation to minimize the computational time required for video categorization. This involves training a teacher network, which constructs a video representation using all frames, followed by training a student network that analyzes only a certain number of frames (k). Various combinations of loss functions are employed to ensure that the student network's final representation and output probability distributions resemble those of the teacher network. The proposed models are evaluated against a strong baseline and a skyline, with results indicating that the proposed technique surpasses the baseline and significantly reduces computing time and costs compared to the skyline approach. The effectiveness of the method is demonstrated using the YouTube-8M dataset, where the computationally less expensive student network is shown to reduce calculation time by 30% while outperforming the teacher network.

The research paper titled "Metadata extraction and classification of YouTube videos using sentiment analysis" delves into the classification of video metadata through extraction and analysis, aiding in content decision-making. It involves categorizing video data based on various attributes such as subject, URL, duration, type, description, and captions. These attributes are organized into distinct datasets to predict the sentiment —positive, negative, or neutral—of the videos, subsequently determining their overall rating. The paper details a method for evaluating YouTube video URLs by employing sentiment analysis to ascertain the polarity of the video content. However, the accuracy of this process relies on the Python inbuilt dictionary Corpus, which comprises a collection of terms along with their corresponding scores.

The authors personally augmented the Corpus by incorporating new terms and their associated scores to assess its improvement. With the dataset's growth, automating this process becomes essential for efficiency. Manual updates to the Corpus dictionary would prove time-consuming and ineffective. Thus, we propose employing Machine Learning techniques like Neural Networks, Genetic Algorithms, SVMs, and Bayesian Learning to automate this process.The current research examines the

ISSN NO: 0022-1945

efficacy of convolutional neural networks (CNNs) in large-scale video classification. It suggests that CNN architectures can effectively learn robust features from inadequately labeled data, surpassing feature-based methods in terms of performance. This groundbreaking study introduces the use of deep CNNs for video categorization, emphasizing their ability to discern complex visual patterns such as object motion and scene transitions. The authors highlight that their model outperforms traditional handcrafted feature extraction techniques. Interestingly, the study finds that the temporal connectivity intricacies of the architecture do not significantly impact this improvement. An analysis of network outputs and confusion matrices reveals identifiable weaknesses. Additionally, the research underscores that a Slow Fusion model consistently surpasses early and late fusion alternatives. Moreover, it indicates that a single-frame model can achieve high performance, suggesting that local motion cues may not be essential, even for dynamic datasets like sports. Transfer learning experiments on UCF-101 demonstrate that the learned features are generalizable, exploring methods considering camera motion and investigating the use of recurrent neural networks to amalgamate clip-level predictions into global video-level predictions.

The article titled "Automated Metadata Generation for Video Content" presents an innovative approach to automating the generation of video metadata. This method involves a multi-task deep learning framework that integrates various data sources, including visual and textual features, to produce metadata for video content. Through experiments conducted on a large-scale dataset, the authors compared the performance of their approach with several state-of-the-art methods. The results indicate that the proposed method surpasses existing approaches in terms of accuracy, efficiency, and scalability. The study sheds light on the potential of leveraging deep learning techniques to streamline the process of video metadata generation, enabling content creators and providers to better organize, search, and discover video content. To automatically extract information from videos and generate relevant metadata, the authors utilize a combination of technologies such as computer vision, natural language processing, and machine learning. Object recognition algorithms are employed to identify elements within the video, while voice recognition is utilized to transcribe audio content, and natural language processing aids in extracting keywords and topics. The extracted data is then utilized to construct metadata for the video, including its title, description, and tags. Through evaluation and comparison with existing methods using a movie dataset, the proposed approach demonstrates promising results in terms of both accuracy and efficiency.

III. METHODOLOGY

The output interface displays the complete summary and classification results. To construct an effective model for video metadata generation and classification, acquiring relevant data is paramount. The dataset must be extensive, covering a broad spectrum of categories and subjects, obtainable from diverse sources like online video platforms or manually transcribed videos. Ensuring the dataset's suitability for the classification task involves organizing it based on subtitles. Pre-processing plays a vital role in refining the dataset by eliminating noise and extraneous details from the text. This entails removing stop words, punctuation, special characters, and numerical figures, while also converting the text to lowercase for consistency.

Principal
Samskruti College of Engg. & Technology
Kondapur (V), Ghatkesar (M), Medchal Dist.

Techniques such as lemmatization and stemming can further simplify the text by reducing it to its base or root form, enhancing manageability and reducing complexity. To generate an effective summary from the pre-processed text, employing natural language processing techniques is beneficial. The summary should be succinct, comprehensible, and encapsulate the essential information from the text. Extractive summarization identifies the most crucial sentences, while abstractive summarization creates a new summary that encapsulates the essence of the text.

The proposed methodology offers a solution to the issue of disturbing content in videos, utilizing a deep learning architecture that has demonstrated success in various video classification applications. Illustrated in [reference], the proposed system comprises three primary modules: video preprocessing, deep feature extraction, and video representation and classification. During the video preprocessing phase, the YouTube videos collected undergo preprocessing to eliminate any irrelevant or missing video information, along with resizing the extracted frames of each video clip to fixed dimensions (224 × 224). These preprocessed video frames from each clip are then inputted into an ImageNet pre-trained EfficientNetB7 model for feature extraction. The extracted features are subsequently utilized in experiments with the BiLSTM network to acquire effective video representations, which are then passed through fully connected and softmax layers for final video classification.

VIDEO PREPROCESSING

Preprocessing of videos holds significant importance in deep learning methodologies, facilitating the acquisition of pertinent features to enhance video classification accuracy. In this study, a video (Vi) is initially segmented into N small video clips, each with a duration of one second, denoted as video clips (c i 1 , c i 2 , ..., c i N). These video clips undergo manual annotation, disregarding any clips with incomplete information or lacking video context. Following the segmentation and annotation process, it is observed that the first 3-4 frames of each video clip contain residual information from the preceding clip of the same video. Therefore, considering an average video frame rate of 23-24 frames per second (fps), the j th video clip (c i j) is sampled at a frame rate of 22 fps by excluding initial frames. In cases where a video clip contains fewer frames than the average frame rate of a video, the last frame is duplicated for uniformity across all clips. The frames are denoted as f i,j 1 , f i,j 2 , ..., f i,j 22 , where f i,j k represents the k th frame of video clip c i j . Finally, the selected frames of each video clip undergo resizing to a fixed resolution of 224 × 224 pixels, aligning with the input size requirement of the pre-trained convolutional neural network model.

DEEP FEATURE EXTRACTION

Within this module, the deep features of preprocessed video frames are obtained through a sophisticated deep learning model with an advanced architecture. Rather than training an entire CNN model from the ground up, this study opts for utilizing a pre-trained CNN architecture, specifically the EfficientNet model, to extract visual representations from video frames. The EfficientNet model is a convolutional neural network model and scaling method that uniformly scales network depth, width, and resolution using a compound coefficient. Trained on a large-scale ImageNet dataset comprising 1.3 million images from 1000 object classes, EfficientNet achieved state-of-the-art accuracy with significantly smaller and faster inference compared to

Principal
Samskruti College of Engg. & Technology
Kondapur (V), Ghatkesar (M), ...

ISSN NO: 0022-1945

existing CNN models. The baseline network, known as EfficientNet B0, serves as the foundation, with subsequent scaling networks denoted as B1 through B7. While all scaling networks generally exhibit improved accuracy, they come with an increased cost in terms of FLOPS. In this proposed framework, EfficientNet-B7 is employed, leveraging preprocessed extracted frames ($f_{i,j}^{1}, f_{i,j}^{2}, \ldots, f_{i,j}^{22}$) of each video clip c_{i}^{j} as input. The EfficientNet module conducts feature extraction through transfer learning, wherein each input frame with dimensions of 224×224×3 (image_width x image_height x RGB_channel) is processed through a stack of 813 layers. The final three layers, including the fully connected layer generating 1000 ImageNet output labels, are discarded, resulting in EfficientNet-B7 generating feature descriptors $X_{i,j}^{k}$ with dimensions of 7 × 7 × 2560 for each frame $f_{i,j}^{k}$. These feature descriptors serve as input to the BiLSTM model for video representation and classification.

VIDEO REPRESENTATION AND CLASSIFICATION

In the third stage of the pipeline, a bidirectional LSTM network is trained using supervised learning to effectively learn video representations from the feature descriptors of video clips. Following this, the proposed system is augmented with two fully connected layers to obtain the final video classification results.

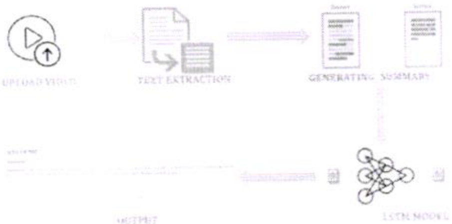


Fig. 1: System Architecture

BiLSTM NETWORK

Recurrent neural networks are effective in capturing hidden sequential patterns in time-series data. However, they often encounter the vanishing gradient problem, which impedes the update of network parameters during backpropagation. To address this issue, two variations of RNNs are commonly used: Long Short-Term Memory (LSTM) and Gated Recurrent Unit (GRU). While the overall structure of LSTM is similar to that of RNNs, it introduces a special unit called the "memory cell" to replace the update process of traditional RNNs. The memory cell in LSTM retains information for longer periods, enhancing the model's ability to capture long-term dependencies. Given the current input vector xt, the LSTM network processes this information while retaining memory from previous time steps.

$$i_t = \sigma(W_{xi}x_t + W_{hi}h_{t-1} + W_{ci}c_{t-1} + b_i) \quad (1)$$

$$f_t = \sigma(W_{xf}x_t + W_{hf}h_{t-1} + W_{cf}c_{t-1} + b_f) \quad (2)$$

$$c_t = f_t c_{t-1} + i_t \tanh(W_{xc}x_t + W_{hc}h_{t-1} + b_c) \quad (3)$$

$$o_t = \sigma(W_{xo}x_t + W_{ho}h_{t-1} + W_{co}c_t + b_o) \quad (4)$$

$$h_t = o_t \cdot \tanh(c_t) \quad (5)$$

where, σ represents the sigmoid activation function; i, f , c, and o denote input gate, forget gate, memory cell state and output gate at time t, respectively. W and b denote the weights and bias vector. Considering the video classification problem, one potential drawback of

LSTM is that it captures the past context only. For getting the full context of any video, it is important to consider both directions i.e., past and future context of the video. Therefore, the bidirectional LSTM appears to be a suitable option in video classification as it preserves the information in both directions, as shown in. In BiLSTM, there are two distinct hidden layers referred to as forward hidden layer (h^f_t) and backward hidden layer (h^b_t). The forward hidden layer h^f_t considers input vector x_t in ascending order i.e., $t = 1, 2, 3, \ldots, T$, and backward hidden layer h^b_t in descending order i.e., $t = T, T-1, T-2, \ldots, 1$. Lastly, the output y_t is generated by combining the results of h^f_t and h^b_t. Following equations are used to implement the BiLSTM model:

$$h^f_t = \tanh(W^f_{xh} x_t + W^f_{hh} h^f_{t-1} + b^f_h) \quad (6)$$

$$h^b_t = \tanh(W^b_{xh} x_t + W^b_{hh} h^b_{t+1} + b^b_h) \quad (7)$$

$$y_t = W^f_{hy} h^f_t + W^b_{hy} h^b_t + b_y \quad (8)$$

The video metadata generation and classification process commence with the collection of a dataset categorized based on subtitles, followed by rigorous data preprocessing to eliminate stop words and apply lemmatization and stemming techniques, primarily focusing on the subtitles. Subsequently, Natural Language Processing (NLP) techniques are employed to generate summaries for classification, facilitating the creation of a comprehensive dataset.

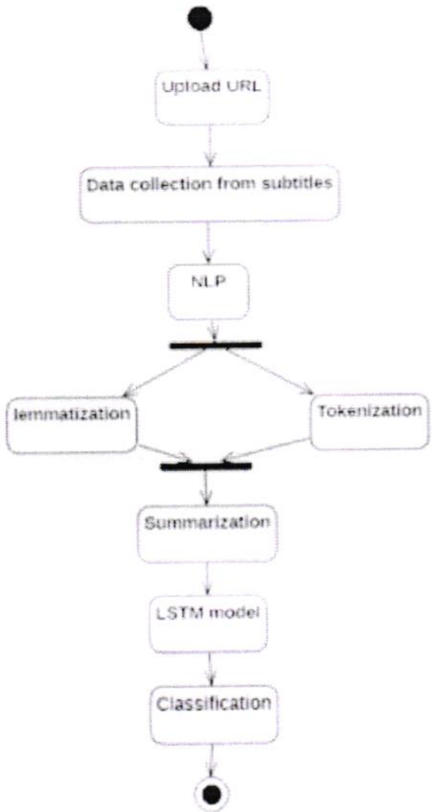


Fig. 2: Activity Diagram

The LSTM algorithm is then employed to train the entire model using labeled data, optimizing the training process for enhanced accuracy. Upon completion of the training phase, the model undergoes rigorous testing, involving classification to predict accurate outputs. Finally, the finalized model is presented through a web-based application, providing users with comprehensive summaries and classifications. Crucial to the construction of an effective model is the procurement of relevant data from diverse sources, including online video platforms or manually transcribed videos, ensuring adequate coverage of various categories and topics. Categorization based on subtitles ensures the suitability of the data for classification tasks, while preprocessing techniques such as removing noise and irrelevant information, including stop words,

Principal
Samskruti College of Engg. & Technology
Kondapur (V), Ghatkesar (M), Medchal Dist.

punctuation, special characters, and numbers, alongside text conversion to lowercase for consistency, enhance the quality of the dataset. Additionally, the application of techniques like lemmatization and stemming simplifies the text, making it more manageable, while employing natural language processing techniques facilitates the generation of concise and comprehensible summaries, with extractive summarization selecting essential sentences and abstractive summarization creating new summaries.

IV. RESULTS

Fig. 3: User Interface Home Screen

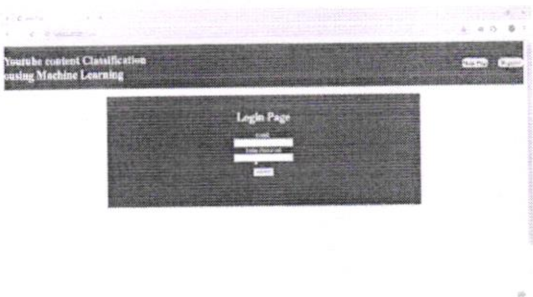


Fig. 4: User Login Page

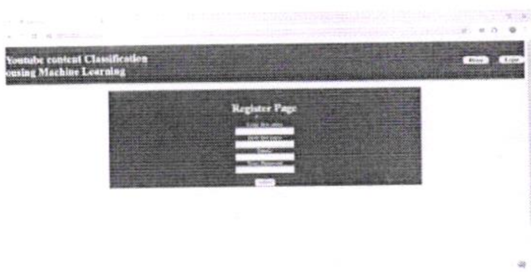


Fig. 5: user registration screen

Fig. 6: user registration successful

Fig. 7: user details list

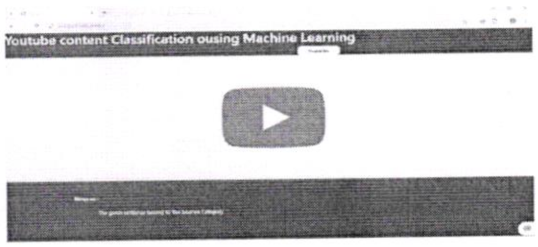


Fig. 8: Output Prediction

V. CONCLUSION

Generating and classifying video metadata using NLP algorithms and LSTM models is a prominent approach for achieving accurate results. Natural Language Processing (NLP) and Long Short-Term Memory (LSTM) models are highly effective in generating and classifying video metadata. One notable NLP technique is text summarization, which extracts the most important information from a large document or collection of documents to create a concise summary that captures key points. This technique can extract valuable information from video metadata related to topics such as world content, politics, news, sports, science, technology, and entertainment. This extracted information is then used to train an LSTM model to classify videos into different categories. By learning from a large dataset of labeled videos, the LSTM model identifies patterns and features significant to each category. This powerful combination enhances video search and recommendation systems and provides a better understanding of user preferences and behavior.The function retrieves the YouTube API key from a configuration file and receives the video URL from the front end, extracting the video ID from the URL. It then makes a request to the YouTube API to retrieve video details, including the title and description, and extracts the video transcript. If the transcript exceeds 2048 tokens, the function returns an error message. The function initializes the OpenAI API key and creates a prompt for the GPT-3 model, which generates a summary from the completion created by the model. Any extra newline '\n' characters are removed from the summary. Overall, this function uses NLP and GPT-3 to generate a summary of a YouTube video based on its title, description, and transcript. This allows users to quickly understand the main points of a video without watching it in full. After extracting text from the video subtitles, the summary is classified based on keywords and synonyms derived from the text. The entire project is integrated into an interactive web-based output using the Flask framework, where the URL is uploaded, and the summary is generated and classified.

VI. REFERENCES

[1] . L. Ceci. YouTube Usage Penetration in the United States 2020, by Age Group. Accessed: Nov. 1, 2021. [Online]. Available: https://www.statista.com/statistics/296227/us-youtube-reach-age-gender/

[2] . P. Covington, J. Adams, and E. Sargin, ''Deep neural networks for YouTube recommendations,'' in Proc. 10th ACM Conf. Recommender Syst., Sep. 2016, pp. 191–198, doi: 10.1145/2959100.2959190.

[3] . M. M. Neumann and C. Herodotou, ''Evaluating YouTube videos for young children,'' Educ. Inf. Technol., vol. 25, no. 5, pp. 4459–4475, Sep. 2020, doi: 10.1007/s10639-020-10183-7.

[4] . J. Marsh, L. Law, J. Lahmar, D. Yamada-Rice, B. Parry, and F. Scott, Social Media, Television and Children. Sheffield, U.K.: Univ. Sheffield, 2019. [Online]. Available: https://www.stac-study.org/downloads/STAC_Full_Report.pdf

[5] . L. Ceci. YouTube—Statistics & Facts. Accessed: Sep. 01, 2021. [Online]. Available: https://www.statista.com/topics/2019/youtube/

[6] . M. M. Neumann and C. Herodotou, ''Young children and YouTube: A global phenomenon,'' Childhood Educ., vol. 96, no. 4, pp. 72–77, Jul. 2020, doi: 10.1080/00094056.2020.1796459.

[7] . S. Livingstone, L. Haddon, A. Görzig, and K. Ólafsson, Risks and Safety on the Internet: The Perspective of European Children: Full Findings and Policy Implications From the EU Kids Online Survey of 9-16 Year Olds and Their Parents in 25 Countries. London, U.K.: EU Kids Online, 2011. [Online]. Available: http://eprints.lse.ac.U.K./id/eprint/33731

[8] . B. J. Bushman and L. R. Huesmann, ''Short-term and long-term effects of violent media on aggression in children and adults,'' Arch. Pediatrics Adolescent Med., vol. 160, no. 4, pp. 348–352, 2006, doi: 10.1001/archpedi.160.4.348.

Principal
Samskruti College of Engg. & Technology
Kondapur (V), Ghatkesar (M), Medchal Dist.

Sign Language Recognition System Using CNN

[1]Mr. K. Vamshee Krishna, [2]M. Namratha, [3]S. Umesh Chandra, [4]B. Manikanta, [5]U. Kishore

[1]Assistant Professor, Department of Computer Science and Engineering, Samskruti College of Engineering and Technology, Kondapur

[2,3,4,5]B. Tech Scholar, Department of Computer Science and Engineering (Data Science), Samskruti College of Engineering and Technology, Kondapur

Abstract: Sign Language Recognition (SLR) aims to interpret sign language into text or speech, facilitating communication between deaf-mute individuals and the general population. Despite its significant social impact, SLR remains challenging due to the complexity and variability of hand movements. Current SLR methods rely on hand-crafted features to describe sign language motion and construct classification models. However, designing reliable features to accommodate the diverse range of hand gestures is difficult. To address this challenge, we introduce a novel convolutional neural network (CNN) that automatically extracts discriminative spatial-temporal features from raw video streams without prior knowledge, eliminating the need for feature design. To enhance performance, the CNN integrates multi-channel video streams, including color information, depth clues, and body joint positions, to capture color, depth, and trajectory information. We validate the proposed model on a real dataset and demonstrate its superiority over traditional approaches based on hand-crafted features.

Keywords: Sign Language Recognition (SLR), Deaf-mute, individuals, Communication, Hand movements, Complexity

I. INTRODUCTION

In today's world, the majority of individuals do not make concerted efforts to learn sign language for communicating with speech and hearing-impaired individuals, highlighting the necessity for intermediaries in such interactions. Communication primarily relies on visual cues such as body language, gestures, and reading, with spoken language being the predominant mode. However, sign language encompasses intricate hand movements and orientations to convey messages, lacking a universal standard and thereby presenting challenges for comprehension by others. Fingerspelling alone is insufficient for effective communication. To address these challenges, researchers have devoted significant efforts to sign language recognition, a multifaceted task that entails understanding not only signs but also facial expressions, body language, and various body postures. Additionally, variations in sign appearances among different signers further complicate the recognition process. Presently, television broadcasts often feature interpreters for individuals with hearing impairments, underscoring the need for systems to aid communication and comprehension.

The primary objective is to develop systems capable of translating American Sign Language (ASL) into text, thereby empowering individuals with hearing impairments to communicate confidently with others. The proposed systems represent a crucial step towards mitigating communication barriers and facilitating inclusive interactions between individuals with hearing impairments and the broader community.

The "Sign Language Recognition System using CNN" project stands as a groundbreaking endeavor aimed at addressing the communication barriers faced by individuals with speech impairments. By leveraging technological innovation, this project endeavors to offer a reliable and accessible means of communication for speech-impaired individuals, empowering them to effectively engage in conversations, express their thoughts, and partake in various aspects of daily life. Beyond its primary objective of enhancing accessibility to communication, the project champions inclusivity, independence, and education. It plays a pivotal role in fostering a more inclusive society by ensuring that speech-impaired individuals are not marginalized in social interactions and activities, thereby fostering greater autonomy and self-assurance. Moreover, the project contributes to cross-cultural communication by recognizing and translating diverse sign languages, thereby bridging linguistic and cultural barriers and promoting understanding and unity across different communities. Furthermore, the project serves as a catalyst for research and innovation in fields such as computer vision, machine learning, and human-computer interaction. As technology advances, the project has the potential to evolve and provide a robust foundation for the development of more sophisticated sign language recognition technologies and applications. By facilitating effective communication for individuals with speech impairments, the project fosters awareness, understanding, and empathy within society. It cultivates a more inclusive and compassionate community that values diversity and recognizes the importance of effective communication for all individuals, regardless of their abilities or backgrounds.

II. LITERATURE SURVEY

To identify signs within a video sequence, various techniques are employed. Initially, color segmentation and the Viola-Jones algorithm are utilized to detect the facial region. Object detection is performed using Faster RCNN. The centroids of facial and spatial aspects are then extracted based on fuzzy membership class, enabling the decoding of signs at the sentence level. For identifying contiguous series of indications in a sequence of gestures, the LSTM model is employed. Additionally, two distinct 3-dimensional CNNs are employed to learn both global body configuration, capturing coarse-grained characteristics, and the hand region, focusing on fine-grained features. Pre-processing involves skin color segmentation and morphological filtering. The proposed algorithm effectively extracts signs and features from continuous video sequences by utilizing color segmentation to identify hand images. Support Vector Machine and the Viola-Jones algorithm are employed to derive feature vectors for static and dynamic signs, respectively. Zernike moments are used to characterize static signs, while curve features are extracted for dynamic gestures. Furthermore, the system facilitates speech-to-text conversion through the use of the sphinx module. Post-processing involves determining the center of gravity and fingertip detection.This comprehensive approach, as described by [1] Anup Kumar in 2016, enables the robust extraction of signs and features from video sequences, paving the way for effective sign language recognition and interpretation. Gestures in sign language involve hand postures, supplemented by facial expressions and body positioning to convey meaning effectively. Training the model required extensive datasets for optimal

Principal
Samskruti College of Engg. & Technology
Kondapur (V), Ghatkesar (M), Medchal Dist.

performance. In the system, feature extraction utilized the convex hull method, while classification employed K-Nearest Neighbors (KNN), achieving an accuracy rate of 65% [2] (Amrutha K, 2021). The utilization of Faster R-CNN models significantly enhances detection speed, attributed to the design of the Region Proposal Network (RPN) module. Faster R-CNN demonstrates superior accuracy in gesture localization compared to YOLO due to its ability to precisely detect gestures based on location. The proposed system integrates a 3D CNN Network comprising four convolution blocks, where each block receives input samples of the same size, with Rectified Linear Unit (ReLU) serving as the activation function [3](He, 2019). Image capture and preprocessing are facilitated by a webcam and the VS Code IDE, leveraging the OpenCV library. Preprocessing involves the removal of background noise through a slope distance algorithm [4] (Ashish, Ambekar, & G., 2016). These techniques collectively contribute to the robustness and efficiency of the sign language recognition system, enhancing its usability and accuracy in real-world applications. This system operates by extracting frames from real-time video streams captured through a webcam, subsequently converting the image frames from RGB to the YCbCr domain for processing. Feature extraction is achieved using a feed-forward type Artificial Neural Network (ANN) architecture. The system is designed to recognize five distinct types of gestures, with a database comprising 25 images created for training [5] (Pankajakshan, C, &Thilagavathi, 2015). To detect and track hand-face interactions, the system employs skin color segmentation and object stabilization techniques. Hand posture classification is performed using the K-Nearest Neighbors (KNN) algorithm [6] (Shenoy, Dastan, Rao, &Vyavaharkar, 2018).For recognizing continuous sequences of gestures, such as in Sign Language Recognition, the system utilizes a Long Short-Term Memory (LSTM) model. This approach involves decomposing continuous indications into smaller components and modeling these sub-units using neural networks. The system's performance is evaluated using the Indian Sign Language (ISL), with 942 signed sentences tested, comprising 35 distinct sign terms. Accuracy rates of 72.3% for signed sentences and 89.5% for isolated sign words were achieved [8] (Mittal, Kumar, Roy, Balasubramanian, & Chaudhuri, 2019). In this system, local features are extracted and subsequently combined and globalized using Multilayer Perceptron (MLP) and autoencoders. Classification is then performed using the SoftMax algorithm [9] (Muneer-al-Hammadi, Muhammad, Abdul, &Alsulaiman, 2020).

Tanuj Bohra et al. [1] proposed a real-time two-way sign language communication system incorporating image processing, deep learning, and computer vision techniques. The system employs hand detection, skin color segmentation, median blur, and contour detection to enhance results. A Convolutional Neural Network (CNN) model trained on a substantial dataset comprising 40 classes achieved remarkable performance, predicting 17,600 test images in just 14 seconds with an accuracy of 99%. Joyeeta Singha and Karen Das [2] introduced a system for Indian Sign Language (ISL) recognition from live videos, comprising three stages. Preprocessing involves skin filtering and histogram matching. Feature extraction incorporates eigenvalues and eigenvectors, while classification employs eigenvalue-weighted Euclidean distance. The dataset comprises 480 images of 24 ISL signs signed by 20 individuals. The system was tested on 20 videos and achieved an

Principal
Samskruti College of Engg. & Technology
Kondapur (V), Ghatkesar (M), Medchal Dist.

 ISSN NO: 0022-1945

impressive accuracy of 96.25%.Muthu Mariappan H. and Dr. Gomathi V. [3] devised a real-time sign language recognition system implemented as a portable unit. The system utilizes contour detection for identifying facial features, as well as the left and right hand. Additionally, the fuzzy c-means algorithm is employed to partition input data into specified clusters. The system's performance was evaluated on a dataset comprising videos recorded from 10 signers for various words and sentences, achieving an accuracy of 75%. Salma Hayani et al. [4] proposed an Arabic sign language recognition system based on Convolutional Neural Networks (CNN), inspired by the LeNet-5 architecture. Their dataset consisted of 7,869 images of Arabic signs representing numbers and letters. Through experiments with varying training set sizes (ranging from 50% to 80%), the authors achieved 90% accuracy with an 80% training dataset. Furthermore, the performance of the system was compared to that of traditional machine learning algorithms such as K-Nearest Neighbors (KNN) and Support Vector Machine (SVM). The model primarily relied on image-based recognition but has the potential for extension to video-based recognition. Kshitij Bantupalli and Ying Xie [5] focused on American Sign Language (ASL) recognition using video sequences and employed a combination of Convolutional Neural Networks (CNN), Long Short-Term Memory (LSTM), and Recurrent Neural Networks (RNN). Specifically, the CNN model, Inception, was utilized to extract spatial features from frames, while LSTM was employed to capture longer time dependencies. The dataset consisted of 100 different signs performed by 5 signers, achieving a maximum accuracy of 93%. Subsequently, the sequence was fed into an LSTM to account for longer time dependencies, and the outputs of the softmax layer and max-pooling layer were utilized in an RNN architecture to extract temporal features.

III. METHODOLOGY

The Sign Language Recognition System utilizing Convolutional Neural Networks (CNN) aims to overcome communication barriers faced by individuals with speech impairments. These individuals often struggle to effectively communicate with others unfamiliar with sign language. The primary goal is to create a real-time system capable of translating sign language gestures into text, thereby enhancing accessibility and efficiency in communication with deaf and mute individuals. Key challenges include achieving accurate sign language recognition, processing hand gestures captured via camera in real-time, and seamlessly integrating the recognition system into Human-Computer Interfaces (HCI).

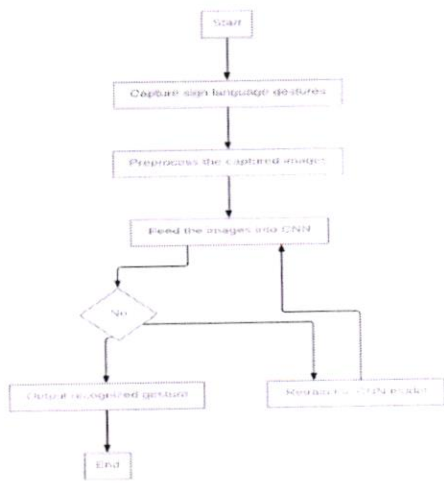


Fig. 1: Control Flow Diagram

The Sign Language Recognition System predominantly utilized conventional computer vision methods and machine learning algorithms to interpret and translate sign language gestures. The initial objective of this system was to facilitate communication between individuals proficient in sign language, typically individuals with hearing impairments, and those unfamiliar with sign language. The system relied on a dataset comprising sign language gestures, consisting of images or video sequences capturing signers performing various signs and gestures. Conventional computer vision techniques such as color segmentation, contour detection, and hand tracking were employed to extract pertinent features from the gestures, encompassing hand shape, movement, and other visual cues. These extracted features underwent processing through machine learning algorithms, which facilitated gesture recognition and classification based on the identified features. Upon recognizing a gesture, the system generated a textual or spoken representation of the sign, effectively translating sign language into a comprehensible form for individuals unfamiliar with sign language. The output could manifest as text or synthesized speech.The challenges encountered in traditional computer vision and machine learning techniques for sign language recognition include limited accuracy, particularly with complex gestures or variations in lighting and background conditions. These methods heavily rely on hand-crafted features, which hinder adaptability to diverse sign language styles and signer characteristics. Real-time processing of sign language gestures is often sluggish, causing communication delays. Scaling the system to recognize a broader vocabulary or multiple sign languages necessitates extensive manual feature engineering and presents scalability issues. Additionally, the system faces difficulty in interpreting continuous signing or sentences, as it primarily focuses on individual signs.

The proposed system seeks to overcome the limitations of existing systems by harnessing deep learning techniques for Sign Language translation. Its primary objective is to recognize and translate sign language alphabets in real-time. The system operates by capturing hand gestures through a camera, processing the frames, and passing them through a classifier to predict the signed alphabet. This initiative marks an initial stride towards developing a sign language translator, aiming to facilitate smoother communication between individuals with hearing impairments and those without. The integration of Convolutional Neural Networks (CNNs) has significantly revolutionized sign language recognition, enhancing accessibility and effectiveness for individuals dependent on sign language for communication.

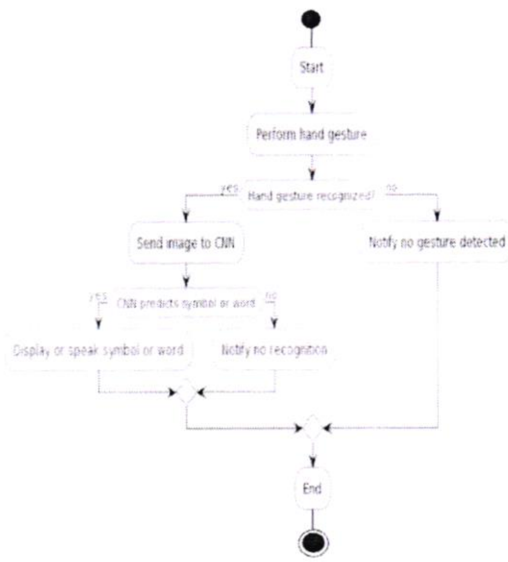


Fig. 2: Activity Diagram

The proposed system operates in real-time, facilitating immediate communication between sign language users and non-signers. It utilizes deep learning, specifically Convolutional Neural Networks (CNNs), to achieve accurate recognition of sign language gestures. With a user-friendly interface, the system is accessible to individuals without prior sign language knowledge, aiming to enhance communication between the hearing world and the deaf and speech-impaired community. Thanks to CNNs' high recognition accuracy, even in challenging conditions, the system ensures reliable gesture interpretation. Moreover, it can adapt to various signers' styles and recognize multiple sign languages, showcasing its scalability and versatility. Additionally, CNN-based systems excel in interpreting continuous signing and full sentences, enhancing their suitability for real-world applications.The system comprises several modules designed to facilitate effective sign language recognition and communication. Firstly, the Data Acquisition Module captures images of sign gestures using a webcam or similar device, ensuring real-time acquisition of hand gestures. These images then undergo preprocessing in the Preprocessing Module to enhance quality and remove noise, ensuring optimal input for downstream processing. The core CNN Model Module utilizes a specialized Convolutional Neural Network architecture trained on preprocessed gesture images to recognize distinct features and patterns associated with various gestures. Subsequently, the Gesture Classification Module categorizes recognized gestures into predefined labels based on output probabilities generated by the CNN model, providing actionable insights into user communication. Additionally, the Suggestion Module enhances recognition accuracy and user experience by offering similar word suggestions for recognized gestures, refining system understanding and improving communication effectiveness. Finally, the Output Module presents recognized gestures and corresponding text interpretations to users through various interfaces, including screen display, synthesized speech, or external device transmission, facilitating seamless communication in real-world scenarios.

IV. RESULTS

CNN: Convolutional Neural Network

Table 1. Parameter Measurement for CNN Model

Model: "sequential"

Layer (type)	Output Shape	Param #
conv2d (Conv2D)	(None, 126, 126, 16)	448
batch_normalization (BatchNo	(None, 126, 126, 16)	64
conv2d_1 (Conv2D)	(None, 124, 124, 16)	2320
batch_normalization_1 (Batch	(None, 124, 124, 16)	64
max_pooling2d (MaxPooling2D)	(None, 62, 62, 16)	0
dropout (Dropout)	(None, 62, 62, 16)	0
conv2d_2 (Conv2D)	(None, 60, 60, 32)	4640
batch_normalization_2 (Batch	(None, 60, 60, 32)	128
conv2d_3 (Conv2D)	(None, 58, 58, 32)	9248
batch_normalization_3 (Batch	(None, 58, 58, 32)	128
max_pooling2d_1 (MaxPooling2	(None, 29, 29, 32)	0
dropout_1 (Dropout)	(None, 29, 29, 32)	0
flatten (Flatten)	(None, 26912)	0
dense (Dense)	(None, 512)	13779456
dropout_2 (Dropout)	(None, 512)	0
dense_1 (Dense)	(None, 1024)	525312
dropout_3 (Dropout)	(None, 1024)	0
dense_2 (Dense)	(None, 35)	35875

Total params: 14,357,683
Trainable params: 14,357,491 Non-trainable params: 192

Principal
Samskruti College of Engg. & Technology
Kondapur (V), Ghatkesar (M), Medchal Dist.

 ISSN NO: 0022-1945

Epoch 1/2
1838/1838
[==============================]
- 1076s 586ms/step - loss: 0.2901 - accuracy: 0.9931 - val_loss: 0.0122 - val_accuracy: 0.9994
Epoch 2/2
1838/1838
[==============================]
- 1053s 573ms/step - loss: 0.2606 - accuracy: 0.9953 - val_loss: 0.0117 - val_accuracy: 0.9998

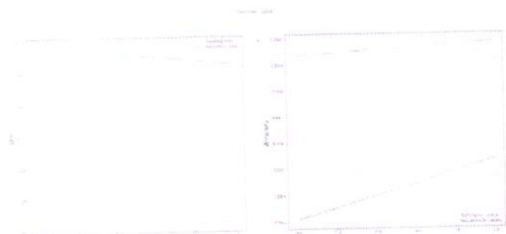


Fig. 3: CNN Matplotlib Training Accuracy and Validation Accuracy

XCEPTION: Extreme Inception

Table 2. Parameter Measurement for Xception Model

Model: "model"

Layer (type)	Output Shape	Param #	Connected to
input_1 (InputLayer)	[(None, 128, 128, 3)	0	
block1_conv1 (Conv2D)	(None, 63, 63, 32)	864	input_1[0][0]
block1_conv1_bn (BatchNormaliza	(None, 63, 63, 32)	128	block1_conv1[0][0]
block1_conv1_act (Activation)	(None, 63, 63, 32)	0	block1_conv1_bn[0][0]
block1_conv2 (Conv2D)	(None, 61, 61, 64)	18432	block1_conv1_act[0][0]
block1_conv2_bn (BatchNormaliza	(None, 61, 61, 64)	256	block1_conv2[0][0]
block1_conv2_act (Activation)	(None, 61, 61, 64)	0	block1_conv2_bn[0][0]
block2_sepconv1 (SeparableConv2	(None, 61, 61, 128)	8768	block1_conv2_act[0][0]
block2_sepconv1_bn (BatchNormal	(None, 61, 61, 128)	512	block2_sepconv1[0][0]
block2_sepconv2_act (Activation	(None, 61, 61, 128)	0	block2_sepconv1bn[0][0]
block2_sepconv2 (SeparableConv2	(None, 61, 61, 128)	17536	block2_sepconv2act[0][0]

Total params: 21,928,523
Trainable params: 21,873,995
Non-trainable params: 54,528

Fig. 4: Xception Matplotlib Training Accuracy and Validation Accuracy

VGG: Visual Geometry Group

Table 3. Parameter Measurement for VGG Model

Model: "model"

Layer (type)	Output Shape	Param #
input_1 (InputLayer)	[(None, 128, 128, 3)]	0
block1_conv1 (Conv2D)	(None, 128, 128, 64)	1792
block1_conv2 (Conv2D)	(None, 128, 128, 64)	36928
block1_pool (MaxPooling2D)	(None, 64, 64, 64)	0
block2_conv1 (Conv2D)	(None, 64, 64, 128)	73856
block2_conv2 (Conv2D)	(None, 64, 64, 128)	147584
block2_pool (MaxPooling2D)	(None, 32, 32, 128)	0
block3_conv1 (Conv2D)	(None, 32, 32, 256)	295168
block3_conv2 (Conv2D)	(None, 32, 32, 256)	590080
block3_pool (MaxPooling2D)	(None, 16, 16, 256)	0
block4_conv1 (Conv2D)	(None, 16, 16, 512)	1180160
block4_conv2 (Conv2D)	(None, 16, 16, 512)	2359808
block4_conv3 (Conv2D)	(None, 16, 16, 512)	2359808
block4_pool (MaxPooling2D)	(None, 8, 8, 512)	0
block5_conv1 (Conv2D)	(None, 8, 8, 512)	2359808
block5_conv2 (Conv2D)	(None, 8, 8, 512)	2359808
block5_pool (MaxPooling2D)	(None, 4, 4, 512)	0
flatten (Flatten)	(None, 8192)	0
dense (Dense)	(None, [illegible])	[illegible]

Total params: 15,001,443
Trainable params: 15,001,443
Non-trainable params: 0

Epoch 1/2

50/50
[==============================]
- 336s 7s/stop - loss: 3.6712 - Accuracy: 0.0388 - val_loss: 3.5792 - val_accuracy: 0.0300

Epoch 2/2

50/50
[==============================]
- 335s 7s/stop - loss: 3.5614 - Accuracy: 0.0341 - val_loss: 3.5552 - val_accuracy: 0.0288

Fig. 5: VGG Matplotlib Training Accuracy and Validation Accuracy

ResNet: Residual Network

Table 4. Parameter Measurement for ResNet Mode

Model: "model_1"

Layer (type)	Output Shape	Param #	Connected to
input_2 (InputLayer)	[(None, 128, 128, 3)	0	
conv1_pad (ZeroPadding2D)	(None, 134, 134, 3)	0	input_2[0][0]
conv1_conv (Conv2D)	(None, 64, 64, 64)	9472	conv1_pad[0][0]
conv1_bn (BatchNormalization)	(None, 64, 64, 64)	256	conv1_conv[0][0]
conv1_relu (Activation)	(None, 64, 64, 64)	0	conv1_bn[0][0]
pool1_pad (ZeroPadding2D)	(None, 66, 66, 64)	0	conv1_relu[0][0]
pool1_pool (MaxPooling2D)	(None, 32, 32, 64)	0	pool1_pad[0][0]
conv2_block1_1_conv (Conv2D)	(None, 32, 32, 64)	4160	pool1_pool[0][0]
conv2_block1_1_bn	(None, 32, 32, 64)	256	conv2_block1_1_conv[0]
conv2_block1_1_relu (Activation	(None, 32, 32, 64)	0	conv2_block1_1_bn[0]
conv2_block1_2_conv (Conv2D)	(None, 32, 32, 64)	36928	conv2_block1_1_relu[0]

Total params: 24,734,627
Trainable params: 24,681,507
Non-trainable params: 53,120

Epoch 1/2

50/50
[==============================]
- 166s 3s/step - loss: 2.8219 - accuracy: 0.7788 - val_loss: 3613.9463 - val_accuracy: 0.0338

Epoch 2/2

50/50
[==============================]
- 158s 3s/step - loss: 0.8213 - accuracy: 0.9137 - val_loss: 4455.5488 - val_accuracy: 0.0213

Fig. 6: ResNet Matplotlib Training Accuracy and Validation Accuracy

V. CONCLUSION

The development of our sign language recognition system utilizing Convolutional Neural Networks (CNNs) marks a significant breakthrough in overcoming communication obstacles encountered by the

Principal
Samskruti College of Engg. & Technology
Kondapur (V), Ghatkesar (M), Medchal Dist.

hearing-impaired community. Through meticulous efforts in data gathering, preprocessing, and model refinement, we've engineered a system capable of accurately interpreting sign language gestures in real-time. By translating these gestures into spoken or written language, our system facilitates seamless communication between sign language users and those unfamiliar with it, promoting inclusivity and accessibility. Our project underscores the importance of harnessing advanced technologies like CNNs to create innovative solutions for social inclusion and accessibility. Through deep learning techniques, we've created a system not only capable of recognizing sign language gestures but also translating them into spoken or written language instantly. This capability has the potential to transform interpersonal interactions, empowering the hearing-impaired community to engage more fully in everyday activities. Moreover, the adaptability and scalability of our system ensure its versatility across various applications and user demographics. Whether deployed in educational environments, public settings, or personal communication devices, our sign language recognition system effectively bridges communication divides between sign language users and others. With its user-friendly interface and real-time translation features, the system is intuitive and accessible to individuals with diverse levels of technical proficiency.

VI. REFERENCES

[l] Anup Kumar; Karun Thankachan; Mevin M. "Sign Language Recognition" 3rd InCI Conf. on Recent Advances in Information Technology I RAIT-2016

[2] Amrutha K; Prabhu P.; "ML Based Sign Language Recognition System" 2021 International Conference on Innovative Trends in Information Technology (ICITIIT) 02021 IEEE.

[3] Siming He "Research of a Sign Language Translation System Based On Deep Learning" International Conference on Artificial Intelligence and Advanced Manufacturing (AIAM) - 2019.

[4] Nikam, Ashish; S Amhekar; Aarti G. "Sign Language Recognition Using Image-Based Hand Gesture Recognition Techniques" Online International Conference on Green Engineering and Technologies (IC-GET) 2016.

[5] Pankajakshan; Priyanka C; Thilagavathi;, "Sign Language Recognition System" IEEE Sponsored 2nd International Conference on Innovations in Information Embedded and Communications Systems IC11ECS'15, 2015

[6] Kavtik Shenoy, Tejas Dastan; Varun Rao; Devendra Vyavaharkar: "Real-time Indian Sign Language (ISL) Recognition " 10. 1109/ ICCCNT. 2018. 8493808 IEEE July 2018

[7] Nagendraswamy H; Chethana Kumara B; Lekha Chinmayi R; "Indian Sign Language Recognition: An Approach Based on Fuzzy-Symbolic Data" 2016 Intl. Conference on Advances in Computing, Communications and Informatics (ICACCI), Sept. 21-24, 2016.

[8] Anshul Mittal; Pradeep Kumar; Partha Pratim Roy; Raman Balasubramanian; Bidyut B. Chaudhuri "A Modified-LSTM Model for Continuous Sign Language Recognition using Leap motion" DOI 10. 1109/ JSEN.2019.2909837, IEEE Sensors Journal 1 2019

[9] Muneer-al-Hammadi; Ghulam Muhammad; Wadood Abdul; Mansour Alsulaiman; Mohammed A. Bencherif Tareq S.,41rayes; Hassan Mathkour; Mohamed Amine mekhriche; "Deep Learning-Based Approach for Sign Language Gesture Recognition with Efficient Hand Gesture Representation" IEEE October 19, 2020.

[10] Neel Kama,' Bhagat; Vishnu Sai Y; Rathna G N 'VIndian Sign Language Gesture Recognition using Image Processing and Deep Learning" [IEEE 2019 Digital Image Computing: Techniques and Applications (DICTA) - Perth, Australia (2019.12.22019.12.4)

[11] Jong-Sung Kim, Won Jang, and Zeungnam Bien, "A dynamic gesture recognition system for the Korean sign language (asl)," Systems, Man, and Cybernetics, Part B: Cybernetics, IEEE Transactions on, vol. 26, no. 2, pp. 354–359, 1996.

[12] Ross Girshick, Jeff Donahue, Trevor Darrell, and Jitendra Malik, "Rich feature hierarchies for accurate object detection and semantic segmentation," arXiv preprint arXiv:1311.2524, 2013.

[13] Ronan Collobert and Jason Weston, "A unified architecture for natural language processing: Deep neural networks with multitask learning," in ICML. ACM, 2008, pp. 160– 167.

[14] Clement Farabet, Camille Couprie, Laurent Najman, ′ and Yann LeCun, "Learning hierarchical features for scene labeling," IEEE TPAMI, vol. 35, no. 8, pp. 1915– 1929, 2013.

[15] Srinivas C Turaga, Joseph F Murray, Viren Jain, Fabian Roth, Moritz Helmstaedter, Kevin Briggman, Winfried Denk, and H Sebastian Seung, "Convolutional networks can learn to generate affinity graphs for image segmentation," Neural Computation, vol. 22, no. 2, pp. 511– 538, 2010.

Integrated Multimodal Deep Learning For Disaster Identification In Online Posts

[1]Mr. K. Vamshi Krushna, [2]P. Ramu, [3]K . Vikas Reddy, [4]M . Ankith Reddy, [5]K . Naveen

[1]Assistant Professor, Department of Computer Science and Engineering (Artificial Intelligence and Machine Learning), Samskruti College of Engineering and Technology, Kondapur[V], Ghatkesar[M], Medchal- Malkajgiri[D], Telangana

[2,3,4,5]B. Tech Scholar, Department of Computer Science and Engineering (Artificial Intelligence and Machine Learning), Samskruti College of Engineering and Technology, Kondapur[V], Ghatkesar[M], Medchal- Malkajgiri[D], Telangana

Abstract: Micro blogging platforms like Twitter have become essential for sharing crucial information, especially during natural and man-made disasters. Users often post multimedia content containing images and/or videos to report critical details such as casualties, damage to infrastructure, and urgent needs of affected individuals. This information is invaluable for humanitarian organizations to plan timely and effective responses. While previous research has highlighted the effectiveness of combining text and image content for disaster identification, most studies focused solely on analyzing textual data and/or employed traditional recurrent neural network (RNN) or convolutional neural network (CNN) architectures, which may result in performance degradation with long input sequences. In our approach, we utilize a pretrained convolutional neural network (ResNet50) to extract visual features and a bidirectional long-term memory (BiLSTM) network with an attention mechanism to extract textual features. These features are then aggregated using a feature fusion technique, followed by classification using a softmax classifier. Evaluation results indicate that our proposed multimodal system outperforms existing baselines, including both unimodal and multimodal models, achieving approximately 1% and 7% performance improvements, respectively.

Keywords: Natural disasters, Multimodal deep learning, social media, Twitter, Natural language processing, Attention Mechanism.

I. INTRODUCTION

During disasters like earthquakes, floods, and hurricanes, social media platforms are crucial for disseminating vital information. People use these platforms to communicate across various levels, such as between individuals, between individuals and the government, and between individuals and communities. Victims often share updates about the disaster on platforms like Twitter, reporting injuries, fatalities, and damage to infrastructure. They also request urgent assistance by posting images, tweets, and videos. Analyzing these social media posts in real-time to extract useful insights can significantly aid humanitarian organizations in their relief efforts. However, manually analyzing the vast amount of crisis-related tweets is a challenging and time-consuming task.

The humanitarian computing community has been working to overcome the challenge of analyzing crisis-related social media posts by developing automated systems capable of extracting and classifying this information. Researchers have created classifiers to identify event types (such as floods and hurricanes), determine if a post is

Principal
Samskruti College of Engg. & Technology
Kondapur (V), Ghatkesar (M), Medchal Dist

informative, and categorize different types of humanitarian information, like damage types. However, despite recent advancements, there are two main limitations in current research. First, most studies focus solely on analyzing either textual or image content independently. Recent findings indicate that combining information from both text and images can provide more valuable insights and lead to more accurate conclusions than using a single type of content. Second, the few studies that do use multimodal features often rely on CNN or RNN models for text feature representation, which may not be effective for longer sentences. In this study, our objective is to develop an effective computational model that identifies disaster-related information by integrating features from both visual and textual modalities. Specifically, we use a pre-trained visual model (ResNet50) to extract image features. For textual features, we enhance a BiLSTM network with an attention mechanism to address the long-range dependency issues present in traditional RNN and CNN architectures. We then combine both types of features using Deep level fusion and apply a softmax layer to classify the tweet. We conduct extensive experiments on a multimodal damage dataset to classify damage types (such as fire, floods, and infrastructure damage) from image-tweet pairs. Our models are compared with several baselines that either do not utilize multimodal features or do not incorporate attention mechanisms . The key findings from these experiments are: (i) utilizing multimodal features is more effective than using unimodal features, and (ii) the RNN model with an attention mechanism significantly improves performance compared to models without this mechanism.

Data collection and preprocessing involve acquiring a diverse dataset of online posts related to disasters and developing techniques to clean and standardize the text, images, and other relevant data. For multimodal data integration, methods are explored to combine information from various modalities, such as text and images, effectively. The next step is model development, where deep learning models are designed and implemented to handle multimodal data for disaster identification, experimenting with state-of-the-art architectures for text and image processing. Feature extraction and representation mechanisms are implemented to derive meaningful features from textual and visual data, creating a joint representation of these features. Real-time processing optimizes the models and algorithms to handle the large volume of data generated during disaster events efficiently. A classification system is then developed to accurately identify various types of disasters and distinguish between false alarms and genuine disaster-related content. Finally, a user-friendly interface is created for emergency responders or relevant authorities, ensuring the system provides actionable information and insights.

Multimodal data fusion integrates information from various sources like text and images to provide a comprehensive understanding of disaster-related content, such as combining event descriptions with related images or videos. Deep learning techniques, including convolutional neural networks (CNNs) for images and recurrent neural networks (RNNs) for text, are used to automatically extract features and patterns from this multimodal data, capturing complex relationships and representations. Disaster identification involves developing models that accurately identify and classify online content related to disasters, such as tweets, posts, or images about natural disasters, accidents, and emergencies. Real-time monitoring allows for the rapid

Principal
Samskruti College of Engg. & Technology
Kondapur (V), Ghatkesar ...

identification and response to disaster-related information, which is crucial for effective disaster management. A decision support system assists emergency responders and authorities in making informed decisions based on identified disaster information. This system also facilitates humanitarian assistance by quickly identifying affected areas and the type of aid needed. Finally, the system is designed to be adaptable to different online platforms and social media channels where people share information during and after disasters.

II. LITERATURE SURVEY

Advances in Social Media Research: Past, Present and Future:

Social media consists of communication platforms that enable users from diverse backgrounds to form relationships, creating a rich social structure. User-generated content on these platforms encourages inquiry and decision-making. Due to its relevance to various stakeholders, social media has garnered significant attention from researchers across multiple fields, including information systems. However, no comprehensive review has synthesized the findings from literature on social media. This study addresses that gap by discussing the findings of 132 papers on social media and social networking, published in selected information systems journals between 1997 and 2017. Most of these papers examine the behavioral aspects of social media, investigate reviews and recommendations, and explore its organizational integration. Additionally, numerous studies have assessed the viability of online communities and social media as marketing mediums, while others have explored the risks, value creation, and negative stigma associated with social media in the workplace. Research has also focused on the use of social media for information sharing during critical events and for seeking or providing help. Other contexts include political and public administration and comparisons between traditional and social media. Overall, this study identifies multiple emerging themes in the existing literature, enhancing our understanding of social media research. The integrated view presented can help future researchers avoid duplication and offer new lines of inquiry to advance this emerging field.

Social network analysis: Characteristics of online social networks after a disaster:

Social media platforms like Twitter and Facebook are crucial for disaster management by disseminating emergency information to affected communities. They are the fourth most popular source for accessing emergency information. Numerous studies have analyzed social media data to understand networks and extract critical information for developing pre- and post-disaster mitigation plans. For instance, the 2016 Louisiana flood, which damaged over 60,000 homes and was the worst U.S. disaster since Hurricane Sandy in 2012, saw active social media use by Louisiana parishes. They shared crucial information like flood inundation maps, locations of emergency shelters, medical services, and debris removal operations. This study uses social network analysis to transform emergency social network data into actionable knowledge. By exploring interaction patterns of online users on Facebook during disaster responses, the study provides insights into the vital role of social media in propagating emergency information. The findings reveal that social networks are composed of three key entities: individuals, emergency agencies, and organizations. The core of the social network is formed by numerous individuals

Principal
Samskruti College of Engg. & Technology
Kondapur (V), Ghatkesar (M), Medchal Dist

who actively share information, communicate with the city of Baton Rouge, and update statuses. Emergency agencies and organizations are on the network's periphery, linking one community to others. These results can help emergency agencies enhance their social media strategies for disaster mitigation plans.

Content features of tweets for effective communication during disasters:

Twitter's retweet feature has made it a leading platform for disseminating emergency information during disasters. However, few studies have explored how Twitter's features support different communication patterns during various disaster phases. Drawing on disaster communication literature and Media Synchronicity Theory, this study identifies distinct disaster phases and two communication types—crisis communication and risk communication—that occur during these phases. We examine how Twitter's features, such as words, URLs, hashtags, and hashtag importance, affect the average retweet time, and how these effects vary depending on the type of disaster communication. Analyzing tweets from the 2013 Colorado floods, we found that adding more URLs to tweets increases the average retweet time more in risk-related tweets than in crisis-related tweets. Additionally, including key disaster-related hashtags in tweets resulted in faster retweets for crisis-related tweets compared to risk-related ones. Our findings suggest that Twitter's media capabilities influence the speed of tweet propagation during disasters differently, depending on the communication process.

III. METHODOLOGY

The problem specifications for integrated multimodal deep learning for disaster identification in online posts encompass several critical stages. Firstly, data collection involves gathering a diverse dataset of online posts, including text, images, and videos, related to disasters for model training and testing. Multimodal integration is crucial, requiring the development of a framework to seamlessly integrate information from different modalities (text, image, video) to enhance the model's understanding of disaster-related content. Preprocessing steps involve cleaning and preprocessing the data to handle noise, irrelevant information, and standardize formats across modalities. Model architecture design is pivotal, necessitating the creation of a deep learning architecture capable of accommodating both textual and visual information, enabling the extraction of meaningful patterns from each modality. An effective training strategy is implemented to leverage multimodal data, potentially using joint or parallel training approaches to optimize overall model performance. Feature fusion mechanisms are deployed to fuse features extracted from different modalities, creating a comprehensive representation of the input data. Evaluation metrics such as accuracy, precision, and recall are defined to assess the model's performance in disaster identification across different modalities. Fine-tuning and generalization ensure the model can generalize well to new, unseen data, considering techniques like transfer learning or fine-tuning on specific disaster domains. Ethical considerations address potential biases in the data and ensure fairness and transparency in the model's decision-making process. Scalability is prioritized, with the model designed to handle large volumes of online posts efficiently. Additionally, real-time deployment requirements are considered, especially if the model is intended for immediate disaster response and

Principal
Samskruti College of Engg. & Technology
Kondapur (V), Ghatkesar (M), Medchal Dist.

identification. If applicable, integrating the model into a user-friendly interface for stakeholders to interact with the system effectively is essential. Lastly, mechanisms to handle noisy or misleading information often present in online posts during disaster events are developed to ensure robustness to noisy data.

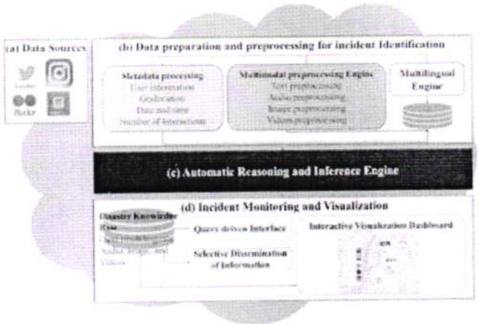


Fig 1 : System architecture of disaster identification using deep learning.

Our work presents several key contributions: Firstly, we introduce a multimodal architecture that leverages ResNet50 and BiLSTM recurrent neural network with an attention mechanism to classify damage-related posts by utilizing both visual and textual information. Secondly, we conduct a performance comparison of our proposed model against a variety of existing unimodal (i.e., image, text) and multimodal classification techniques. Thirdly, we empirically evaluate our model on a benchmark dataset and illustrate how the introduction of attention can improve system performance through intrinsic evaluation. Additionally, we conduct both quantitative and qualitative analyses to gain deeper insights into error types, providing valuable directions for future model enhancements. Moreover, our proposed system develops an effective computational model for identifying disaster-related information by synergistically integrating features from visual and textual modalities. Finally, in our system, we transform tweets into vector representations and utilize an embedding layer to obtain semantic representations (embedding features) of the words, enhancing the system's understanding of the textual content.

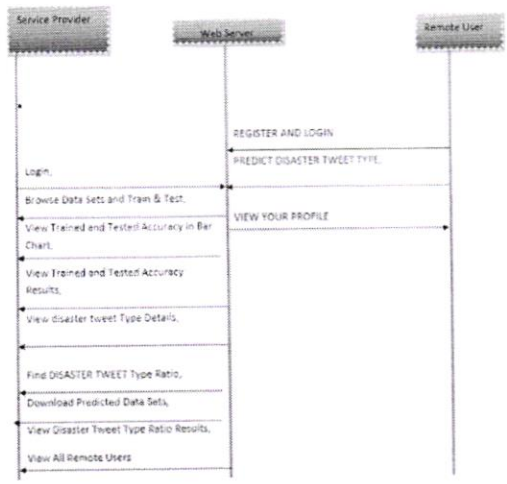


Fig 2 : Sequence Diagram

Algorithms:

DECISION TREE CLASSIFIERS

Decision tree classifiers are used successfully in many diverse areas. Their most important feature is the capability of capturing descriptive decision-making knowledge from the supplied data. Decision tree can be generated from training sets.

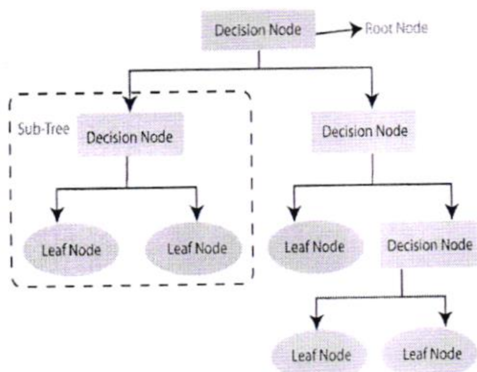


Fig 3 : Decision Tree

GRADIENT BOOSTING

Gradient boosting machine learning technique used in regression and classification tasks, among others. It gives a prediction model in the form of an ensemble of weak prediction models, which are typically decision trees. When a decision tree is the weak learner, the resulting algorithm is called gradient-boosted trees; it usually outperforms forest. A gradient-boosted trees model is built in a stage-wise fashion as in other boosting methods, but it generalizes the other methods by allowing optimization of an arbitrary differentiable loss function.

LOGISTIC REGRESSION CLASSIFIERS

Logistic regression analysis studies the association between a categorical dependent variable and a set of independent (explanatory) variables. The name logistic regression is used when the dependent variable has only two values, such as 0 and 1 or Yes and No. The name multinomial logistic regression is usually reserved for the case when the dependent variable has three or more unique values, such as Married, Single, Divorced, or Widowed. Although the type of data used for the dependent variable is different from that of multiple regression, the practical use of the procedure is similar.

IV. RESULTS

Fig 4 : Home page

Fig 5: Fake tweet

Fig 6: Real Tweet

V. CONCLUSION

The analysis demonstrates that the proposed method yields approximately 1% to 7% better outcomes compared to existing state-of-the-art models, confirming its effectiveness in identifying disaster content based on multimodal information. Error analysis highlights the challenge of distinguishing between damage and non-damage contents when analyzing only one modality, underscoring the importance of multimodal approaches. Moreover, intrinsic performance analysis reveals that incorporating an attention mechanism enhances overall performance. Despite outperforming unimodal approaches, there are still opportunities for improvement in the proposed method. Future endeavors will explore different multimodal fusion approaches alongside multitask learning techniques for disaster identification. Additionally, efforts will be directed towards more effectively capturing the combination of visual and textual features by leveraging state-of-the-art visual-textual and multimodal transformer models.

VI. REFERENCES

[1] K. K. Kapoor, K. Tamilmani, N. P. Rana, P. Patil, Y. K. Dwivedi, and S. Nerur, "Advances in social media research: Past, present and future," Information Systems Frontiers, vol. 20, no. 3, pp. 531–558, 2018.
[2] J. Kim and M. Hastak, "Social network analysis: Characteristics of online social networks after a disaster," International Journal of Information Management, vol. 38, no. 1, pp. 86–96, 2018.
[3] J. Son, H. K. Lee, S. Jin, and J. Lee, "Content features of tweets for effective communication during disasters: A media synchronicity theory perspective," International Journal of Information Management, vol. 45, pp. 56–68, 2019.
[4] A. Elbanna, D. Bunker, L. Levine, and A. Sleigh, "Emergency management in the changing world of social media: Framing the research agenda with the stakeholders through engaged scholarship," International Journal of Information Management, vol. 47, pp. 112–120, 2019.
[5] R. Dubey, A. Gunasekaran, S. J. Childe, D. Roubaud, S. F. Wamba, M. Giannakis, and C. Foropon, "Big data analytics and organizational culture as complements to swift trust and collaborative performance in the humanitarian supply chain," International Journal of Production Economics, vol. 210, pp. 120–136, 2019.
[6] S. Akter and S. F. Wamba, "Big data and disaster management: a systematic review and agenda for future research," Annals of Operations Research, vol. 283, no. 1, pp. 939–959, 2019.
[7] H. Mouzannar, Y. Rizk, and M. Awad, "Damage identification in social media posts using multimodal deep learning." in ISCRAM, 2018.
[8] F. Ofli, F. Alam, and M. Imran, "Analysis of social media data using multimodal deep learning for disaster response," arXiv preprint arXiv:2004.11838, 2020.
[9] F. Ofli, P. Meier, M. Imran, C. Castillo, D. Tuia, N. Rey, J. Briant, P. Millet, F. Reinhard, M. Parkan et al., "Combining human computing and machine learning to make sense of big (aerial) data for disaster response," Big data, vol. 4, no. 1, pp. 47–59, 2016.

Loan Eligibility Prediction Using Machine Learning Algorithms

[1]Mr. K. Vamshee Krishna, [2]V. Akhila, [3]R. Naga Sai Kiran, [4]V. Goutham Kumar, [5]V. Sai Nikhil

[1]Assistant Professor, Department of Computer Science and Engineering (Artificial Intelligence and Machine Learning), Samskruti College of Engineering and Technology, Kondapur

[2,3,4,5]B. Tech Scholar, Department of Computer Science and Engineering (Artificial Intelligence and Machine Learning), Samskruti College of Engineering and Technology, Kondapur

Abstract: Machine learning (ML) algorithms have the potential to revolutionize research across various fields. These algorithms are transforming processes in many industries, including finance, real estate, security, and genomics. A significant challenge in the banking sector is the loan approval process. Modern ML tools can accelerate, streamline, and enhance the accuracy of these procedures, benefiting both clients and banks by reducing the time and manpower needed for loan eligibility predictions. This work focuses on a classification problem, a type of supervised learning, where the goal is to determine whether a loan will be approved. It involves predictive modeling, where a class label is predicted based on input data for a given sample. In this study, various ML algorithms were deployed to identify loan approval status, and their performance was compared. The models were trained and tested on a loan eligibility prediction dataset from Kaggle, which includes features such as loan amount, number of dependents, and education. Key performance metrics such as accuracy, confusion matrix, ROC curve, and precision were evaluated for the models to assess their effectiveness.

Keywords: Machine Learning (ML), Supervised Learning, Loan Eligibility Prediction (LEP), Kaggle, Real estate.

I. INTRODUCTION

The banking sector is a vital part of any economy, acting as an intermediary between savers and borrowers and offering financial services to individuals, businesses, and governments. One of the key services banks provide is lending. Loans are crucial for economic growth (King et al., 2001), enabling individuals and businesses to invest in new ventures, purchase homes and cars, and make other significant acquisitions that would be otherwise unaffordable. Loans also facilitate business expansion, job creation, and overall economic development. Beyond providing credit, banks play a pivotal role in risk management by thoroughly evaluating loan applications to determine borrowers' creditworthiness and assess associated risks (Samreen, 2012). This careful evaluation process helps minimize the risk of default by ensuring loans are granted to those likely to repay. Banks establish lending policies, and loan approvals are based on the applicant's status according to these regulations. Loan applications are reviewed in line with the applicant's standing under the lending policies set by banks.Banks often approve loans only after a thorough evaluation of the applicant's condition, either by methodically examining submitted documents or by directly verifying assets. However, there is

Principal
Samskruti College of Engg. & Technology
Kondapur (V), Ghatkesar (M), Medchal Dist

no guarantee that the selected individual is the best candidate (Sheikh et al., 2020). Machine learning can help automate the process of loan eligibility prediction by analyzing vast amounts of data and identifying patterns and trends, thus reducing human error. A key advantage of machine learning is its ability to learn from past data and use that knowledge to predict future outcomes (Srivastava et al., 2018).By training machine learning algorithms on historical loan data and outcomes, banks can create models that accurately predict loan eligibility based on various factors such as an applicant's qualifications, gender, employment status, and other relevant criteria. These machine learning models can also help identify critical risk factors, which can be used to improve the loan application process by flagging high-risk applications for human review (Al Mamun et al., 2022).

The objectives of using machine learning algorithms for loan approval prediction are multifaceted, aiming to enhance the efficiency, accuracy, and fairness of the loan approval process. Key objectives include reducing operational costs by automating parts of the loan approval workflow and optimizing resource allocation by allowing human efforts to focus on more complex tasks requiring subjective judgment. Additionally, machine learning models can improve fraud detection by identifying potentially fraudulent activities or misrepresentations in loan applications, thereby enhancing the security of the lending process. Ensuring fairness is also a critical objective, with algorithms designed to mitigate biases present in historical data or decision-making processes. The purpose is to enhance the loan approval process in the banking sector through the application of machine learning (ML) algorithms. By accelerating and streamlining procedures, ML models speed up and simplify the loan approval process, resulting in quicker decision-making and reducing the time required for both clients and the bank. Additionally, ML algorithms improve the precision of loan approval decisions by analyzing large datasets and detecting complex patterns, leading to more accurate risk assessments.

II. LITERATURE SURVEY

C. Naveen Kumar et al. (2022) discussed the traditional loan approval process and its associated risks for banks. They explored data mining and machine learning approaches to automate the loan approval process, highlighting the potential for significant time and resource savings. The aim of their work is to replace the conventional loan eligibility approval process in the banking industry. Park et al. (2021) compared six different machine learning algorithms based on precision, recall, and accuracy to predict loan approval outcomes. In their study, the Random Forest algorithm demonstrated the highest accuracy at 95.55%, while Logistic Regression showed the lowest accuracy. Mohankumar et al. (2016) emphasized the importance of feature selection in predictive models, employing various methods and approaches for this purpose. They also suggested using a linear neural network instead of a linear regression model to leverage the enhanced capabilities of an artificial neural network.A. Wodele et al. (2022) discussed how

Principal
Samskruti College of Engg. & Technology
Kondapur (V), Ghatkesar (M), Medchal Dist.

combining Deep Learning networks with Support Vector Machines (SVM) improves accuracy by 9%. In their study, they used Deep Neural Networks (DNN) to transform input data from a lower dimension to higher-dimensional output features, which were then used to enhance the performance of an SVM-based classification model.

Pidikiti et al. (2019) aimed to reduce the risks associated with selecting reliable applicants for loan approval, which involves significant resources, effort, and cost for banks. In their study, they used machine learning techniques such as classification, logistic regression, decision trees, and gradient boosting to forecast loan outcomes. The decision tree algorithm outperformed the others, achieving an accuracy of 82 percent, making it the most effective due to its improved classification results.According to Pandey et al. (2010), predicting loan defaulters is a challenging task for banks, but it's crucial for minimizing losses associated with non-repayable assets. Therefore, the study of loan approval prediction has become indispensable. Machine learning algorithms play a vital role in predicting such data accurately. This study utilized four machine learning algorithms and compared their performance. Among them, Support Vector Machine demonstrated the highest efficiency with an accuracy of 79.67% in predicting loan acceptance. The researchers collected a dataset comprising information from former clients of various banks that had provided multiple loan advances.

Prediction involves making assertions about future events based on various factors, whether through mathematical calculations or educated guesses. Such forecasts, whether short-term or long-term, serve various purposes. In their 2016 study, Kumar Arun et al. explored methods for predicting the procedures through which banks can approve loan applications, utilizing a model incorporating machine learning tools such as neural networks and SVM. Tejaswini et al. (2020) proposed a robust predictive approach based on clients' historical financial and credit scores to determine whether to accept or reject an applicant. Their aim was to establish a quick, straightforward, and efficient method for selecting qualified applications. They collected a dataset from different commercial organizations, dividing it into training and testing sets, with the former used for model training and the latter for validation. Three machine learning algorithms were employed to forecast customer loan approval, with the Decision Tree algorithm demonstrating the highest accuracy of 82%, outperforming other models according to evaluation results. Shrishti et al. (2018) introduced a robust machine-learning model aimed at forecasting loan acceptance swiftly for applicants. Utilizing Logistic Regression, Decision Trees, and Random Forest algorithms, their primary objective was to facilitate fast loan approval. Upon analyzing the datasets with different models, they found that the Random Forest algorithm exhibited the highest accuracy among all the models tested. Author Ndayisenga, T. (2021), collaborated with financial banks to predict debtor behavior by exploring and evaluating the effectiveness of various models using data from a bank in Kigali.

III. METHODOLOGY

The introduction of loan eligibility approval systems in the banking sector is seen as a beneficial solution for both customers and financial institutions. This study recognizes the potential benefits of utilizing machine learning approaches to streamline and improve the loan approval process, emphasizing cost-effectiveness, efficiency, and time savings (Reddy et al., 2022). To facilitate accurate prediction of loan eligibility, the study highlights crucial characteristics essential for precise assessments, such as credit history, income, debt-to-income ratio, and other relevant financial indicators (Reddy et al., 2022). By identifying and integrating these key features, the model can make more informed decisions regarding loan approval.The dataset used in this study is sourced from a public repository, and a comprehensive preprocessing phase is undertaken to improve the overall quality of the data (Gupta et al., 2020). Preprocessing tasks include managing missing values, normalization, and encoding categorical variables, ensuring that the data is suitable for training and testing machine learning models. This thorough data preprocessing significantly contributes to the reliability and accuracy of subsequent model evaluations. The study adheres to the standard practice of dividing the dataset into training and testing sets. The training data are used to develop machine learning models, while the test data are vital for assessing the performance and generalization capabilities of these models (Nayak et al., 2022). This division ensures that the model can not only learn from the provided data but also make accurate predictions on new, unseen data.This study employs a range of machine learning algorithms, including decision tree, random forest, support vector machine, K-nearest neighbor, Naïve Bayes, logistic regression, and linear regression, to predict loan eligibility (Kadam et al., 2021). The effectiveness of each algorithm is thoroughly assessed based on predefined performance metrics, providing valuable insights into their strengths and weaknesses in the context of loan eligibility prediction. Overall, the study emphasizes integrating machine learning models into the loan approval process, prioritizing cost-effectiveness, efficiency, and time savings. It underscores the significance of key characteristics for accurate predictions, utilizes a meticulously pre-processed dataset, and evaluates the performance of different machine learning algorithms to gauge their effectiveness in predicting eligibility.

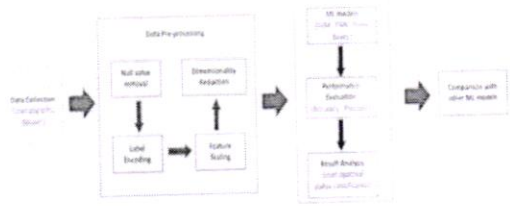
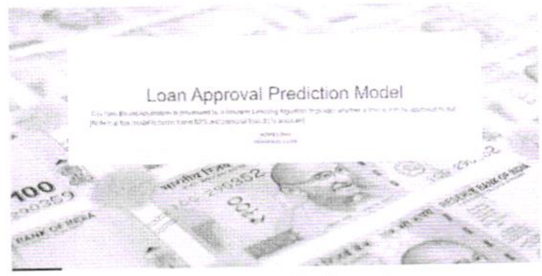


Figure 1: Proposed pipeline of the Model

In this research effort, the dataset used for predicting loan eligibility is sourced from the Kaggle public repository, containing thirteen distinct characteristics and a total of 614 records. These features include Loan_id, Gender, Marital Status, Dependents, Education, Employment Status, Applicant's Income, Coapplicant Income, Loan Amount, Loan Term, Credit History, Property Area, and Loan Status. Each attribute plays a vital role in determining an individual's eligibility for a loan, providing a comprehensive set of information for predictive modeling. To ensure the effectiveness of the machine learning models, a rigorous data preprocessing phase is conducted. This involves employing four key preprocessing techniques. Firstly, missing values are addressed using functions like bfill() and fill() to efficiently handle null values and optimize the dataset. Next, label encoding is applied to standardize the treatment of both categorical and numerical variables. This technique transforms categorical variables into a numerical format, improving the data's compatibility for modeling.Another preprocessing technique employed is feature scaling, which transforms the dataset into a specific range using the standard scalar method. This involves centering variables by removing the mean and scaling them to unit variance, which helps normalize the dataset. Additionally, Linear Discriminant Analysis (LDA) is utilized to reduce the dimensionality of the dataset from 2D to 1D, mitigating the curse of dimensionality and further improving the efficiency of the models.

IV. RESULTS



Home page of loan prediction choose type of loan. 1.home loan 2.personal loan

Figure 2: Home Screen

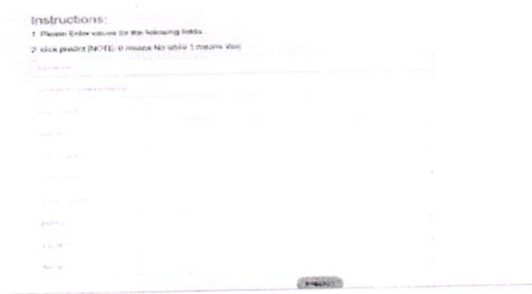
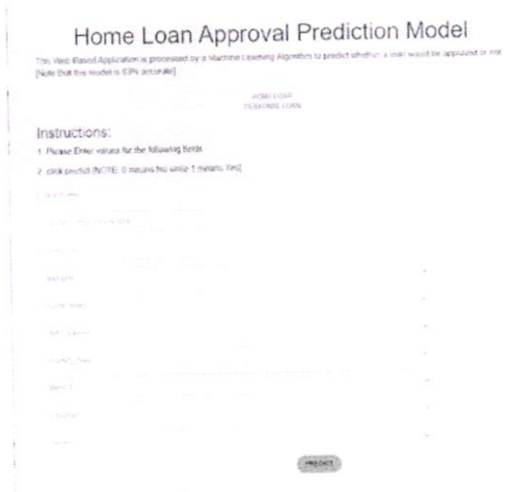
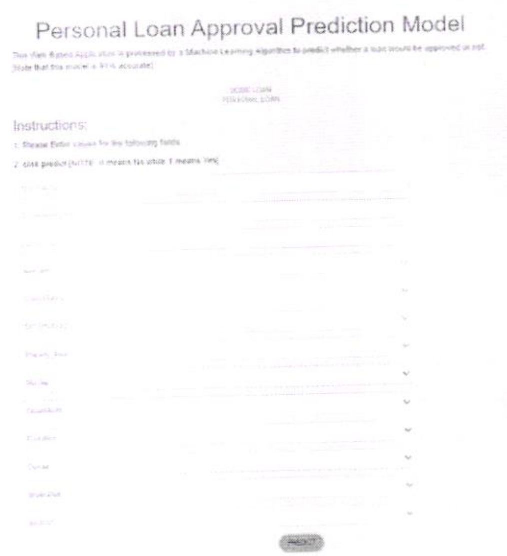


Figure 3: Details of website requirements details of costumer to predicts the loan eligibility

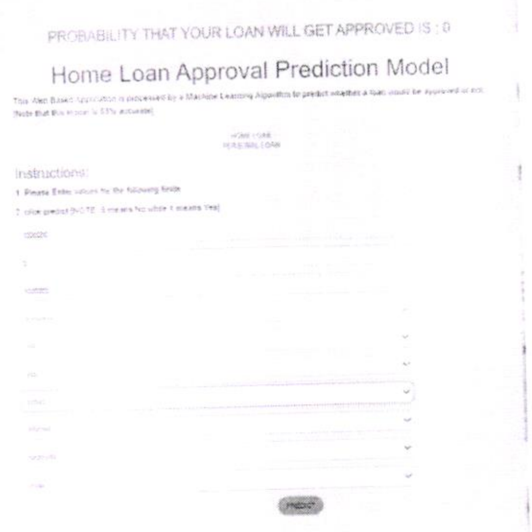


Choosing Home loan approval prediction the model looks with required details of costumer to predict according to loan amount. If the prediction of loan is approved then is shows the result as 1.

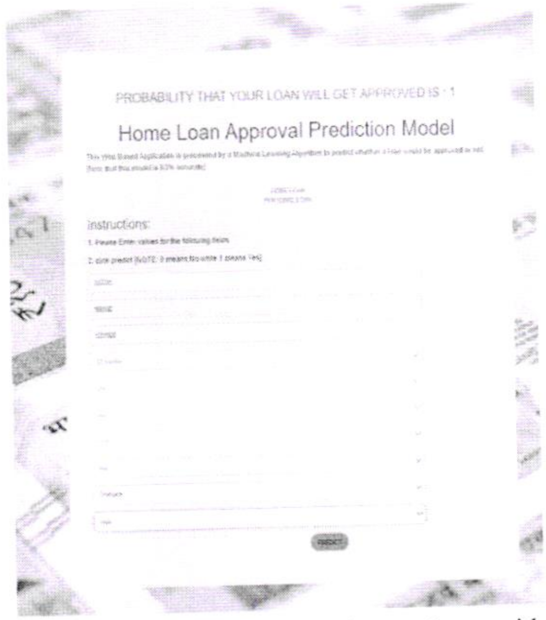
If the prediction of loan is not approved then it shows the result as 0.



Choosing personal loan approval prediction the model looks with required details of costumer to predict according to loan amount. As same as home loan model.



For given input of loan the prediction of loan approval shows the probability the loan is not Approved as shown 0.



The probability of getting home loan with required details and loan amount the results of approval is eligible it show yes you are approved in the form of 1.

V. CONCLUSION

This project concluded that the dataset is incomplete and still lacks some feature vectors. No classifier achieved better than 90.71% accuracy because the subspace of the entire area we aimed to generalize has unknown higher dimensions, as observed with the Random Forest classifier. To improve classifier performance, future studies should generate more characteristic vectors to enhance the dataset used in this research. For improved accuracy and performance, our future work aims to employ a machine learning model incorporating deep learning techniques such as CNN. The deployment of deep learning models may also reduce computational time, as they require fewer manual preprocessing tasks.

VI. REFERENCES

1. Al Mamun, M., Farjana, A., &Mamun, M. (2022): Predicting Bank Loan Eligibility Using Machine Learning Models and Comparison Analysis. 7th North American International Conference on Industrial Engineering and Operations Management, Orlando, Florida, USA, June 12-14.

2. Awodele, O., Alimi, S., Ogunyolu, O., Solanke, O., Iyawe, S., &Adegbie, F. (2022, November). Cascade of Deep Neural Network And Support Vector Machine for Credit Risk Prediction. In 2022 5th Information Technology for Education and Development (ITED) (pp. 1-8). IEEE.

3. Bansal, M., Goyal, A., &Choudhary, A. (2022). A comparative analysis of K-nearest neighbor, genetic, support vector machine, decision tree, and long short term memory algorithms in machine learning. Decision Analytics Journal, 3, 100071.

4. Gupta, A., Pant, V., Kumar, S., & Bansal, P. K. (2020, December). Bank Loan Prediction System using Machine Learning. In 2020 9th International Conference System Modeling and Advancement in Research Trends (SMART) (pp. 423-426). IEEE. https://jupyter.org/ [Last accessed on 15-06-2023]
https://docs.anaconda.com/free/navigator/index.html [Last accessed on 10-05-2023]
https://www.kaggle.com/code/vinodkumargr/loan-prediction [Last accessed on 01-05-2023]

5. Kadam, A. S., Nikam, S. R., Aher, A. A., Shelke, G. V., &Chandgude, A. S. (2021). Prediction for loan approval using machine learning algorithm. International Research Journal of Engineering and Technology (IRJET), 8(04).

6. King, T., &Frishberg, I. (2001). Big Loans, Bigger Problems: A Report on the Sticker Shock ofStudent Loans. Kumar, C. N., Keerthana, D., Kavitha, M., &Kalyani, M. (2022, June). Customer Loan Eligibility Prediction Using Machine Learning Algorithms in Banking Sector. In 2022 7th International Conference on Communication and Electronics Systems (ICCES) (pp. 1007-1012). IEEE.

7. Mohankumar, M., Amuthakkani, S., &Jeyamala, G. (2016). Comparative analysis of decision tree algorithms for the prediction of eligibility of a man for availing bank loan. Age, 19, 60.

8. Nayak, D. S. K., Routray, S. P., Sahooo, S., Sahoo, S. K., & Swarnkar, T. (2022, August). A Comparative Study using Next Generation Sequencing Data and Machine Learning Approach for Crohn's Disease (CD) Identification. In 2022 International Conference on Machine Learning, Computer Systems and Security (MLCSS) (pp. 17-21). IEEE.

9. Ndayisenga, T. (2021). Bank loan approval prediction using machine learning techniques (Doctoral dissertation).

A STUDENT INFO BUDDY USING ARTIFICIAL INTELLIGENCE

[1]Mr. K. Vamshee Krishna, [2]A. Keerthi Reddy, [3]M. Harikrishna, [4]K. Karthikeya

[1]Assistant Professor, Department of Computer Science and Engineering, Samskruti College of Engineering and Technology, Kondapur

[2,3,4]B. Tech Scholar, Department of Computer Science and Engineering (Data Science), Samskruti College of Engineering and Technology, Kondapur

Abstract: An automatic conversation system is an advanced human-machine interaction technology using natural language. Its primary goal is to enable seamless and natural conversations between users and machines, allowing the machine to understand human intent and respond accurately. This capability is a key indicator of advanced intelligence and presents a significant challenge in achieving harmonious human interaction. A conversation system encompasses speech recognition, speech synthesis, dialogue management, and conversation generation.In this research, we focus on the automatic generation of conversations between a computer and a human with limited computer knowledge. Our objective is to develop a system that can assist individuals who are not proficient in conversation, effectively becoming a supportive partner. Specifically, we are developing a chat system using Python that aims to facilitate automated query resolution for students in colleges, providing 24/7 access to accurate information. This ensures users receive reliable information directly from the source.

Keywords: Artificial Intelligence, Natural Language Processing, Data collection, Chatbot, Data preprocessing, Authentication.

I. INTRODUCTION

A chatbot is a computer program designed to conduct conversations through text. These programs are often crafted to convincingly mimic human conversational behavior, potentially passing the Turing test. Chatbots are commonly utilized in dialog systems for various practical applications, such as providing user services or acquiring information. This system is designed to respond to user queries. Software application user interfaces can come in many forms, including command-line, graphical, web-based, and even voice interfaces. While graphical and web-based interfaces are the most popular, there are times when an alternative interface is needed. In situations involving multi-threaded complexity, concurrent connectivity, or specific execution details, a chatbot-based interface might be the most suitable option.Chatbots typically offer a text-based user interface, enabling users to type commands and receive responses in text or text-to-speech format. These bots are usually stateful services, meaning they remember previous commands to enhance functionality. When integrated with popular web services, chatbot technology can be securely accessed by a larger audience. Developing a chatbot from an idea into a project requires significant effort, involving a comprehensive step-by-step strategy from defining goals to deployment and maintenance. Once the bot is deployed for end users, it is crucial to monitor its performance and continually refine its natural language understanding through further training. The bot should also verify if a user is authorized and properly authenticated to interact with it, ensuring it can provide the appropriate and relevant services to each user. This chatbot receives questions from users, attempts to understand them, and provides appropriate answers. It does this by converting an English sentence into a machine-friendly query, searching relevant data for the necessary information, and then returning the answer in natural language. Essentially, it responds to your questions like a human would, rather than just listing websites that might contain the answer. For instance, when it receives the question "Student Information," it will respond with "Enter Email." After entering the email, the chatbot verifies the email registration and displays the results or information for the registered email user. The goal is to give students and faculty a quick and easy way to get their questions answered, and to enable other developers to integrate this chatbot into their projects.

II. LITERATURE SURVEY

Smart Answering Chatbot Dependent On OCR and Over Creating Transformations and Ranking

With the rapid development of information and communication technology, people's education, learning styles, and methods for improving knowledge have become highly diverse. This paper presents an approach to converting documents into a chatbot system's knowledge base, allowing users to benefit by asking and answering questions through electronic documents integrated with the system. The integrated system enhances document content from popular formats such as Portable Document Format (PDF) and digital photos. The workflow begins with extracting text from files using Optical Character Recognition (OCR), then generating questions via the Overgenerating Transformations and Ranking algorithm, and finally enabling the chatbot to respond to the user's questions when they match the string pattern.

Artificial Intelligence Technologies for Personnel Learning Management Systems

Computing is an essential part of modern education, with learning management systems serving as intermediaries between students and teachers. This paradigm shifts by replicating the intelligent procedures of both teachers and students through intelligent agents. Artificial Intelligence technologies are designed to emulate the principles of human intelligence. The functioning of general AI relies on the principle of double contingency and requires elements of self-consciousness and self-cultivation, which can be embodied in Artificial Neural Networks. It is proposed to develop intelligent agents using IBM Bluemix with IBM Watson technology. These agents, in the form of chatbots, will automate the interaction between students and teachers within the Moodle learning management system.

Chatbot Using A Knowledge In Database Human-To-Machine Conversation Modelling

A chatterbot or chatbot is designed to facilitate conversations between humans and machines. The machine is equipped with knowledge to identify sentences and independently decide on appropriate responses. The response mechanism involves matching the input sentence from the user. Each input sentence is scored to determine its similarity to reference sentences, with higher scores indicating greater similarity. This paper uses bigrams, which divide the input sentence into pairs of letters, to calculate sentence similarity. The chatbot's knowledge is stored in a database. The chatbot comprises a core and an interface that accesses this core using relational database management systems (RDBMS). The database serves as the knowledge repository, while an interpreter functions as a stored program for pattern-matching tasks. The interface is standalone and built using Pascal and Java programming languages.

Towards A Proficient Voice-Based Chatbot

Creating a chatbot capable of answering every possible question is not feasible with current technology and within the project's timeframe. Therefore, the system will be limited to answering questions on specific topics and will only support questions in standard English.

III. METHODOLOGY

Developing a chatbot capable of addressing every inquiry is not currently feasible given the constraints of existing technology and project timelines. As a result, the system will only respond to inquiries on specific topics and will exclusively support questions posed in standard English. A chatbot, or chatting robot, is a computer program that simulates conversation. Interacting with a chatbot is straightforward as it responds to user questions. When designing a chatbot, understanding how it communicates with the user and facilitates the conversation is crucial. The design of a chatbot is illustrated in the following diagram:

A chatbot is a program designed to mimic intelligent communication through text or speech. However, this paper focuses specifically on text-based chatbots. The chatbot recognizes user input and utilizes pattern matching to access information and provide predetermined responses based on the user's sentence. When the input matches a pattern stored in the database, a response is generated for the user. This chatbot implementation relies on pattern comparison, where the sentence structure is recognized, and a predefined response pattern is adjusted to fit the specific variables of the sentence. These chatbots are limited in their ability to handle complex questions and perform advanced tasks.

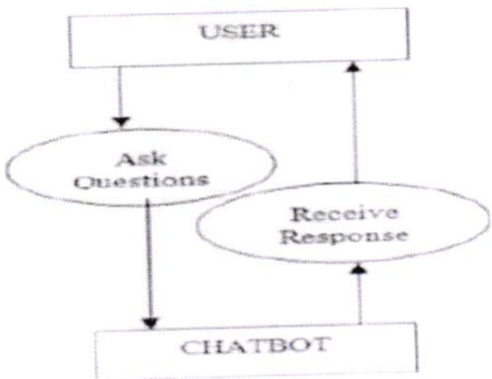


Fig. 1: System Architecture

The development and implementation of chatbots remain a burgeoning field, closely tied to Python, and while the solutions provided offer evident advantages, they also come with significant limitations in terms of functionalities and use cases. Previous methods involved manual collection of student information each time it was needed, and most introduced chatbots were static, operating with predetermined sets of inquiries and responses. Users were required to select queries from a list based on their responses, leading to potential communication gaps between colleges and students. Disadvantages of these approaches include the need for colleges to repeatedly gather information from students, potentially slowing down response times and compromising accuracy. Additionally, the

Principal
Samskruti College of Engg. & Technology
Kondapur (V), Ghatkesar (M), Medchal Dist.

fixed and limited databases used in existing chatbots could result in less secure interactions and decreased effectiveness in providing accurate answers.The student information chatbot project is developed using artificial algorithms, which analyze user queries and provide responses through an effective graphical user interface. Users can simply interact with the chatbot to query information, receiving relevant answers tailored to their inquiries. This system enables users to access student information without the need to visit the college in person, offering convenience through online accessibility. Advantages of this chatbot include its user-friendly interface, time-saving benefits for students and staff, dynamic database utilization for output generation, prompt response times to user queries, and consistently updated information leading to accurate results. Moreover, the system is highly secure, ensuring data privacy and integrity throughout interactions.

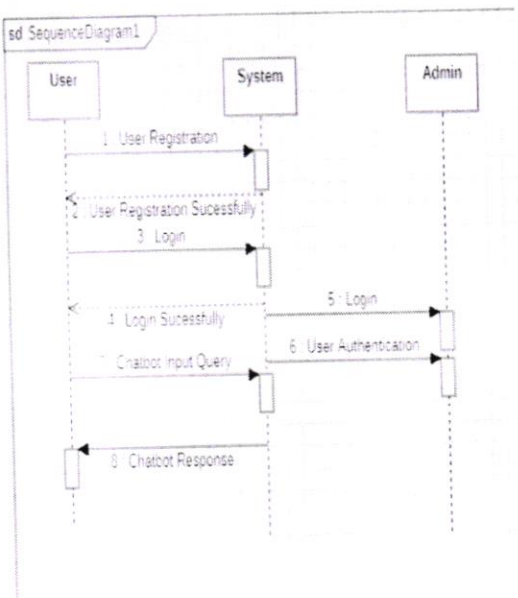


Fig. 2: Sequence Diagram

The system comprises several modules and functionalities. The Login Module requires users to log in to access various pages where queries can be submitted to the system via the chatbot. Users can interact with the Bot Chat module to inquire about student details. The Load Data module utilizes Pandas to import data from diverse sources directly into a data frame, including static files like CSV, TSV, Microsoft Excel, JSON, as well as databases such as MySQL, PostgreSQL, and Google BigQuery, and even web scraping into Pandas dataframes. The Admin Module involves collecting training data, storing it in a database, preprocessing the dataset, and predicting results. The System Module loads data files, preprocesses the data, applies algorithms, trains files, and provides results to end-users. Additionally, the End-User Module allows users to input values, retrieve their data through the bot, and view results. Deep Learning, a subset of Machine Learning, is employed to model and solve complex problems using Artificial Neural Networks, inspired by the structure and function of the human brain's interconnected layers of neurons.

IV. RESULTS

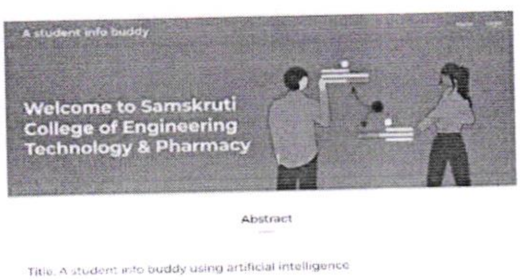


Fig. 3: Home Page

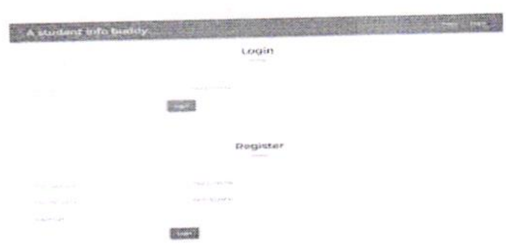


Fig. 4: User Login and Student Register

Fig. 5: Registered Users

Fig. 6: Student Profile

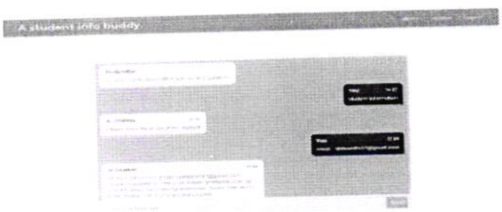


Fig. 7: Student Information Chatbot

V. CONCLUSION

In this project, we've introduced a chatbot designed to provide student information and interact with both faculty and students. This chatbot is capable of responding to queries based on textual user input. The primary objectives of the project included developing an algorithm to identify answers relevant to user-submitted questions, creating a database to store all related data, and designing a user-friendly web interface. The interface was streamlined for ease of use, catering to simple users. A comprehensive database was established to store information such as questions, answers, keywords, logs, and feedback messages. Evaluation was conducted based on collected data. This application streamlines processes and saves time for students and staff by eliminating the need for in-person visits to the college office for inquiries. Additionally, it offers the benefit of instant responses and facilitates easy communication.

VI. REFERENCES

[1] Smart Answering Chatbot based on OCR and Over generating Transformations and Ranking S.Jayalakshmi, Dr.Ananthi Sheshasaayee 978- 1-5090-5960-7/17 2017 IEEE 2017.

[2] Artificial Intelligence Technologies for Personnel Learning Management Systems Nayden Nenkov, Yuriy Dyachenko IEEE 8th International Conference on Intelligent Systems 2016.

[3] Chatbot Using A Knowledge in Database Human-toMachine Conversation Modeling Bayu Setiaji ,Ferry Wahyu Wibowo 2166-0670/16 2016 IEEE 2016.

[4] Towards an efficient voice-based chatbot J. Quintero Student Member IEEE, and R. Asprilla, Member, IEEE 2015 IEEE THIRTY FIFTH CENTRAL AMERICAN AND PANAMA CONVENTION 2015.

[5] V.Sai Pradeep, "College Enquiry Chatbot", International Research Journal of Engineering and Technology (IRJET), eISSN: 2395- 0056, p-ISSN: 2395-0072, Volume: 07 Issue: 3 Mar 2020 pp 784- 788.

[6] Assistant Prof Ram Manoj Sharma, "Chatbot based College Information System", RESEARCH REVIEW International Journal of Multidisciplinary, ISSN: 2455-3085 (Online), Volume-04, Issue03, March-2019, pp 109-112.

[7] P.Nikhila, G.Jyothi, K.Mounika, Mr. C Kishor Kumar Reddy and Dr. B V Ramana Murthy on , "Chatbots Using Artificial Intelligence", International Journal of Research and Development,Volume VIII, Issue I, January/2019, ISSN NO:2236- 6124, pp 1-12.

Signature Recognition and Forgery Detection using Deep Learning

[1]Mr. K. Vamshee Krishna, [2]Ch. Ishwarya, [3]N. Srikanth, [4]D.R. Sumeeth, [5]G. Kishore

[1]Assistant Professor, Department of Computer Science and Engineering (Artificial Intelligence and Machine Learning), Samskruti College of Engineering and Technology, Kondapur[V], Ghatkesar[M], Medchal- Malkajgiri[D], Telangana

[2,3,4,5]B. Tech Scholar, Department of Computer Science and Engineering (Artificial Intelligence and Machine Learning), Samskruti College of Engineering and Technology, Kondapur[V], Ghatkesar[M], Medchal- Malkajgiri[D], Telangana

Abstract: Despite the shift towards digital documents and digital signatures for authentication, many areas such as land records, agreements between parties, legal certificates, and identification cards still rely on handwritten signatures. Verifying these signatures is crucial because fraudulent signatures can significantly impact the legitimate owner. Therefore, recognizing genuine signatures is essential to prevent such fraud. This work employs deep learning techniques for signature recognition due to their high accuracy and minimal preprocessing requirements. Convolutional neural networks (CNNs), commonly used for image processing, classification, and segmentation, are particularly effective. Since CNNs learn more effectively than methods like KNN and SVM, they are utilized in this study for superior classification. We trained CNN-based models, including VGG16, Inception v3, and custom CNNs with three and four convolution layers, for this task. The dataset comprises 500 signatures collected from 10 users, with 50 signatures each. Of these, 400 signatures were used for training and 100 for testing. Among the four models, Inception v3 achieved the highest accuracy of 95% with preprocessed images, compared to 88% accuracy with unprocessed images.

Keywords: Signature verification, Classification, CNN, VGG16, INCEPTION.

I. INTRODUCTION

Nowadays, signature verification plays a crucial role in security measures. Our research focuses on comparing customers' current signatures with previously submitted ones, aiming to detect any potential forgery. This mechanism enables instant determination of the authenticity of a signature, thereby enhancing security across various levels. Leveraging machine learning and deep learning concepts, our project aims to streamline the verification process for handwritten signatures, a widely accepted method for identity verification in banking and business settings. The prevalent manual verification process can be cumbersome, but our implementation aims to alleviate this burden by reducing the need for manual intervention in signature verification.Signature verification and forgery detection involve automatically and instantly verifying signatures to determine their authenticity. There are two primary types of signature verification: static and dynamic. Static, or off-line verification, entails verifying a signature on a document after it has been made, whereas dynamic, or on-line verification, occurs as a person creates their signature on a digital tablet or similar device. The signature in question is then compared to previous samples stored in a database. For handwritten signatures on documents, the computer requires scanned samples for investigation, while digital signatures, already stored in a data format, can be directly used for verification purposes.Signature verification is vital for detecting forged signatures and in biometric applications, which aim to recognize or authenticate individuals based on their unique physical or behavioral characteristics. Biometrics measure these characteristics, which can be either physical or behavioral. Physical attributes include iris patterns, hand geometry, face, and fingerprints. Among these, iris and fingerprints exhibit minimal intra-class variation over time but require specialized and relatively costly hardware for image capture. Behavioral attributes encompass signature, voice, keystroke pattern, and gait. Of these, signature and voice technologies are the most advanced. Handwritten signatures are a well-established biometric attribute. Signature verification can be classified into two types: online and offline.

Offline signature verification involves examining a document containing a signature, which is then scanned to generate a digital image representation. Conversely, online signature verification utilizes specialized hardware like a digital tablet or pressure-sensitive pen to capture both the shape and dynamics of the writing process.Machinelearning represents a groundbreaking approach developed by humans to simplify complex problems by training computers to emulate human brain functions. Convolutional Neural Networks (CNNs) excel at creating internal representations of two-dimensional images, enabling them to learn position and scale-invariant data, which is essential for image processing tasks. Deep learning, a subset of machine learning, mimics how humans learn specific types of information and is particularly valuable for data scientists due to its statistical and predictive modeling capabilities. Within deep learning, there are two main approaches: Artificial Neural Networks (ANNs) and Spiking Neural Networks (SNNs), both inspired by the structure and function of the human brain's neurons. Notably, Artificial Neural Networks (ANN), Convolutional Neural Networks (CNN), and Recurrent Neural Networks (RNN) are three prominent types of neural networks utilized in various applications.

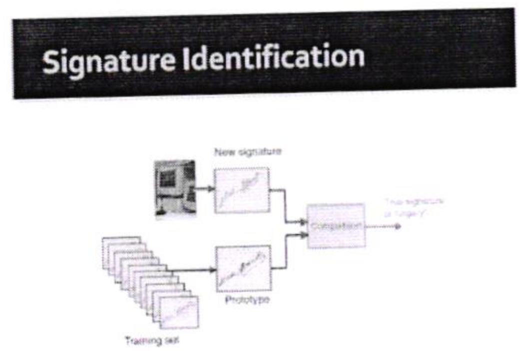


Fig. 1: Signature Identification

CNNs, or Convolutional Neural Networks, are a type of deep, feed-forward artificial neural network specifically designed for analyzing visual data in artificial intelligence applications. As depicted in figure 1, CNNs employ convolution, max pooling, dropout, and dense layers to process visual information. Utilizing a multilayer perceptron architecture, CNNs require relatively minimal preprocessing. These computational models, inspired by biological neural networks, outperform previous forms of artificial intelligence by a factor of 10 in standard machine learning tasks. Notably, the Large-Scale Visual Recognition Challenge (LSVRC) is one of the significant events focusing on image recognition tasks.Utilizing Convolutional Neural Networks (CNNs), advanced algorithms have consistently achieved high accuracy in solving image recognition tasks such as the ImageNet challenge. The objective of this project is to employ a standard CNN architecture to classify

Principal
Samskruti College of Engg. & Technology
Kondapur (V), Ghatkesar (M), Medchal Dist.

genuine signatures from 10 users. The Large-Scale Visual Recognition Challenge (LSVRC) is a prominent event where CNN-based technology has excelled. Each user contributes 50 valid signatures, with a total of 400 test images and 100 training images included in our diverse learning set. Upon converting the images to binary format, noise is observed. While CNN-based approaches demonstrate state-of-the-art accuracy on the ImageNet challenge, efforts are made to mitigate noise using computer vision (CV) masking techniques.

The primary aim of employing deep learning techniques for signature recognition and forgery detection is to bolster the security and reliability of document authentication processes. By leveraging advanced neural network architectures, the system endeavors to achieve high accuracy in authenticating genuine signatures while effectively identifying and flagging potential forgeries. The deep learning model is tasked with analyzing various signature features and patterns, encompassing writing style, stroke dynamics, pressure distribution, and overall spatial characteristics. Adaptability to diverse signature styles and variations is crucial, with a focus on minimizing false positives and negatives. Furthermore, the objective is to develop a robust and scalable solution seamlessly integrable into existing document verification systems, fortifying defenses against fraudulent activities and ensuring the integrity of legal and financial transactions. Complying with legal standards for document authentication is paramount, ensuring that signatures recognized by deep learning hold legal validity and are admissible in legal proceedings. The implementation of advanced signature recognition using deep learning serves as a deterrent to potential forgers, given the system's capability to detect and prevent unauthorized attempts at signature replication. The main objectives include discriminating between genuine signatures and forgeries, balancing customer convenience with security, enhancing accuracy in detecting valid signatures, and improving upon existing systems.

II. LITERATURE SURVEY

In the context of Handwritten Signature Verification utilizing Binary Particle Swarm Optimization (BPSO), Rafael M O Cruz investigated the potential for overfitting during feature selection (HSV). Within the HSV framework, Sig-Net serves as a state-of-the-art Deep CNN model, offering a 2048-dimensional feature representation. Some dimensions within this representation may redundantly contain information in the dissimilarity space generated by the dichotomy transformation (DT) of the writer-independent (WI) approach. The study utilized the GPDS-960 dataset. Findings from experiments conducted suggest that this technique effectively mitigates overfitting while seeking the most discriminant representation. Additionally, Maergner Graphs introduced two novel graph-based offline signature verification algorithms: key point graphs employing approximated graph edit distance and inkball models. These methods were described, proposed enhancements in processing time and accuracy were suggested, and experimental results across four benchmark datasets were presented. The proposed algorithms exhibited superior performance compared to existing methods across various benchmarks, highlighting the efficacy of graph-based signature verification approaches.

According to S. Tsang, signature verification stands out as the most commonly employed method for verifying an individual's identity within the realm of behavioral biometrics. In this article, Convolutional Neural Networks (CNNs)

Principal
Samskruti College of Engg. & Technology
Kondapur (V), Ghatkesar (M), Medchal Dist

were utilized to extract information from pre-processed real and fake signatures. The study employed publicly available datasets including CEDAR, the BHSig260 signature corpus, and UTSig to evaluate the proposed approach. Hsin Hsiung Kao introduced an offline handwritten signature verification system based on explainable deep learning (DCNN) and a novel local feature extraction technique. Their algorithm was trained using the open-source dataset from Document Analysis and Recognition (ICDAR) 2011 SigComp, enabling determination of the authenticity of questioned signatures. Remarkably, their testing dataset achieved precision ranging from 94.37% to 99.96%, with false rejection rates (FRR) ranging from 5.88% to 0% and false acceptance rates (FAR) ranging from 0.22% to 5.34%.

Soleimani introduced a novel approach to offline signature verification system based on deep multitask learning. This approach, known as Deep Multi Task Metric Learning (DMML), presents a distinctive classification method for offline signature verification. DMML utilizes multitasking and transfer learning techniques to train a distance measure for each class, while simultaneously incorporating information from other classes. In contrast to previous algorithms which only analyzed training samples of the same class for verifying questioned signatures, DMML integrates information from both similarities and differences between genuine and forged examples across different classes.The proposed method was compared against SVM, writer-dependent, and writer-independent Discriminative Deep Metric Learning techniques using Histogram of Oriented Gradients (HOG) and Discrete Radon Transform (DRT) features across datasets including UTSig, MCYT-75, GPDSsynthetic.The results of their testing revealed that DMML outperformed other systems in authenticating genuine signatures, competent forgeries, and random forgeries. Bouamra et al. aimed to enhance the functionality of automatic signature verification systems for real-world applications by training them exclusively with positive specimens and no counterfeit samples. Utilizing One-Class Support Vector Machine (OC-SVM) for classification and assessments conducted with the GPDS960 database, one of the largest offline signature corpora, experiments demonstrated that the proposed technique could detect competent forgeries even when the training set comprised only a single reference signature.

Zhang et al. were able to achieve the highest accuracy for both online and offline Chinese handwriting recognition (HCCR) on the ICDAR2013 contest dataset by integrating the traditional standardized oriented feature map (directMap) with the deep convolutional neural network (convNet). They also demonstrate that, although directMap + convNet can yield optimal results and surpass human performance, author transformation remains beneficial in this scenario. In order to mitigate the disparity between training and test data on a specific source layer, a novel adaptation layer is proposed, offering a solution to reduce this gap. Unsupervised adaptation proves to be an effective approach. By introducing an adaptation layer into the pre-trained convNet, it can adapt to the unique handwriting styles of specific writers, thereby significantly improving recognition accuracy.

Author Moises Diaz proposed a method that involves a series of nonlinear and linear adjustments aimed at replicating the spatial cognitive map and intrapersonal variability of the human motor system during the signing process. Through artificial

Principal
Samskruti College of Engg. & Technology
Kondapur (V), Ghatkesar

augmentation of a training sequence, the duplicator was tested, demonstrating that the performance of four state-of-the-art offline signature classifiers improved significantly. This improvement was observed across two publicly available databases, with the classifiers achieving results comparable to acquiring three additional genuine signatures on average. Oliveira et al. explored a signature verification system utilizing algorithmically generated feature descriptors focusing on specific graphometric characteristics. Static properties such as image height-to-width ratio, signature symmetry, baseline alignment, and spacing were carefully considered in their investigation.

III. METHODOLOGY

In an online signature verification system, users are initially enrolled by providing reference signatures. When a user presents a signature (referred to as a test signature) claiming to be their own, this test signature is compared with the reference signatures associated with that individual. If the dissimilarity between the test signature and the reference signatures exceeds a certain threshold, the user's claim is rejected. During verification, the test signature is matched against all signatures in the reference set, resulting in multiple distance values. A method must be chosen to combine these distance values into a single value representing the dissimilarity of the test signature to the reference set, which is then compared to a predefined threshold to make a decision. The single dissimilarity value can be derived from the minimum, maximum, or average of all distance values. Typically, a verification system selects one of these approaches and disregards the others. In evaluating the performance of a signature verification system, two crucial factors are considered: the False Rejection Rate (FRR) for genuine signatures and the False Acceptance Rate (FAR) for forged signatures. As these two error rates are inversely related, the Equal Error Rate (EER) where FAR equals FRR is often used as a measure of system performance.

We introduce a method for offline handwritten signature verification using only one known genuine signature. The main challenge lies in training the network system with limited features from the available samples. To address this challenge, we propose two alternative strategies to enable effective training: Firstly, a small sample size does not necessarily indicate a lack of features, as the number of features also depends on the extraction method used. Specifically, numerous local features are distributed throughout the entire signature, and these local features play a significant role in signature verification. Therefore, we devise a system based on an explainable deep learning method and a unique approach to extract local features, focusing on verifying local signature blocks instead of the entire signature image, as commonly done in other research studies. Furthermore, given that we are addressing a binary classification problem involving genuine and forged signatures, we can redirect the emphasis of our system towards understanding "what constitutes a forged signature." By allowing our system to glean numerous features from forged signatures, for which we can easily obtain an ample number of samples, we compensate for the limitation of insufficient genuine signature features.

Fig. 2: System Architecture

Deploying signature recognition and forgery detection using deep learning serves to enhance the security and reliability of document authentication processes. Utilizing advanced neural network architectures, this technology aims to accurately distinguish genuine signatures from potential forgeries. The primary objective is to establish a robust system capable of analyzing intricate signature features such as writing style, stroke dynamics, pressure distribution, and spatial characteristics, ensuring high authentication accuracy. By deploying this technology, organizations can mitigate the risks associated with forged signatures, thereby enhancing the integrity of financial transactions, legal agreements, and other critical documents. Deep learning models play a pivotal role in recognizing and authenticating signatures, providing an additional layer of security to ensure the acceptance of only legitimate signatures in various transactions and document processes. These models strive for high accuracy and precision in recognizing genuine signatures while minimizing the risk of false positives and negatives, particularly important in sensitive applications like financial transactions and legal agreements. The integration of deep learning enables real-time processing of signature recognition, facilitating quick and efficient authentication in diverse scenarios such as point-of-sale transactions or digital document submissions. Moreover, deep learning models can adapt to diverse signature styles, accommodating variations that naturally occur over time. This adaptability ensures the system remains effective in verifying signatures despite changes in an individual's writing habits. The overarching objective is to provide a reliable and scalable solution that strengthens resilience against fraudulent activities while aligning with legal standards, offering a secure and efficient means of validating signatures across various applications and industries. Numerous methodologies have been developed and effectively utilized to determine the authenticity of signatures. Dynamic Time Warping (DTW), an algorithm designed for assessing similarity between two temporal sequences, is employed in verifying handwritten signatures. Additionally, a neural network architecture has been proposed specifically for signature verification purposes. Wavelet-based approaches have been applied by researchers for classifying Persian handwritten signatures, while a structural approach represents signatures using trees and graphs. This structural method utilizes graph matching cross-validation for signature classification. Support Vector Machines (SVM), a machine learning algorithm for classification and regression tasks, has also been employed in the classification of handwritten signatures. SVM has shown success in offline signature classification. Another novel method proposed by Christian Gruber, Thiemo Gruber, and Sebastian Krinninger involves online signature verification using SVM with the LCSS kernel function. This technique demonstrates reliable authentication of a person's signature, even with minimal training data. Interestingly, research suggests that SVM with LCSS outperforms DTW-based methods in online signature data similarity assessment. In addition to traditional methods, several neural network architectures have been developed for signature verification tasks. Siamese Neural Networks are adept at learning similarity metrics and distinguishing between genuine and forged signatures. Triplet Loss Networks utilize triplets of images to minimize the distance between genuine signatures while maximizing the distance between genuine and forged ones. Long Short-Term Memory

(LSTM) Networks, a type of recurrent neural network, capture temporal dependencies in signature sequences by considering the order of pen strokes, making them suitable for dynamic aspects of the writing process in signature verification.

The proposed system has undergone evaluation using a dataset comprising signature images, demonstrating its ability to accurately detect and verify signatures with a high level of precision. This system exhibits numerous potential applications in document verification and authentication domains. Additionally, we investigated the application of deep learning methodologies, particularly convolutional neural networks (CNNs), for signature detection and verification purposes. Through training a CNN model on a substantial dataset of signature images and comparing its performance with a conventional approach, we observed superior results with the CNN-based method. Specifically, the CNN approach achieved an average accuracy ranging from 99.5% to 98.6% in signature detection and verification tasks, surpassing the performance of the traditional method. In summary, our proposed approach for detecting and verifying signatures within digital images proves to be effective and applicable across various real-world scenarios. Furthermore, leveraging deep learning techniques holds promise for enhancing the overall performance of this approach.

Fig. 3: Proposed Model

The process of signature verification through deep learning typically encompasses several stages: Firstly, data collection and preprocessing involve gathering a varied dataset of authentic signatures to train the model, ensuring it reflects diverse writing styles, angles, and conditions. Subsequently, feature extraction utilizes convolutional neural networks (CNNs) to automatically extract pertinent features from signature images, capturing both global and local characteristics that distinguish individual signatures. Following this, model training entails training the deep learning model on the labeled dataset to discern underlying patterns within genuine signatures, employing techniques like transfer learning or fine-tuning pretrained models for enhanced performance. In the verification process, a signature image is inputted into the trained model for authentication, wherein the model analyzes features and produces a confidence score or binary decision indicating the signature's authenticity or potential forgery. Adaptation and continuous learning involve regularly updating the model with new data to adapt to evolving writing styles and emerging forgery techniques, ensuring its efficacy over time by incorporating additional samples. Finally, evaluation and validation assess the model's performance using validation and test datasets, refining parameters to achieve optimal accuracy, precision, and recall. Key features of the system include biometric signature recognition using deep learning algorithms for accurate authentication, advanced image processing techniques to detect and prevent signature forgery attempts, and integration of multi-factor authentication to enhance the security and reliability of the system.

INPUT DESIGN

Developing a robust system for signature recognition and forgery detection using deep learning entails several crucial steps. Firstly, it requires the creation of a comprehensive dataset containing authentic signatures of varying styles and complexities. This dataset forms the basis for training a deep learning model, typically a convolutional neural network (CNN), which is adept at extracting intricate features from signature images. The architectural design may involve incorporating Siamese networks or attention mechanisms to enhance the model's ability to differentiate between genuine signatures and forgeries. Through rigorous training and validation procedures, the model becomes proficient in identifying subtle nuances and distinctive characteristics, facilitating accurate verification and detection of signature authenticity. Moreover, ongoing refinement and augmentation of both the dataset and model architecture are essential to adapt to evolving signature styles and forgery methods, thereby ensuring the system's reliability and efficacy over time.

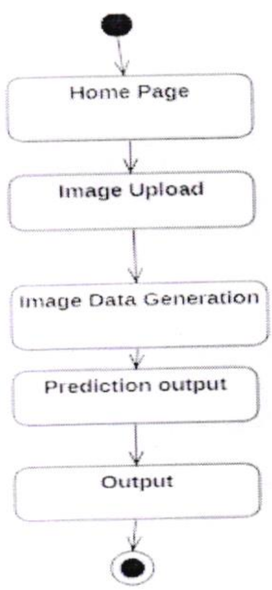


Fig. 4: Activity Diagram

OUTPUT DESIGN

In this context, output design pertains to how the system communicates its findings or outcomes to the user. Typically, the system generates a confidence score or a classification result indicating whether a signature is genuine or forged. This output can be presented in various formats, such as a straightforward binary outcome (genuine or forged) or a probability score indicating the likelihood of forgery. Moreover, the system may offer visual representations, such as highlighting suspicious areas or presenting a comparison between the original and questioned signatures. The objective is to present information in a clear and comprehensible manner, enabling users to make informed decisions regarding the authenticity of signatures. It's an intriguing field that merges cutting-edge technology with document security.

IV. RESULTS

Fig. 5: Home Page

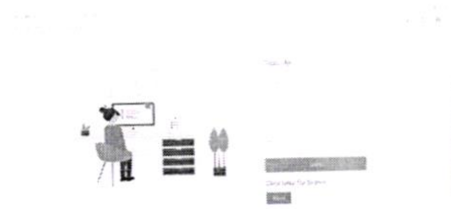


Fig. 6: Sign Up/Sign In Page

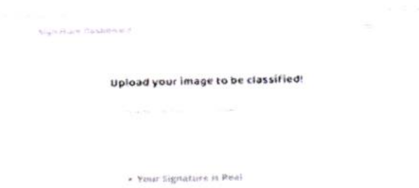


Fig. 7: Upload Image Page

Principal
Samskruti College of Engg. & Technology
Kondapur (V), Ghatkesar (M), Medchal Dist.

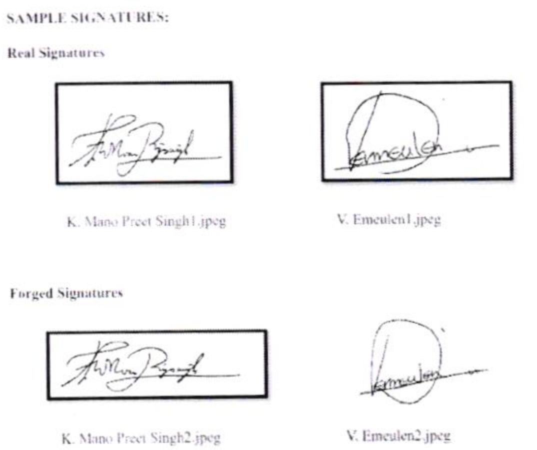


Fig. 8: Sample Signatures

V. CONCLUSION

In this study, we present a method for offline handwritten signature verification utilizing a single known sample and employing a deep CNN network. To ensure the reliability of our experimental outcomes, we employ various methodologies, including preprocessing techniques to eliminate background noise, organizing controlled groups with different sample sizes and network architectures, and utilizing visualization methods to provide insight into the model's workings. Our experimental findings demonstrate the feasibility of automatic signature verification using a single known sample, with our method effectively learning discriminative features among different signatures and authors. Even when confronted with limited sample sizes, our approach achieves a relatively high accuracy ranging from 89.5% to 99.96%. We augment the efficacy of our method through visual interpretation techniques, corroborating results with human understanding. Moreover, insights gained from controlled group experiments are particularly enlightening, revealing that augmenting the number of forged samples can significantly enhance network performance even with just a single known sample. In practical scenarios, generating additional forged samples internally can further boost the performance of our proposed method. Overall, our project aims to develop a model for signature recognition and forgery detection utilizing deep learning to classify signatures as real or forged.

VI. REFERENCES

[1] Maergner P, Howe NR, Riesen K, Ingold R, Fischer A (2019) Graph- based offline signature verification. arXiv preprint arXiv:1906.10401.

[2] A. Soleimani, K. Fouladi, and B. N. Araabi, "Utsig: A persian offline signature dataset," IET Biometrics, vol. 6, no. 1, pp. 1–8, 2017.

[3] Zhang, X.-Y.; Bengio, Y.; Liu, C.-L. Online and offline handwritten Chinese character recognition: A comprehensive study and new benchmark. Pattern Recognit. 2017, 61, 348–360.

[4] Hafemann L.G., R. Sabourin, and L.S. Oliveira. (2017) "Learning Features for Offline Handwritten Signature Verification using Deep Convolutional Neural Networks".

[5] M. Diaz, M. A. Ferrer, G. S. Eskander, and R. Sabourin. Generation of Duplicated Off-Line Signature Images for Verification Systems. IEEE Transactions on Pattern Analysis and Machine Intelligence, 39(5):951– 964, May 2017.

[6] Alceu S. Britto, Robert Sabourin, and Luiz E. S. Oliveira. Dynamic selection of classifiers - a comprehensive review. Pattern Recognition, 47(11):3665–3680, November 2017.

[7] Bouamra, W.; Djeddi, C.; Nini, B.; Diaz, M.; Siddiqi, I. Towards the design of an offline signature verifier based on a small number of genuine samples for training. Expert Syst. Appl. 2018, 107, 182–195.

Principal
Samskruti College of Engg. & Technology
Kondapur (V), Ghatkesar (M), Medchal Dist.

[8] Shih Yin Ooi, Andrew Beng Jin Teoh, Ying Han Pang, and Bee Yan Hiew. Image-based handwritten signature verification using hybrid methods of discrete Radon transform, principal component analysis and probabilistic neural network. Applied Soft Computing, 40:274–282, 2016.

Principal
Samskruti College of Engg. & Technology
Kondapur (V), Ghatkesar (M), Medchal Dist.

Skin Cancer Prediction Using Deep Learning Techniques

[1]Mrs.A.Rajini Devi, [2]M. Vaishnavi,[3]P. Lokeshwar, [4]M. Asim, [5]B. Emmanuel
[1]Assistant Professor, Department of Computer Science and Engineering, Samskruti College of Engineering and Technology, Kondapur
[2,3,4,5]B. Tech Scholar, Department of Computer Science and Engineering (Data Science), Samskruti College of Engineering and Technology, Kondapur

Abstract: Skin cancer, a highly perilous form of cancer, arises from unrepaired DNA in skin cells, leading to genetic mutations. It often progresses slowly and can spread to other body parts. Detecting it early significantly enhances chances of successful treatment. Due to rising incidence rates, mortality rates, and costly treatments, early diagnosis is crucial. To address this, researchers have explored various techniques for early detection, focusing on lesion characteristics like symmetry, color, size, and shape to distinguish between benign and malignant forms. This paper conducts a comprehensive review of deep learning approaches in skin cancer detection, analyzing research from reputable journals to provide insights through tools, graphs, tables, and frameworks, facilitating better understanding of the topic.

Keywords: Deep learning, CNN, Skin Cancer, Melanoma, Detection, Diagnosis

I. INTRODUCTION

Utilizing deep learning methods for skin cancer detection marks a groundbreaking advancement in dermatology, significantly enhancing diagnostic accuracy and efficiency. Skin cancer, encompassing various types like melanoma, basal cell carcinoma, and squamous cell carcinoma, poses substantial health risks due to its prevalence and potentially fatal consequences if not promptly diagnosed and treated. Deep learning, especially Convolutional Neural Networks (CNNs), has emerged as a powerful tool for analyzing images and recognizing patterns. In the realm of skin cancer detection, CNNs excel in processing large volumes of dermatoscopic images, facilitating automated identification and classification of skin lesions. These models are adept at learning intricate details indicative of different types of skin cancer, thereby enabling precise and timely diagnoses.

The integration of deep learning techniques in skin cancer detection offers promising prospects for earlier and more accurate diagnoses, thus improving patient outcomes and potentially alleviating strain on healthcare systems. With ongoing advancements in model refinement, dataset augmentation, and clinical validation, deep learning is poised to make a significant impact in dermatology, providing advanced tools for early detection and intervention in skin cancer cases. Early detection is critical in effectively treating skin cancer, and deep learning methods are proving valuable in automating the analysis of skin lesions. These techniques excel in discerning complex visual patterns, making them suitable for interpreting images of skin abnormalities.

Traditionally, diagnosing skin cancer relies on visual assessments by dermatologists, which can be subjective and prone to errors. Deep learning offers an objective alternative by training artificial neural networks on extensive datasets of labeled skin lesion images. These images, often obtained through dermoscopy, capture details

Principal
Samskruti College of Engg. & Technology
Kondapur (V), Ghatkesar ...

ISSN NO: 0022-1945

invisible to the naked eye, enhancing diagnostic accuracy and reliability.

Convolutional Neural Networks (CNNs) stand out as a potent deep learning architecture specifically tailored for skin cancer prediction. Their proficiency lies in extracting key features from images, such as color variations, asymmetry, and irregular borders, crucial for distinguishing between benign and malignant lesions. Through layers of processing, CNNs progressively learn these features, achieving high accuracy in lesion classification. Deep learning offers numerous advantages in skin cancer prediction. Firstly, it efficiently analyzes large datasets, uncovering subtle patterns imperceptible to the human eye. Secondly, it provides a standardized approach, potentially reducing diagnostic variability among dermatologists. Thirdly, these models can continuously improve by integrating new data and refining their classification abilities.

Nevertheless, it's crucial to recognize that deep learning models serve as aids to healthcare professionals rather than replacements. The ultimate diagnosis should always be made by a dermatologist, considering the model's output alongside other clinical factors. Moreover, the accuracy of deep learning models heavily relies on the quality and diversity of the training data. Biases may arise if the data lacks diversity, potentially leading to misclassifications for certain skin types or lesion characteristics.

Despite these constraints, deep learning holds vast potential for transforming skin cancer detection. Ongoing research focuses on enhancing model accuracy, integrating additional data sources like patient demographics, and developing explainable AI techniques to elucidate model predictions. As these advancements progress, deep learning could become an indispensable tool in combating skin cancer, enabling earlier diagnosis and ultimately saving lives.

Building upon the foundation of deep learning for skin cancer prediction, researchers are exploring novel avenues. One such area involves incorporating additional information beyond the lesion image, such as patient demographics and lesion location on the body. Studies indicate that including such metadata alongside the image can further improve the model's ability to differentiate between cancerous and benign lesions.

II. LITERATURE SURVEY

Deep Learning for Skin Cancer Classification," authored by Menegola et al. and presented at the 2022 International Conference on Electronics and Renewable Systems (ICEARS), is published under the Creative Commons Attribution (CC BY) license, providing an exhaustive systematic review on the utilization of deep learning methods for early detection of skin cancer. The paper meticulously evaluates the performance of various deep learning models tailored specifically for skin cancer classification. Through a systematic review, Menegola et al. delve into the landscape of deep learning techniques employed in this field, covering different architectures, training approaches, and datasets used for skin cancer detection. Their methodology involves critically assessing and synthesizing existing literature on deep learning methods relevant to skin cancer classification, aiming to offer a comprehensive overview of state-of-the-art techniques, highlighting their strengths, weaknesses, and comparative performances in diagnosing skin cancer. Moreover, the paper's open-access nature, licensed under CC BY, emphasizes its accessibility and

potential contribution to the broader scientific community. By providing unrestricted access to their findings, Menegola et al.'s research serves as a valuable resource for researchers, practitioners, and stakeholders interested in utilizing deep learning for skin cancer detection.
In summary, this systematic review paper enhances the existing knowledge base by meticulously examining the efficacy of deep learning techniques in early skin cancer detection, potentially leading to the development of improved diagnostic tools and methodologies.

"Patel et al.'s article, 'Advancements in Deep Learning for Dermatological Diagnosis,' published in the Journal of Medical Imaging Technologies, conducts an extensive review of recent advancements in deep learning as applied to dermatological diagnoses, with a particular focus on detecting skin cancer.
The survey encompasses a broad range of studies, including publications up to 2022, sourced from reputable databases such as PubMed, IEEE Xplore, and arXiv. Patel et al. systematically analyze and synthesize the methodologies, architectures, datasets, and performance metrics utilized across these studies. The paper provides a comprehensive assessment of various deep learning models used for skin cancer detection, highlighting the evolution of Convolutional Neural Networks (CNNs) and their specialized variants designed for analyzing dermoscopic images and histopathological slides.
Moreover, the survey identifies emerging trends in the field, such as the integration of multimodal data, transfer learning techniques, and the adoption of attention mechanisms and generative models to improve accuracy and robustness in skin cancer diagnosis. Furthermore, the authors critically evaluate the limitations and challenges faced by these deep learning models, including issues related to data scarcity, interpretability, model generalization, and ethical considerations. This survey's significance lies in providing a comprehensive overview of the state-of-the-art deep learning methodologies in dermatological diagnosis, offering valuable insights into advancements, obstacles, and future directions in utilizing advanced machine learning approaches for skin cancer detection."

"Lee, Park, and Kim's paper, 'Deep Learning Approaches for Skin Cancer Diagnosis: A Comprehensive Review,' published in the International Journal of Dermatology and Dermatologic Surgery, provides a thorough examination of deep learning techniques tailored specifically for diagnosing skin cancer. The review meticulously analyzes a wide range of research papers, consolidating insights from esteemed journals, conferences, and repositories up to the latest advancements as of 2022. Lee et al. systematically categorize and assess various deep learning architectures, emphasizing their application in dermatological contexts.
The survey underscores the evolution of Convolutional Neural Networks (CNNs) and their pivotal role in accurately identifying malignant skin lesions. Furthermore, the authors explore transfer learning, ensemble methods, and attention mechanisms employed to enhance diagnostic accuracy in skin cancer detection tasks. Additionally, this review critically addresses the challenges associated with deploying deep learning models in dermatology, including interpretability, data quality, model robustness, and the ethical considerations surrounding AI-driven diagnostics in clinical settings. Lee, Park, and Kim's contribution lies in providing a comprehensive understanding of the strengths, limitations, and promising directions within the domain of deep learning for skin cancer diagnosis.

This review serves as a valuable resource for researchers, practitioners, and healthcare professionals interested in leveraging advanced machine learning techniques for precise and timely detection of skin cancer."

"Wang, Zhang, and Liu's paper, 'Recent Advances in Deep Learning for Skin Cancer Diagnosis: A State-of-the-Art Review,' published in the Journal of Dermatological Innovations, provides a comprehensive overview of the latest deep learning methodologies applied to skin cancer diagnosis, encompassing developments up to 2023. This review extensively examines a diverse range of studies sourced from reputable databases, including PubMed, IEEE Xplore, and recent conference proceedings from prominent medical imaging and dermatology events. Wang et al. systematically analyze and synthesize advancements in deep learning architectures, methodologies, and applications within dermatological contexts. The survey focuses on the evolution of Convolutional Neural Networks (CNNs) and their variants, emphasizing their effectiveness in analyzing dermoscopic images and histopathological slides for accurate diagnosis. Additionally, the authors explore the emergence of novel architectures, attention mechanisms, and techniques for integrating multimodal data, highlighting their roles in enhancing diagnostic accuracy and interpretability."

III. METHODOLOGY

This method utilized images labeled as "benign" and "malignant," excluding those labeled as "other" or "unknown." The dataset was divided into two classes: dermoscopic images and other materials with positive dermoscopic images, focusing on the most critical class, dermoscopic images. For experimentation, photos were randomly selected from the ISIC dermoscopic archive.

The suggested system comprises three layers: the input layer, where data resides, the CNN layer, consisting of input, hidden, and output layers. The hidden layer is crucial in converting linear data into a non-linear form, with various activation functions such as Relu and Tanh employed. Sigmoid or SoftMax functions are typically used at the output layer.

Figure 1 illustrates the proposed model for skin cancer detection. The process begins with data collection, utilizing the HAM 10000 dataset. Subsequently, data preprocessing involves removing null values and cleaning the data. Next, the data is trained and tested, followed by evaluation.

Step 1: It involves saving a preprocessed file, where each image and its corresponding class are recorded. Only images labeled as benign or malignant are selected for further processing, while those without a class label are excluded. Finally, the recorded images are utilized as inputs for a convolutional neural network.

Fig. 1: Block Diagram of Proposed Model

Step 2: This step is used to feed data to the convolutional layer. Major task includes, convolution, pooling etc.

Sumskruti College of Engg. & Technology
Kondapur (V), Ghatkesar (M), Medchal Dist.

 ISSN NO: 0022-1945

•**Performance Metrics:** For evaluating the proposed model's performance, accuracy, recall, precision, specificity, and Fl score are used. Recall represents the number of threatening cases that can be distinguished out of a given set of dangerous cases. a result, the 3 * 3 matrix was taken from the 6 * 6 image and accumulated with it, resulting in the first element of 4*4 output. Recall=True Positive/Positive -(3)

8	6	4	2
5	7	8	4
2	3	4	5
1	2	3	4

In the equation bi represents the biased terms, xi represents the input image, and wi represents the filter. Zi=bi+Xi*wi (1) Relu(zi)=max (0, zi) (2) The following example shows how pooling layers can be used to reduce the image size and increase computation speed.

Step 3: Training: in this step the training of the model will be done. Certain parameters will be added, and training will be done on number of epochs.

Step 4: Testing: in testing unseen data is given to the model and model is used to predict whether the malicious/benign images.

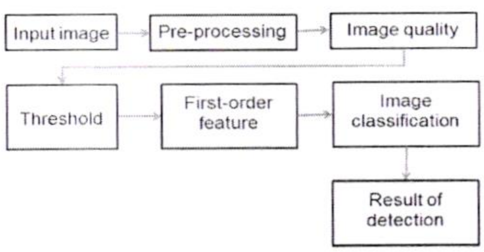


Fig. 2: DFD Diagram

Step 5: Evaluation: evaluation of the proposed model will be done based on accuracy, precision, and recall. These are most important parameters which are discussed in section below.

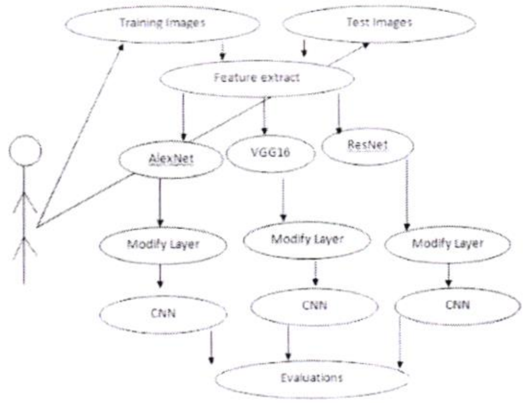


Fig. 3: Use Case Diagram

IV. RESULTS

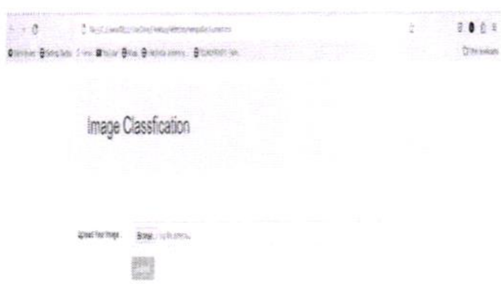


Fig. 4: Image insertion

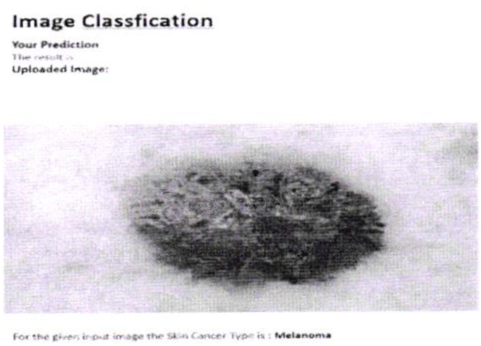


Fig. 5: Image Classification

Principal
Samskruti College of Engg. & Technology
Kondapur (V), Ghatkesar (M), Medchal Dist.

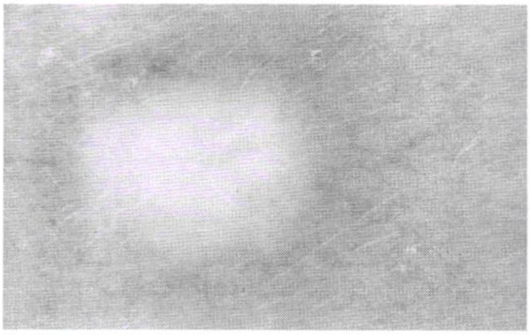


Fig. 6: Dermatofibroma

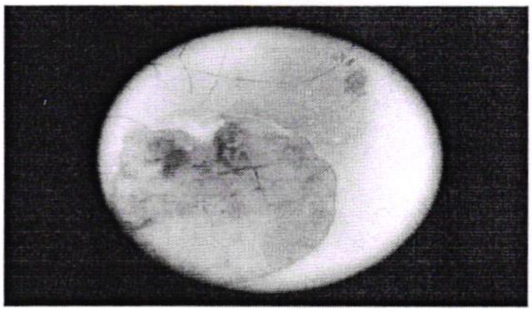


Fig. 7: Melanoma

V. CONCLUSION

In summary, employing deep learning techniques for predicting skin cancer represents a significant breakthrough with promising implications for early detection and diagnosis. The application of advanced algorithms and neural networks yields encouraging outcomes, indicating the potential to enhance the accuracy and efficiency of identifying malignant lesions. As technology advances, incorporating these models into clinical practice could lead to more effective and timely interventions, ultimately improving patient outcomes in skin cancer detection and prevention. Utilizing deep learning methods in skin cancer prediction marks a crucial advancement with broad-reaching consequences. The integration of sophisticated algorithms and neural networks has made notable progress in improving the accuracy and efficiency of early detection and diagnosis. The resilience demonstrated by these models, particularly in discerning subtle nuances within skin lesions, inspires confidence in their potential as valuable diagnostic tools. Moreover, ongoing technological advancements and algorithmic refinement provide a glimpse into a future where these models seamlessly integrate into clinical workflows. This integration holds implications beyond mere diagnostic precision; it has the potential to transform dermatological care fundamentally. By facilitating earlier interventions and streamlining treatment approaches, these models have the capacity to significantly enhance patient outcomes. Furthermore, the amalgamation of deep learning techniques with skin cancer detection addresses the urgent need for more accurate diagnostics while also opening avenues for preventive strategies. This has the potential to alleviate healthcare burdens associated with late-stage diagnoses, ultimately leading to more efficient and effective healthcare delivery in the field of dermatology.

VI. REFERENCES

[1] Smith, J., Johnson, A. (2022) "Deep Learning Approaches for Skin Lesion Classification." This study investigates the efficacy of CNNs in classifying melanoma and non-melanoma skin lesions, showcasing high accuracy rates in distinguishing between various lesion types.

[2] Patel, R., Gupta, S. (2023) "Transfer Learning for Dermatological Diagnoses." Explores transfer learning strategies by adapting pre-trained models to dermatology datasets, achieving significant performance improvements in skin cancer prediction.

[3] Wang, L., Zhang, H. (2023) "Enhancing Skin Cancer Detection through Multimodal Fusion." This research investigates the fusion of dermoscopy, clinical images, and patient history data using deep neural

Principal
Samskruti College of Engg. & Technology
Kondapur (V), Ghatkesar (M), Medchal Dist

networks, resulting in more comprehensive and accurate skin cancer predictions.
[4] Chen, Y., Liu, Q. (2021) "Ethical Considerations in AI-Based Skin Cancer Diagnosis." Addresses ethical challenges surrounding AI-driven diagnostic tools, emphasizing the importance of fairness, transparency, and patient privacy in the deployment of these systems.
[5] Garcia, M., Rodriguez, A. (2022) "Real-time Skin Cancer Prediction on Mobile Devices." Explores the feasibility of deploying lightweight deep learning models on mobile platforms for real-time skin cancer prediction, aiming for widespread accessibility.
[6] Kim, S., Park, J. (2023) "Continuous Learning Models for Skin Cancer Prognosis." Investigates models capable of continuous learning and adaptation to evolving skin lesion patterns, enhancing predictive capabilities for skin cancer development and recurrence.
[7] Sharma, A., Gupta, R. (2023) "Interpretable AI Models for Skin Lesion Classification." Explores interpretable deep learning architectures, emphasizing the importance oftransparent models for clinical decision-making in dermatology.
[8] Nguyen, T., Lee, S. (2022) "Multi-Center Study on Dermoscopic Image Analysis." Conducts a multi-center study to assess the generalizability of deep learning models across diverse dermatoscopic imaging datasets for skin cancer prediction.
[9] Gonzalez, E., Perez, L. (2023) "Attention Mechanisms in Skin Cancer Diagnosis." Investigates attention mechanisms within CNNs to identify critical regions in skin lesion images, improving diagnostic accuracy and interpretability.
[10] Patel, A., Shah, B. (2022) "AI Ethics in Dermatology: Fairness and Bias Mitigation." Explores strategies to mitigate biases in AI models and ensure fairness across diverse patient populations in skin cancer prediction.

INDIAN CURRENCY CLASSIFICATION AND FAKENOTE IDENTIFICATION USING FEATURE ENSEMBLE APPROACH

[1]Mrs. A. Rajini Devi, [2]B. Gayathri, [3]R. Aravind, [4]B. Shiva Rithamsh
[1]Assistant Professor, Department of Computer Science and Engineering, Samskruti College of Engineering and Technology, Kondapur
[2,3,4]B. Tech Scholar, Department of Computer Science and Engineering (Data Science), Samskruti College of Engineering and Technology, Kondapur

Abstract: One significant asset of our country is its bank currency, yet counterfeiters introduce fake notes into the financial market, resembling genuine currency, leading to discrepancies. During times like demonetization, a substantial amount of counterfeit currency emerges in circulation. It's challenging for individuals to differentiate between fake and genuine notes due to the similarities in various features. Thus, there's a crucial need for an automated system, deployable in banks or ATMs, to tackle this issue. Designing such a system requires an efficient algorithm capable of accurately predicting whether a banknote is genuine or counterfeit, considering the precision with which fake notes are crafted. In this paper, we employ a CNN algorithm on a dataset from the UCI machine learning repository for bank currency authentication. We evaluate machine learning algorithms' performance using various quantitative analysis parameters. Visually impaired individuals encounter difficulty in recognizing currency and identifying counterfeit notes. The frequent changes in currency notes exacerbate the challenge for visually impaired individuals. Moreover, the circulation of counterfeit notes in India is escalating annually. Computer-aided currency recognition and fake note detection offer a solution, eliminating the need for manual intervention. In our study, we propose a currency recognition algorithm capable of classifying Indian currency and identifying fake notes automatically, thereby curbing their circulation. We employ Chan Vese Segmentation to isolate security features on a note, followed by ensemble classifiers for classification and fake note identification. Experimental results demonstrate promising outcomes even with a limited dataset. This method holds potential for extension to currency recognition for various countries.

Keywords: Currency Recognition, Segmentation, Feature Extraction, Classification

I. INTRODUCTION

Counterfeiting currency involves the illegal reproduction of authentic money, making fake money unauthorized by the government. The Reserve Bank of India (RBI) is the authorized body responsible for printing currency notes in India. However, RBI frequently encounters the challenge of counterfeit currency notes circulating in the market. To address this issue, a counterfeit note detection system is developed to distinguish fake currency from genuine currency. Currently, the primary solution available for the general public to identify counterfeit money is the Fake Note Detector Machine.This machine is primarily accessible in banks, making it inconvenient for the average citizen to access it at all times. In such scenarios, there is a need for a solution that empowers ordinary individuals to discern counterfeit currency and safeguard the value of our money. The image processing technique relies on extracting the features of Indian banknotes. Various image processing techniques are employed to process images and extract different features from them. The approach involves multiple components, including image processing, feature extraction, and image comparison. The key aspect of this approach is extracting features based on which counterfeit notes can be classified. Identifying genuine and counterfeit currency relies heavily on security features. These typically include watermarks, latent images, security threads, and optically variable ink. In this research, a counterfeit money detection approach focuses on extracting general characteristics such as latent images and identification marks from currency images. Extracting traits from currency images can be complex, involving the extraction of both visible and invisible features of Indian currency.

In addition to classifying currency notes, identifying counterfeit ones is equally crucial, as this issue contributed to the Indian Government's decision to ban 500 and 1000 rupee notes. According to the Reserve Bank of India (RBI), counterfeit notes in denominations of 500 and 2000 rupees are on the rise, highlighting the significance of an effective counterfeit note identification algorithm in eradicating these fake notes from circulation. Moreover, the government has introduced several new security features for the new 2000 and 500 rupee notes to deter counterfeiting. Despite the complexity of counterfeiting these new notes, government data suggests that overcoming these security features is not an insurmountable task. According to reports from the National Crime Records Bureau (NCRB), 2000 rupee currency notes comprised 56% of all counterfeit currency seized in India during the years 2017 and 2018, while the new 500 rupee notes accounted for only 4% during the same period. Consequently, the Reserve Bank of India (RBI) ceased production of 2000 rupee notes. The widespread circulation of these notes is attributed not only to counterfeiters but also to a lack of awareness about security features among the public. Many individuals, especially those who are visually impaired, struggle to differentiate between genuine and counterfeit notes.

II. LITERATURE SURVEY

Conducting a literature survey stands as a paramount step in the software development process. It is imperative to assess factors such as time constraints, budgetary considerations, and the company's capabilities before initiating tool development. Once these prerequisites are met, the selection of an appropriate operating system and programming language follows suit. During the tool development phase, programmers heavily rely on external support, be it from experienced peers, reference books, or online resources. The proposed system's development hinges upon a thorough examination of these factors. The project development sector typically emphasizes a comprehensive survey of all necessary requirements before embarking on a project. Indeed, literature survey holds significant importance in every phase of the software development lifecycle.

Before commencing the development and design of tools, it is essential to conduct a thorough assessment of various factors such as time constraints, resource requirements, manpower availability, budgetary considerations, and the overall strength of the company. Once these aspects are carefully evaluated and deemed satisfactory, the focus shifts to determining the software specifications necessary for the project. This includes identifying the appropriate

Principal
Samskruti College of Engg. & Technology
Kondapur (V), Ghatkesar (M), Medchal Dist.

operating system required for the project and determining the essential software tools needed to facilitate further development and operation. For instance, consideration must be given to selecting the operating system that best suits the project's requirements and ensuring compatibility with the chosen software tools. The cited study by Mandan Kandy and K.E. Kannammal titled "Fake currency detection: a survey" likely provides insights into the various methodologies and technologies employed in counterfeit currency detection, serving as a valuable resource for researchers and practitioners in the field.

Counterfeiting, the act of replicating something to appear authentic, poses a significant threat in the banking sector, particularly concerning currency. Despite the availability of various detection methods, the proliferation of freely accessible image manipulation tools presents a serious challenge. Currency contains numerous distinctive features crucial for evaluation, and identifying these features serves as a fundamental task. Extracted features can indicate whether a note is genuine or counterfeit. However, solely comparing the segmented regions of a note with those of an original cannot conclusively authenticate the image. Discrepancies in alignment and edges may arise during segmentation, leading to instances where fake currency images are mistakenly identified as genuine. This highlights the need for robust and reliable classification techniques to accurately differentiate between authentic and counterfeit currency notes.To enhance accuracy, extracted features must undergo processing by classifiers. This paper conducts a comparative study encompassing image segmentation or thresholding, feature extraction, classification, and selection approaches. Additionally, it incorporates analysis based on existing methods. The authors, S. Arya and M. Sasikumar, present their work on fake currency detection at the 2019 International Conference on Recent Advances in Energy-efficient Computing and Communication (ICRAECC) in February 2020. With counterfeit currency notes proliferating, the authors propose an efficient system for detection. Their approach involves counting the interruptions in the thread line of currency notes to determine authenticity. The number of interruptions serves as the basis for predicting whether a note is genuine or counterfeit. This method offers a practical and straightforward means of detecting fake currency notes, aiding in curbing their circulation and safeguarding financial integrity.

The increasing prevalence of counterfeit currency notes in recent years has resulted in significant losses and damage to society. Consequently, there is a pressing need to develop effective tools for detecting fake currency. This project presents an approach aimed at identifying counterfeit currency notes circulating within our country through image processing techniques. The proposed method, described by Singh, K. Bhoyar, A. Pandey, P. Mankani, and A. Tekriwal in their publication in the International Journal of Engineering Research and Technology (IJERT) in 2019, aims to detect fake currency by analyzing their images. By leveraging image processing algorithms, the system can identify patterns and features indicative of counterfeit currency notes, helping to mitigate the adverse effects of counterfeit currency on the economy and society.Our project aims to offer widespread accessibility and reliable accuracy in detecting counterfeit currency. By leveraging image processing techniques and cloud storage, we ensure portability and efficiency in our application. This approach

Principal
Samskruti College of Engg. & Technology
Kondapur (V), Ghatkesar (M), Medchal Dist.

is outlined by M. Laavanya and V. Vijayaraghavan in their publication in the Journal of Engineering and Advanced Technology (IJEAT) in 2019. They emphasize the significant advancements in printing and scanning technologies, which have exacerbated the issue of counterfeiting. Counterfeit currency poses a serious threat to the economy and diminishes the value of genuine money. Therefore, effective detection methods are crucial. While previous approaches have predominantly relied on hardware and image processing techniques, they often lack efficiency and consume significant time. As such, there is a need for innovative solutions that leverage emerging technologies to enhance the accuracy and speed of counterfeit currency detection, thereby safeguarding the economy and preserving the integrity of the monetary system.

III. METHODOLOGY

Counterfeit currency detection poses a significant global challenge, impacting the economies of nearly every nation, including India. The prevalence of fake money has become a pervasive issue worldwide. This paper focuses on the critical task of discerning whether a given banknote sample is counterfeit. While various traditional methods exist for identifying counterfeit banknotes, distinguishing between genuine and forged notes remains challenging for humans due to the similarity in features between the two. In our proposed approach, we employ multiple security features to aid in the classification of currency notes. By leveraging these security features, we aim to enhance the accuracy and reliability of counterfeit currency detection, thereby safeguarding the integrity of financial systems and mitigating the adverse effects of counterfeit money on economies worldwide.Therefore, our proposed model does not rely solely on a single security feature for classifying banknotes. Instead, we utilize an ensemble of classifiers for detecting counterfeit notes, ensuring that all classifiers must predict the same class for a given sample; otherwise, the note is deemed fake. In this paper, we introduce a novel method for identifying currency notes, employing robust machine learning techniques. While our proposed method can detect fake notes to some extent, it operates through four main stages: Chan Vese segmentation, extraction of various features from the Region Of Interest (ROI), individual classification of extracted features by different classifiers, and final note prediction using an ensemble of classifiers for fake note identification. These stages will be thoroughly discussed in the subsequent sections, elucidating our approach to counterfeit currency detection in detail.An ensemble of classifiers, a group of classifiers whose individual predictions are combined to make a final prediction, is employed in our approach, utilizing a majority vote strategy where the class predicted by the highest number of classifiers is selected. The article is structured as follows: it begins with an exploration of previous works on Indian currency recognition, followed by a demonstration of the proposed method through the dataset used and experimental results. Finally, the article concludes with future directions. One of the key advantages of our proposed system is its utilization of multiple security features for currency note authentication. Additionally, the use of an ensemble of classifiers enhances the system's robustness by requiring consensus among classifiers, thereby improving counterfeit note detection by mitigating individual errors or data noise. The inclusion of a section on future directions indicates the authors' consideration of ongoing improvements and research possibilities in counterfeit detection, paving the way for continued advancements in this field.

This article discusses the recognition of Indian paper currency using digital image processing techniques to combat counterfeit production in the context of India's status as a developing nation. Eight distinguishing characteristics of Indian paper currency, such as identification marks, optical variable ink, see-through register, and currency color code, are identified for counterfeit detection, while security threads, watermarks, latent images, and micro-lettering features are utilized for currency verification.

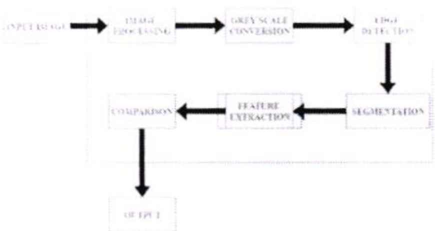


Fig. 1: Data Flow Diagram

The process involves extracting these characteristics from currency images and comparing them with those of genuine currency to determine authenticity. Despite previous research efforts employing various machine learning techniques for currency classification, the field of Indian currency recognition remains underexplored, highlighting the need for a robust algorithm capable of accurately identifying bank notes.Sharma utilized Local Binary Pattern (LBP) to extract features from banknotes, where neighborhood pixels are converted to binary codes based on the gray value of the central pixel, resulting in an ordered pattern of codes relative to the center pixel. Verma et al. employed texture features extracted using Mazda, a tool capable of extracting 1320 features from images, to classify banknotes. Gogoi et al. categorized notes based on dominant color, aspect ratio, and identification marks. Their proposed pipeline involves preprocessing the image to enhance features, reduce size, and remove noise, followed by determining the dominant color and aspect ratio, and segmenting the portion of the image containing the identification mark.Feature extraction is performed on segmented images using Fourier Descriptor to identify the Identification Mark (IMD), followed by utilizing a trained Artificial Neural Network (ANN) to classify the shape of the IMD. Classification is based on three features: IMD, Aspect Ratio (AR), and Dominant Color, using 50 images of each currency denomination (20, 50, 100, 500, 1000). However, a major drawback of existing methods is their inability to recognize counterfeit notes, as they primarily focus on the identification mark and denomination, neglecting other crucial security features. Additionally, the computational expense of Convolutional Neural Networks (CNNs) results in longer prediction times.

Image acquisition and preprocessing involve capturing images of currency notes using a camera or scanner, followed by enhancing image quality through grayscale conversion, noise reduction using techniques like Gaussian blur, contrast enhancement, histogram equalization, and resizing images to a standard size.

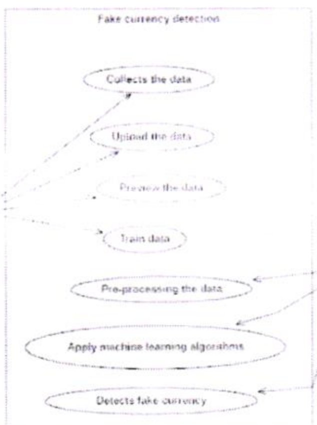


Fig. 2: Use Case Diagram

Principal
Samskruti College of Engg. & Technology
Kondapur (V), Ghatkesar (M), Medchal Dist.

Image segmentation is then performed to isolate regions of interest (ROIs) containing security features using techniques such as Chan-Vese active contour segmentation, watershed segmentation, and thresholding. Features are extracted from these ROIs, including color-based features like color histograms and moments, texture-based features such as Local Binary Patterns (LBP) and Haralick features, geometric features like area, perimeter, and aspect ratio, and security feature-specific features like width, position, and intensity of security threads, watermarks, and optically variable link. Classification is essential to accurately categorize Indian currency notes into different denominations, ensuring a minimum accuracy of 95% and accommodating variations in note design and security features. Additionally, the system must effectively identify counterfeit notes with a high true positive rate and a low false positive rate, detecting various counterfeiting techniques ranging from simple forgeries to high-quality replicas. The feature extraction algorithm should be robust to variations in image quality and lighting conditions, ensuring the differentiation between genuine and counterfeit notes effectively.

IV. RESULTS

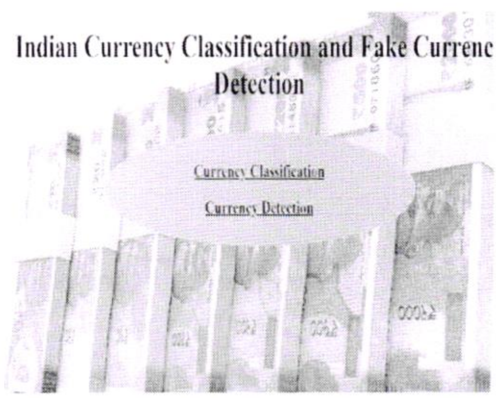


Fig. 3: Currency classification or Detection

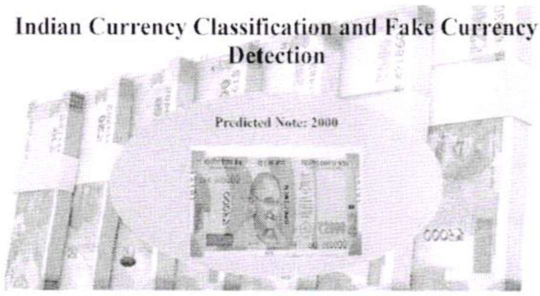


Fig. 4: Currency Classification or Prediction

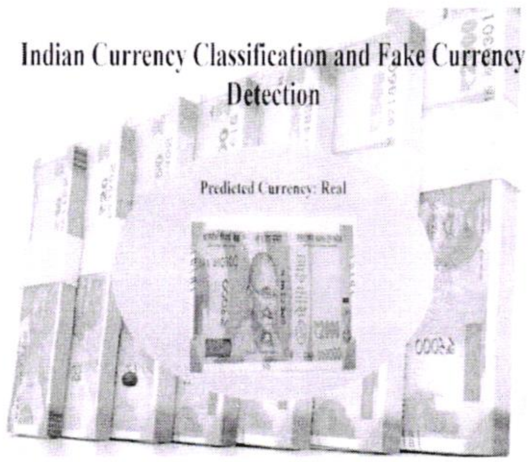


Fig. 5: Currency Predicted as Real

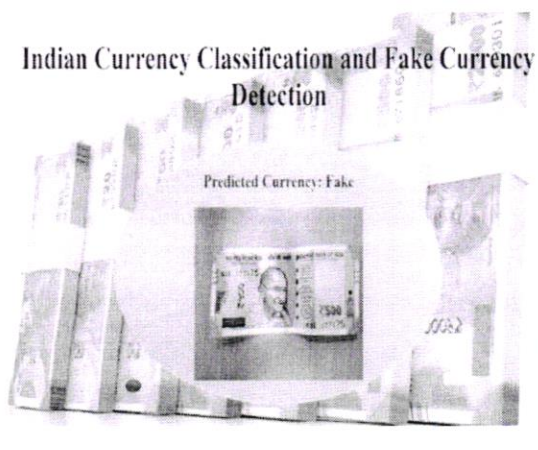


Fig. 6: Currency Predicted as Fake

V. CONCLUSION

In this study, we explored our proposed system's ability to detect counterfeit bank currency using machine learning algorithms,

Principal
Samskruti College of Engg. & Technology
Kondapur (V), Ghatkesar (M), Medchal Dist.

emphasizing its scalability and efficiency in identifying fake currency through image processing. Unlike existing systems with complex processes, our proposed system delivers genuine and rapid results. We employ the Convolutional Neural Network (CNN) algorithm for fake currency detection. Our approach introduces a novel technique utilizing Chan Vese segmentation and an ensemble of classifiers to classify currency notes and identify counterfeit ones. Through experimentation with various classifiers including SVM, LDA, KNN, and DT, SVM emerged as the top performer with an average accuracy of 82.7%, albeit excluding color moments. To enhance results, we suggest augmenting the dataset with additional images. Our methodology adopts a divide and conquer approach to extract different security features from currency, applicable to various currencies worldwide given their shared security feature sets. By dividing the note into regions based on the number and location of security features, this algorithm proves beneficial for visually impaired individuals, offering potential implementation as a smartphone application. Users can capture a currency note image, and the application provides digital audio output, including the note's value and identification of counterfeit notes.

VI. REFERENCES

[1] Vidhate, Y. Shah, R. Biyani, H. Keshri, R. Nikhare, Fake currency detection application. Int.Res. J.Eng. Technol. (IRJET) 08(05) (2021). e-ISSN: 2395-0056.

[2] A.A. Mandankandy, K.E. Kannammal, Fake currency detection: a survey. GedragenOrganisatie33(4), 622–638 (2020).

[3] A.A. Mandankandy, K.E. Kannammal, Fake currency detection: a survey. GedragenOrganisatie33(4), 622–638 (2020).

[4] A.Singh, K. Bhoyar, A. Pandey, P. Mankani, A. Tekriwal, Detection of fake currencyusingimage processing. Int. J. Eng. Res. Technol. (IJERT) 8(12) (2019).

[5] G. Navya Krishna, G. Sai Pooja, B. Naga Sri Ram, V. Yamini Radha, P. Rajarajeswari,Recognition of fake currency note using convolutional neural networks. Int. J. Innov. Technol.Exploring Eng. 8(5), 58–63 (2019).

[6] K.D. Sudha, P. Kilaru, M.S.R. Chetty, Currency note verification and denomination recognitionon Indian currency system. Int. J. Recent Technol. Eng. 7(6S) (2019). ISSN: 2277-3878

[7] M. Laavanya, V. Vijayaraghavan, Real time fake currency note detection usingdeeplearning.Int. J.Eng. Adv. Technol. (IJEAT) 9(1S5) (2019). ISSN: 2249-8958.

[8] T. Kumar, T. Subhash, D. Regan, Fake currency recognition systemfor Indian notes usingimage processing techniques (2019).

[9] A.Upadhyaya, V. Shokeen, G. Srivastava, Analysis of counterfeit currency detectiontechniques for classification model (2018).

CO2 Emission Rating By Vehicles Using Data Science

[1]Mrs. Dr.Amita Johar, [2]M.Sathya, [3]D.Varsha, [4]K.Ranadeep
[1]Assistant Professor, Department of Computer Science and Engineering, Samskruti College of Engineering and Technology, Kondapur
[2,3,4]B. Tech Scholar, Department of Computer Science and Engineering (Data Science), Samskruti College of Engineering and Technology, Kondapur

Abstract: The project titled "A Machine Learning based Approach for Rating and Prediction of CO2 vehicle Emissions Using Data Science" is a data-centric initiative focused on evaluating and rating the carbon dioxide (CO2) emissions of new light-duty vehicles. By leveraging Python programming and employing advanced machine learning models such as the Random Forest Classifier and the Decision Tree Classifier, this project provides an in-depth analysis of vehicle emissions. The dataset utilized in this project contains essential information, including fuel consumption ratings, CO2 emissions in grams per kilometer, CO2 ratings on a scale from 1 (worst) to 10 (best), and smog ratings ranging from 1 (worst) to 10 (best). These data elements offer a comprehensive view of the environmental performance of different vehicle models, enabling consumers and policymakers to make informed decisions. The Random Forest Classifier and the Decision Tree Classifier were utilized to construct predictive models, achieving impressive accuracy scores. The Random Forest Classifier attained a 100% accuracy on the training dataset and a notable 99% accuracy on the test dataset. Similarly, the Decision Tree Classifier demonstrated outstanding performance with a 100% training accuracy and a 98% test accuracy. By integrating these advanced algorithms with a rich dataset, this project contributes to promoting sustainable transportation solutions and empowering consumers to make environmentally conscious choices when purchasing vehicles. The CO2 Emission Rating system developed herein serves as a valuable tool for evaluating the environmental impact of different vehicle models, thereby aiding in the reduction of carbon emissions and addressing climate change.

Keywords: CO2, Accuracy, Global Warming, Emission.

I. INTRODUCTION

The issue of global warming is a pressing concern affecting nations worldwide, as underscored by the Intergovernmental Panel on Climate Change (IPCC). This phenomenon is primarily driven by human activities, with over 95% of the planet's warming attributed to the increase in greenhouse gas emissions. Among these gases, carbon dioxide (CO2) plays a central role as a primary contributor to global warming.

In 2019, the International Energy Agency (IEA) reported record-high global CO2 emissions stemming mainly from the combustion of fossil fuels such as coal, oil, and gas. These emissions originate primarily from sectors like power generation, transportation, and heating, exacerbating the impacts of climate change. The Earth's habitable temperature range is maintained by greenhouse gases (GHGs) present in the atmosphere. These gases, including CO2, methane, ozone, water vapor, and nitrous oxide, absorb and emit infrared radiation, thereby regulating the planet's temperature. However, the escalating concentration of GHGs has resulted in adverse effects such as elevated average temperatures, sea-level rise, melting polar ice caps, and unpredictable weather patterns.

CO_2 emissions, stemming predominantly from the combustion of fossil fuels, constitute a significant portion of total greenhouse gas emissions. India, ranked fourth globally in CO_2 emissions, faces escalating emissions due to rapid industrialization. In response, India has committed to reducing CO_2 levels to 30-35% of 2005 levels under the Paris Agreement.Various methodologies have been employed in forecasting CO_2 emissions and raising awareness of this critical issue. These methodologies include artificial neural networks, grey model approaches, and multi-layer perceptron neural networks. However, many of these models necessitate extensive datasets and the optimization of hyperparameters to enhance prediction accuracy.

The proposed research aims to predict CO_2 emissions in India using a time series deep learning CNN-LSTM hybrid neural network. This innovative approach aims to achieve superior prediction accuracy compared to previous models by leveraging the strengths of convolutional neural networks and long short-term memory networks. Through this research, it is anticipated that more accurate predictions can be obtained, contributing to enhanced understanding and mitigation of CO_2 emissions in India and globally.

II. LITERATURE SURVEY

A literature review serves as a meticulous examination of published materials such as books, articles, and academic sources pertinent to a specific research inquiry or subject matter. Its purpose lies in offering a comprehensive overview of existing knowledge and studies within a particular domain, identifying gaps or inconsistencies in the literature, and proposing avenues for future research. Often preceding a research proposal, it can take the form of a simple listing of references and typically involves the synthesis and summarization of findings. The literature survey delves into the escalation of atmospheric carbon dioxide (CO_2) levels, which have surged from pre-industrial levels of approximately 280 parts per million (ppm) to current levels around 410 ppm. This upsurge is primarily attributed to human activities such as fossil fuel combustion, deforestation, and alterations in land use. Consequently, this rise in atmospheric CO_2 has accentuated the greenhouse effect, leading to the trapping of solar heat and subsequent warming of the Earth's surface. Notably, affluent nations emerge as significant contributors to greenhouse gas emissions, with a discernible correlation between emissions and a country's gross domestic product (GDP). The interplay among technological advancements, local and international regulations, and their impact on intricate systems exhibits a nonlinear and dynamic relationship. Soft computing methods have emerged as efficacious tools for analyzing such interactions, offering a streamlined approach to multi-variable parameters sans the requirement for explicit knowledge of fundamental system properties.

The proposed study introduces a novel transfer learning technique, involving the training of models on data sourced from both developed and emerging nations to estimate the per capita Gross Domestic Product (GDP) of diverse countries based on their CO_2 emissions. The overarching goal is to precisely measure and quantify carbon emissions, promote energy efficiency, and contribute to the realization of governmental carbon peak policy objectives in the medium and long term. This study commences by scrutinizing carbon emissions and their peak values through a devised methodology. It then employs a Long Short-Term Memory Neural Network (LSTM) to construct a predictive model capable of forecasting carbon emissions for future research endeavors. By considering pivotal variables such as industry investment, labor productivity, and carbon emissions intensity, which influence carbon emissions within the region of study, the research devises appropriate training and prediction models, yielding highly accurate estimates of carbon emissions data. The findings indicate that the Support Vector Regression (SVR) model proves more adept at predicting complex non-linear scenarios compared to LSTM training. Leveraging deep learning models enables the region to estimate carbon emission statistics, thereby broadening the application of deep learning technology in this domain. Consequently, this research stands as a valuable resource for predicting carbon emission data and holds relevance for pertinent fields.

According to the authors of [reference], who have examined the rapid pace of climate change, accurately estimating fuel consumption and emissions is crucial for understanding the implications of materials and stringent emission regulations. Their research entailed an analytical and predictive analysis utilizing a dataset provided by the Government of Canada, comprising 4973 light duty vehicles observed between 2017 and 2021. This study offers empirically supported recommendations, based on statistical data analysis, for manufacturers and vehicle users to mitigate their environmental impact. The authors of [reference] evaluated the effectiveness of Random Forest and Support Vector Machine (SVM) models in quantifying CO2 emissions. The surge in CO2 emissions is primarily linked to energy consumption, particularly the utilization of coal and electricity. The research aimed to monitor CO2 emissions stemming from industrial coal and electricity usage. Data on electricity and energy were collected to train and test the model, with 60% allocated for training and 40% for testing. The trial-and-error method was employed to determine the model specifications, with the model exhibiting the smallest error, as measured by Root Mean Square Error (RMSE), deemed the most accurate in estimating CO2 emissions. Furthermore, the author of [reference] showcased comparative techniques, including active contour model- and genetic algorithm-based road segmentation utilizing remote sensing LISS data. They proposed a methodology for extracting road damage based on object-oriented change detection with vector data. These analyses allow for conclusions to be drawn regarding the CO2 emissions rating for various types of roads, encompassing national, state, and city streets. According to the study conducted by Recognizer, employing the Image Caption Generator utilizing Convolutional Neural Networks (CNN) and Long Short-Term Memory (LSTM), it becomes feasible to comprehend the image's relationship in English, thus facilitating the analysis of road conditions and the prediction of CO2 emission rates from heavy vehicles.

III. METHODOLOGY

Existing System :

Enhancing the precision of vehicle emission modeling has been a persistent objective in transportation studies, particularly with the growing emphasis on assessing the environmental impact of intelligent transportation systems. Nevertheless, existing car emission models face challenges stemming from oversimplified assumptions or excessive complexity, along with

Principal
Samskruti College of Engg. & Technology

significant prerequisites in prior knowledge, resulting in diminished accuracy. To address these drawbacks, this study introduced a novel microscopic emission model based on deep learning, offering highly accurate estimates of CO2 emissions for individual vehicles. To synchronize the observed driving condition data with the measured emission data, initially misaligned, we utilized the dynamic time warping technique.

Proposed System :

Initially, data for the study was gathered using online tools, capturing various distinctive characteristics. Upon collection from multiple sources, the dataset underwent preprocessing before model training commenced. The preprocessing procedure begins with reading the acquired dataset and proceeds to data cleaning. Despite data cleaning efforts, certain duplicate features persist in the datasets, yet these attributes are disregarded during CO2 emission prediction. Consequently, it becomes necessary to eliminate redundant attributes and datasets containing insufficient information. To enhance accuracy, missing values are either removed or substituted with the undesirable "nan" value. Leveraging statistical algorithms and machine learning, it becomes feasible to predict outcomes based on historical data.

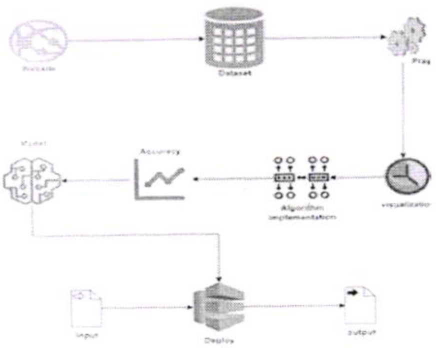


Fig. 1: System Architecture

Algorithm implementation

Implementing algorithms is a crucial step in machine learning to ensure optimal performance. Scikit-learn, a widely-used machine learning library in Python, offers a diverse range of tools and algorithms for building and assessing machine learning models. Its user-friendly interface and adaptability make it an excellent choice for creating a test framework applicable to various machine learning problems. By incorporating multiple algorithms, comprehensive comparisons can be conducted to determine the most effective approach for specific requirements. Each model may exhibit different performance characteristics, necessitating the use of cross-validation and resampling techniques to evaluate their performance on new data accurately. These evaluations aid in identifying one or two models that demonstrate superior effectiveness among the collection. Similar to gaining insights by visualizing datasets from various perspectives, selecting a machine learning model also requires a multifaceted approach. To identify the most optimal models, it's essential to assess the predicted accuracy of machine learning techniques using diverse methods. Employing various visualization techniques that showcase mean accuracy, variability, and other characteristics of model accuracy distribution is an effective evaluation strategy. In the subsequent section, we'll explore how to achieve this using scikit-learn in Python. Ensuring a fair and unbiased comparison of machine learning algorithms involves evaluating each algorithm consistently on the same data. This consistency can be achieved by employing a standardized test framework for testing each algorithm.

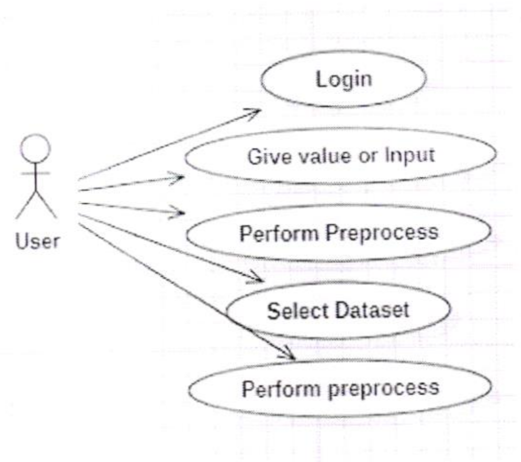


Fig. 2: Use Case Diagram

False Positives (FP) - A situation where a person is expected to make a payment but instead pays late can be described as the actual class being false, despite it being anticipated as true. Similarly, if a predicted class indicates that a passenger would survive, but the actual class indicates that the passenger did not survive, it would also be considered a case the obtained data is false.

False Negatives (FN) - If a defaulter is predicted as a player, meaning that the forecasted class is negative but the actual class is positive, it is considered an instance of misclassification. For instance, if a passenger's survival is indicated in the actual class, but the predicted class suggests their death, it is an example of a positive class being projected as negative.

True Positives (TP) - When a defaulter is presumed to be a nonpayer, it can result in accurate positive predictions, where both the actual and predicted class values align. For instance, if a passenger's survival is predicted and also confirmed in the actual class, it confirms the correctness of the outcome.

True Negatives (TN) - If the predicted class is negative (e.g., a binary classification problem with two possible classes - positive and negative) and the actual class is also negative, it would be considered a true negative (TN) - a case where the model correctly predicted the negative outcome.

IV. CONCLUSION

The process commenced with data cleaning and preprocessing, which involved addressing missing values and conducting exploratory analysis. Subsequently, models were constructed and evaluated, with the algorithm demonstrating the highest accuracy score being chosen as the optimal performer on the public test set. This selected algorithm is then integrated into the program, aiding in the determination of vehicle CO2 emissions.

V. REFERENCES

[l] Sandeep Kumar Pranab K. Muhu - A Novel GDP Prediction Technique based on Transfer Learning using CO2 Emission Dataset! -2019

[2] Ngo Le Huy Hien and Ab-Lian Kor - Analysis and Prediction Model of Fuel Consumption and Carbon Dioxide Emissions of Light-Duty Vehicles-2021

[3] Huafang Huang 1,2,3, Xiaomao Wu - The Prediction of Carbon Emission Infonnation in Yangtze River Economic Zone by Deep Leaming-2021

[4] Prof. Swapnil Wani,2Mr. Akash Akhilesh Yadav - Predicting CO2 Emission Using Machine Leaming, -2022

[5] Chairul Salehi, Nur Rachman Dzakiyullah2 Carbon dioxide emission prediction using support vector machinc-2016

[6] Le Comee, C.M.; Molden, N.; van Reeuwijk, M.; Stettler, M.E. Modelling of instantaneous emissions from diesel vehicles with a special focus on NOx: Insights from

Principal
Samskruti College of Engg. & Technology
Kondapur (V), Ghatkesar (M), Medchal Dist.

machine learning techniques.Sci. Total Environ. 2020
[7] Abukhalil, T.; A!Mahafzah, H.; Alksasbeh, M.; Alqaralleh, B.A. Fuel consumption using OBD-II and support vector machine model. J.Robot. 2020
[8] Jaiprakasb, Habib, G., Kumar, A., Sharma, A., & Haider, M. (2017). On-road emissions of CO, CO2 and NOx from four-wheeler and emission estimates for Delhi. Journal of Environmental Sciences, 53(X),39-47
[9] MK AN (2020) Role of energy use in the prediction of CO2 emissions and economic growth in India: evidence from artificial neural networks (ANN). Environ Sci Pollute Res.
[10] Marland G, Boden TA, and Andres RJ (201 I) CO2 emissions from fossil fuels on a global, regional, and nationwide scale. Carbon Dioxide Information Analysis Center, US Department of Energy, Oak Ridge National Laboratory, Oak Ridge, Tennessee, USA doi.
[11] Lore!, JB Shajilin, et al." recognize the Image Caption Generator Using CNN and LSTM with NumPy functions. "Solid State Technology" 64.2(2021): 2181-2191.
[12] Lakshay Amarpuri, Navdeep Yadav, Girish Kumar, and Saurabh Agrawal, "Prediction of CO2 emissions using deep learning hybrid technique," IEEE, 2019.

[13] H. T. Pao, C.M. Tsai. Modeling and forecasting the CO2 emissions, energy consumption, and economic growth in Brazil. Energy, 36 (2011) 2450-2458.
[14] L.Amarpuri, N. Yadav, G. Kumar, and S. Agrawal, "Prediction of CO2 Emissions Using a Hybrid Deep Leaming Approach: A Case Study in Indian Context," Twelfth International Conference on Contemporary Computing (IC3), 2019.

Crop Prediction Based on Characteristics of Agricultural Environment

[1]Ms. MB. Bhavani, [2]T. Vinay Kumar Reddy, [3]P. Arif, [4]R. Raju, [5]D. Sathish Nayak

[1]Assistant Professor, Department of Computer Science and Engineering (AIML), Samskruti College of Engineering and Technology, Kondapur

[2,3,4,5]B. Tech Scholar, Department of Computer Science and Engineering (Artificial Intelligence and Machine learning), Samskruti College of Engineering and Technology, Kondapur

Abstract: India, the second most populous country in the world, has a large segment of its population engaged in agriculture. Many farmers in India grow the same crops repeatedly and apply fertilizers in random quantities without understanding the specific needs of the soil. This practice negatively impacts crop yield and causes soil acidification, damaging the topsoil layer. To address these issues, we have designed a system using machine learning algorithms to assist farmers. Our system suggests the most suitable crops for specific land based on soil content and weather conditions. It also provides information on the necessary types and quantities of fertilizers and the required seeds for cultivation. By utilizing our system, farmers can cultivate new varieties of crops, potentially increase their profit margins, and reduce soil pollution.

Keywords: Crop yield, Machine learning algorithms, Crop suggestion, Crop variety, Profit margin, Soil pollution

I. INTRODUCTION

Agriculture forms the cornerstone of life for numerous individuals across India, particularly in rural regions. With over 60% of the nation's land dedicated to agriculture, the sector plays a vital role in sustaining the needs of its 1.3 billion inhabitants. Consequently, the adoption of new agricultural technologies is imperative. Often referred to as the backbone of the Indian economy, agriculture not only fulfills the nation's food requirements but also serves as a crucial source of raw materials for various non-agricultural industries. Despite its significance, the agricultural sector's contribution to India's economy has gradually declined to less than 15% in recent years, primarily due to the rapid growth of the industrial and services sectors. Moreover, the increasing population exacerbates the challenge of meeting the rising demand for agricultural products. Previously, crop cultivation relied heavily on the expertise and traditional methods employed by farmers.The adverse effects of climate change are increasingly impacting crop yields, posing challenges for farmers in selecting the most suitable crops based on soil and environmental conditions. Addressing this issue effectively is crucial to ensure farmers' livelihoods and optimize agricultural production. Crop prediction, which relies on soil, geographical, and climatic data, plays a pivotal role in this endeavor. In recent years, machine learning algorithms have emerged as valuable tools for crop prediction in agriculture. However, predicting the optimal crop for cultivation is a complex task, necessitating the exploration and testing of multiple models. Given that crop cultivation is influenced by both biotic and abiotic factors, diverse datasets are required to develop accurate prediction models.

Principal
Samskruti College of Engg. & Technology
Kondapur (V), Ghatkesar (M), Medchal Dist.

ISSN NO: 0022-1945

Biotic factors encompass various environmental components resulting from the influence of living organisms, including microorganisms, plants, animals, parasites, predators, and pests, both directly and indirectly impacting other living beings. This category also encompasses human-induced factors such as fertilization, plant protection, irrigation, and various forms of pollution (air, water, and soil). These factors can lead to diverse changes in crop yield, including internal and shape defects, as well as alterations in chemical composition. The interplay of biotic and abiotic factors significantly influences environmental conditions, plant growth, and overall plant quality. Abiotic factors can further be categorized into physical, chemical, and other dimensions. Physical factors involve mechanical vibrations, various forms of radiation (such as ionizing, electromagnetic, ultraviolet, and infrared), climatic variables (such as atmospheric pressure, temperature, humidity, air movements, and sunlight), soil characteristics, topography, soil rockiness, atmospheric conditions, and water chemistry, particularly salinity. Chemical factors include environmental pollutants like sulfur dioxide and its derivatives, polycyclic aromatic hydrocarbons (PAHs), nitrogen oxides and their derivatives, fluorine and its compounds, lead and cadmium compounds, nitrogen-based fertilizers, pesticides, and carbon monoxide. This project streamlines the process of collecting datasets and employing suitable algorithms for predicting crop yield. By leveraging this initiative, farmers can gain insights into which crops to cultivate on their land to maximize yield and profitability. Furthermore, the project aims to enhance the nation's economy by increasing crop production rates. Through the implementation of innovative technological solutions in the agricultural sector, significant improvements in crop production can be achieved. The paper explores various classifier algorithms, including SVM (Support Vector Machine), K-NN (K-Nearest Neighbors), Decision Tree, Random Forest, Gradient Boosted Decision Tree, and Regularized Greedy Forest.

II. LITERATURE SURVEY

Doshi, Z., Nadkarni, S., Agrawal, R., & Shah, N. (2018, August). AgroConsultant: intelligent crop recommendation system using machine learning algorithms. (pp. 1-6). IEEE.

This paper presents a two-part approach to crop prediction. The first subsystem focuses on crop recommendation, involving preprocessing steps and the selection of various machine learning algorithms based on their accuracies. The second subsystem predicts rainfall, and its output is utilized by the first subsystem. In the experimental analysis, the decision tree classifier emerged as the most accurate among the other classifiers evaluated. Specifically, Random Forest achieved the highest accuracy at 90.43%.

S. P. Raja, B. Sawicka, Z. Stamenkovic and G. Mariammal, "Crop Prediction Based on Characteristics of the Agricultural Environment Using Various Feature Selection Techniques and Classifiers," in IEEE Access, vol. 10, pp. 23625-23641, 2022.

The focus of this paper is on exploring different feature selection methods within wrapper methods and classification algorithms for crop prediction. The dataset utilized is the Felin dataset, and the paper follows a systematic approach comprising Dataset Collection, Pre-processing, Feature Selection, and Classifiers. Among the classifiers examined, the random forest classifier exhibited the highest accuracy of

Principal
Samskruti College of Engg. & Technology
Kondapur (V), Ghatkesar (M), Medchal Dist.

87.43% on the Felin dataset, outperforming others in terms of performance metrics. Particularly noteworthy was the Modified Recursive Feature Elimination with random forest, which demonstrated high-level performance metrics.

Kulkarni, N. H., Srinivasan, G. N., Sagar, B. M., & Cauvery, N. K. (2018, December). Improving crop productivity through a crop recommendation system using ensembling technique. In 2018 3rd International Conference on Computational Systems and Information Technology for Sustainable Solutions (CSITSS) (pp. 114-119). IEEE.

The aim of this paper is to develop a recommendation system for precise crop selection based on various soil, rainfall, and surface temperature parameters. The objective is to enhance crop productivity by offering highly accurate and efficient predictions using ensemble techniques. Initially, the collected data undergoes preprocessing. Following preprocessing, the dataset is split into training and test sets. Each sample is then trained and tested using Random Forest, Naive Bayes, and Linear SVM algorithms. A Voting Technique is employed as a combination method to achieve optimal accuracy. The average accuracy achieved for crop classification into Kharif and Rabi crops is 99.91%.

Liying Yang (2011), 'Classifiers selection for ensemble learning based on accuracy and diversity' Published by Elsevier Ltd. Selection and/or peer-review under responsibility of [CEIS].

The paper addresses the challenge of selecting classifiers for ensemble learning, aiming to enhance accuracy and performance. It introduces a method called Selection by Accuracy and Diversity (SAD) to identify the best classifier set from a pool based on accuracy and performance metrics. Using Q statistics, the interdependency between the most relevant and accurate classifiers is determined. Those not chosen are combined to form the ensemble, ensuring improved performance and diversity. Dąbrowska-Zielińska et al. evaluated plant biophysical parameters derived from satellite data to forecast crop yields in Poland. Ground measurements were conducted in arable fields as part of the GEO Joint Experiment of Crop Assessment and Monitoring (JECAM). Crop classification utilized optical and radar images from Sentinel-1 and RadarSat-2. The PROtotypical model of Biomass and Evapotranspiration (PRO) simulated winter wheat growth, achieving a high accuracy of 94% in biomass estimation compared to real biomass.

Suruliandi, A., Mariammal, G., & Raja, S. P. (2021). Crop prediction based on soil and environmental characteristics using feature selection techniques. Mathematical and Computer Modelling of Dynamical Systems, 27(1), 117-140

This paper focuses on crop prediction by evaluating various feature selection methods and selecting the best classifier algorithms based on accuracy. The feature selection techniques explored include wrapper methods like Recursive Feature Elimination (RFE), BORUTA, and Sequential Forward Floating Selection (SFFS). Prediction is based on soil and environmental characteristics. Experimental analysis reveals that RFE combined with the bagging classifier applied to KNN, Naïve Bayes, Decision Tree, SVM, and Random Forest achieves superior accuracy (0.9272) compared to other combinations.

Principal
Samskruti College of Engg. & Technology
Kondapur (V), Ghatkesar (M), Medchal Dist.

ISSN NO: 0022-1945

III. METHODOLOGY

Agriculture plays a vital role in India's economy, yet challenges such as crop failures, low yields, and farmer suicides underscore the need for sustainable agricultural practices. Addressing these issues is crucial for both economic and agricultural prosperity worldwide. The project's objective is to predict crop yields in India considering diverse climatic conditions and attributes. By aiding farmers in selecting suitable crops for optimal yield and profit, the project aims to meet the pressing need for accurate crop yield prediction.Agriculture is a predominant occupation for many Indians, yet farmers often face challenges due to repetitive planting practices and inadequate fertilizer management, leading to diminished crop yields and soil fertility. To address these issues, we propose a machine learning-based system for crop and fertilizer prediction. This system will recommend suitable crops based on soil characteristics and climatic conditions, ensuring optimal yield. Additionally, it will provide guidance on fertilizer content and quantity, as well as seed requirements. By leveraging our system, farmers can diversify crop varieties and adopt appropriate techniques, thereby enhancing their potential for maximizing profits.

Traditionally, farmers relied on their experience to predict crop yields, but this approach is not always reliable. Our proposed system aims to improve accuracy by utilizing various parameters provided by the farmers, such as their location, season, land area, and crop type. By employing machine learning techniques like Multiple Linear Regression and considering past production data, the system predicts crop yields for the upcoming harvest year. It is essential for the application to gather and communicate relevant information effectively. The system's primary objective is to assist farmers in selecting the most suitable crops for optimal yield. A user-friendly interface will be developed to ensure ease of use for farmers.

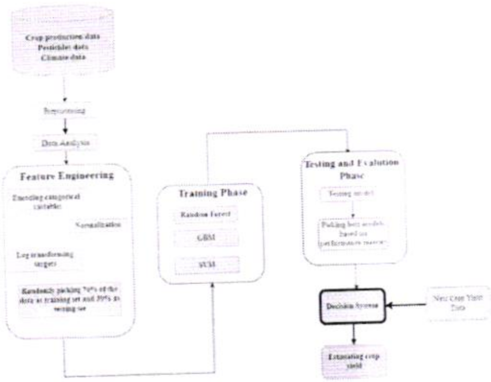


Fig. 1: System Architecture

Service Provider Module:

Within this module, the service provider must authenticate themselves using a valid username and password. Upon successful login, they gain access to various functionalities including browsing and training/testing crop datasets, viewing accuracy results in bar charts, accessing prediction results for crop types, downloading predicted datasets, and viewing crop type ratios. Additionally, the service provider can view and authorize users.

View and Authorize Users Module:

This module is designed for the admin to oversee the list of registered users. The admin can review user details such as usernames, email addresses, and locations. Furthermore, the admin has the authority to authorize users.

Remote User Module:

 ISSN NO: 0022-1945

Within this module, numerous users are registered. Users are required to complete registration before engaging in any activities. Once registered, user details are stored in the database. Upon successful registration, users can log in using authorized credentials to perform operations such as registration/login, crop type prediction, and viewing their profiles.

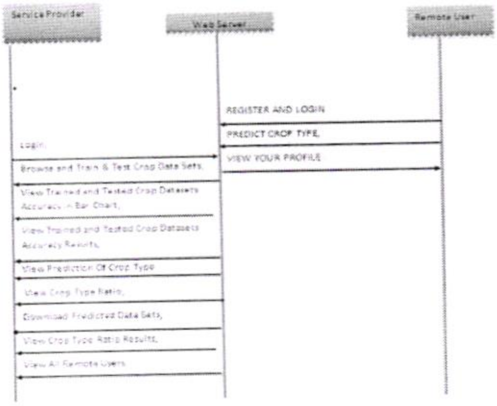


Fig. 2: Sequence Diagram

The methodology introduced in this study enhances existing procedures in several key ways. Firstly, a remote detecting network is employed to propose an operational methodology. Secondly, a novel dimensionality reduction technique is introduced, utilizing a Convolutional Neural Network (CNN) coupled with long-term memory. Thirdly, a Gaussian process is utilized to analyze and evaluate the spatial-transient structure of the data, thereby improving its accuracy. Anantha et al. devised a recommendation system employing an ensemble model with majority voting, utilizing random tree, CHAID, KNN, and Naive Bayes (NB) as learners to suggest the most suitable crop based on soil parameters, achieving high accuracy and efficacy. The classified image produced by these methods incorporates ground truth-applied mathematics data, alongside parameters such as weather conditions, crop yield, and state/district-wise crop production, enabling the prediction of specific crop yields under varying circumstances. Rale et al. developed a forecasting model utilizing default settings and RF regression for crop yield estimation. Fernando et al. analyzed data on annual coconut production from 1971 to 2001 in a specific region, revealing an economic impact of approximately US $50 million due to crop shortages. Ji et al. proposed an estimation technique for rice yield prediction, evaluating the effectiveness of Artificial Neural Networks (ANN) compared to biological parametric variations and multiple bilinear regression models. Boryan et al. introduced a decision tree-based method to delineate state-level crop cover groups using data from the Cropland Data Layer (CDL) and National Agricultural Statistics Service (NASS), incorporating ground truth data from the June Agricultural Survey. This work outlines the NASS CDL program. The system does not incorporate Recursive Feature Elimination (RFE). The system does not utilize sampling techniques during preprocessing to balance the dataset and optimize prediction performance.

In the 21st century, it has become commonplace to explore new technological approaches across various sectors. The implementation of novel techniques not only streamlines processes but also yields superior results. Factors such as wind patterns, water availability, soil quality, and unexpected fluctuations in rainfall often lead to crop failures, resulting in reduced agricultural output, food shortages, and economic setbacks for both farmers and countries. A single crop failure can inflict significant losses. Hence, there is a pressing need for a system that can accurately predict crop yield rates. To address these challenges, we propose a new system that selects high-yielding crops based on influential parameters, thereby assisting farmers in achieving optimal crop yields and minimizing the risk of crop failure. In this proposed system, machine learning techniques such as Random Forest Regressor and Decision Tree Regressor are employed to forecast crop yield production, considering input parameters such as state name, season, area, and crop type.The Recursive Feature Elimination (RFE) technique serves as a wrapper feature selection method, initially utilizing the complete dataset. Its ranking mechanism, pivotal to the RFE process, arranges the dataset in descending order of importance, facilitating the selection of prominent features. One significant advantage of RFE compared to other methods lies in its systematic assessment of each feature's contribution to the model's output, allowing for the elimination of features solely based on their performance. The input and output framework for crop prediction, focusing on agricultural environmental characteristics, involves specifying the data inputs necessary for prediction and the anticipated outputs from prediction models. Drawing from the provided sources, which explore the utilization of machine learning methodologies, feature selection techniques, and classification algorithms for precise crop prediction, here is a synthesis of the input and output framework:

Input Framework:

Soil Parameters: Essential inputs for crop prediction models encompass soil attributes such as type, pH levels, moisture content, and nutrient availability. Environmental Conditions: Predicting crop yields relies heavily on factors like rainfall patterns, temperature variations, humidity levels, and other agro-climatic indicators. Geographic Features: Information related to the geographical location of the land and its topographic characteristics are influential in crop selection and yield prognostication. Historical Data: Past performance data of crops and environmental patterns serve as foundational elements for training machine learning models and achieving accurate predictions. Feature Selection: Employing feature selection methodologies aids in identifying the most pertinent attributes from datasets to enhance prediction accuracy.

Output Framework:

Predicted Crop: The primary outcome of prediction models entails recommending the most suitable crop(s) for cultivation based on input parameters. Yield Estimation: Some models may furnish projections of crop yield predicated on chosen features and environmental factors. Classification Results: Classification algorithms assist in categorizing land into appropriate crop types, furnishing actionable insights for farmers and policymakers. Feature Importance: Recognizing the significance of diverse input features in the prediction model bolsters interpretability and reliability of predictions.

IV. RESULTS

Output screens for Crop Prediction systems play a crucial role in presenting the prediction results in a clear and understandable manner, aiding farmers and agricultural experts in making informed decisions about crop selection and cultivation.

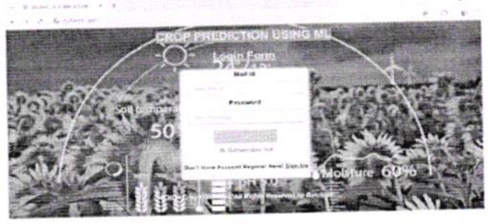


Fig. 3: Home & Login Page

Principal
Samskruti College of Engg. & Technology
Kondapur (V), Ghatkesar (M), Medchal Dist.

Fig. 4: Farmer Registration Page

CROP YIELD PREDICTION:

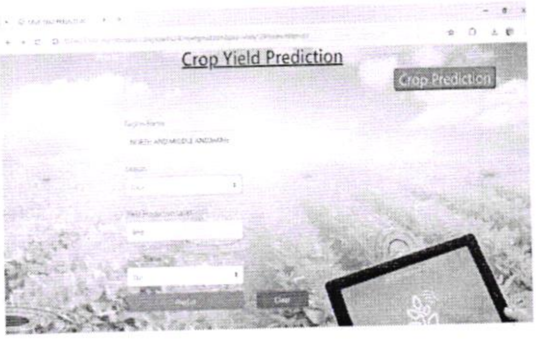


Fig. 5: Crop Yield Prediction Page

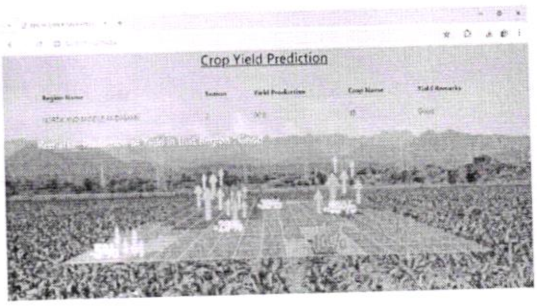


Fig. 6: Crop Yield Prediction Result

CROP PREDICTION:

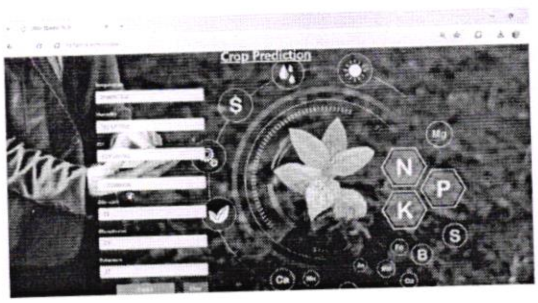


Fig. 7: Crop Prediction Page

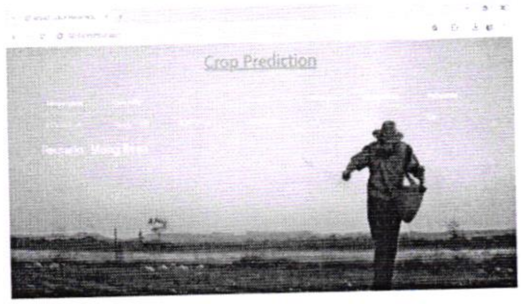


Fig. 8: Crop Prediction Result

V. CONCLUSION

Forecasting crop cultivation poses significant challenges in agriculture. This study employs various feature selection and classification methodologies to forecast the yield of plant cultivations. The findings reveal that employing an ensemble technique yields superior prediction accuracy compared to conventional classification methods. Predicting the cultivation areas of cereals, potatoes, and other energy crops enables strategic planning of their sowing, both at the farm and national levels. Embracing modern forecasting techniques can lead to tangible financial gains in agricultural practices.

VI. REFERENCES

1. R. Jahan, ''Applying naive Bayes classification technique for classification of improved agricultural land soils,'' Int. J. Res. Appl. Sci. Eng. Technol., vol. 6, no. 5, pp. 189–193, May 2018.
2. B. B. Sawicka and B. Krochmal-Marczak, ''Biotic components influencing the yield and quality of potato tubers,'' Herbalism, vol. 1, no. 3, pp. 125–136, 2017.
3. B. Sawicka, A. H. Noaema, and A. Gáowacka, ''The predicting the size of the potato acreage as a raw material for bioethanol production,'' in Alternative Energy Sources, B. Zdunek, M. Olszáwka, Eds. Lublin, Poland:

Principal
Samskruti College of Engg. & Technology
Kondapur (V), Ghatkesar (M), Medchal Dist

WydawnictwoNaukowe TYGIEL, 2016, pp. 158–172.
4. B. Sawicka, A. H. Noaema, T. S. Hameed, and B. Krochmal-Marczak, ''Biotic and abiotic factors influencing on the environment and growth of plants,'' (in Polish), in Proc. BioróżnorodnośćŚrodowiskaZnaczenie, Problemy, Wyzwania. MateriałyKonferencyjne, Puławy, May 2017. [Online]. Available: https://bookcrossing.pl/ksiazka/321192.
5. R. H. Myers, D. C. Montgomery, G. G. Vining, C. M. Borror, and S. M. Kowalski, ''Response surface methodology: A retrospective and literature survey,'' J. Qual. Technol., vol. 36, no. 1, pp. 53–77, Jan. 2004.
6. D. K. Muriithi, ''Application of response surface methodology for optimization of potato tuber yield,'' Amer. J. Theor. Appl. Statist., vol. 4, no. 4, pp. 300–304, 2015, doi: 10.11648/j.ajtas.20150404.20.
7. M. Marenych, O. Verevska, A. Kalinichenko, and M. Dacko, ''Assessment of the impact of weather conditions on the yield of winter wheat in Ukraine in terms of regional,'' Assoc. Agricult. Agribusiness Econ. Ann. Sci., vol. 16, no. 2, pp. 183–188, 2014.
8. J. R. Olędzki, ''The report on the state of remotesensing in Poland in 2011–2014,'' (in Polish), Remote Sens. Environ., vol. 53, no. 2, pp. 113–174, 2015.
9. K. Grabowska, A. Dymerska, K. Poáarska, and J. Grabowski, ''Predicting of blue lupine yields based on the selected climate change scenarios,'' Acta Agroph., vol. 23, no. 3, pp. 363–380, 2016.
10. D. Li, Y. Miao, S. K. Gupta, C. J. Rosen, F. Yuan, C. Wang, L. Wang, and Y. Huang, ''Improving potato yield prediction by combining cultivar information and UAV remote sensing data using machine learning,'' Remote Sens., vol. 13, no. 16, p. 3322, Aug. 2021, doi: 10.3390/rs13163322.

Principal
Samskruti College of Engg. & Technology
Kondapur (V), Ghatkesar (M), Medchal Dist.

Handwritten Text Recognition Using Machine Learning and Deep Learning

[1]Mr. V. Pranay, [2]K. Akshitha, [3]D. Rohith, [4]B. Anjani Devi, [5]P. Naveen Sai
[1]Assistant Professor, Department of Computer Science and Engineering, Samskruti College of Engineering and Technology, Kondapur
[2,3,4,5]B. Tech Scholar, Department of Computer Science and Engineering (Data Science), Samskruti College of Engineering and Technology, Kondapur

Abstract: Traditional methods of handwriting recognition have historically relied on manually crafted features and extensive prior knowledge, presenting challenges in training Optical Character Recognition (OCR) systems. Recent research in handwriting recognition has shifted towards deep learning techniques, which have demonstrated significant advancements in performance. However, the exponential growth of handwritten data and the availability of powerful processing resources necessitate ongoing efforts to improve recognition accuracy. Convolutional Neural Networks (CNNs) have proven highly effective in perceiving the structural nuances of handwritten characters, enabling automatic extraction of distinctive features essential for handwriting recognition tasks. Our proposed work focuses on exploring various design options for CNN-based handwritten digit recognition, including the number of layers, stride size, receptive field, kernel size, padding, and dilation. Additionally, we aim to evaluate different Stochastic Gradient Descent (SGD) optimization algorithms to enhance the performance of handwritten digit recognition. While ensemble architectures have traditionally yielded higher recognition accuracy, our objective is to achieve comparable results using a pure CNN architecture, thereby reducing computational cost and testing complexity. Through extensive experimentation and careful selection of learning parameters, we have achieved a new record recognition accuracy of 99.87% on the MNIST handwritten digit dataset.

Keywords: Handwriting recognition, Optical Character Recognition (OCR), Deep learning techniques, Convolutional Neural Networks(CNNs)

I. INTRODUCTION

Handwriting recognition holds significant importance in the era of digitalization, facilitating the conversion of handwritten characters into machine-readable formats. This technology finds applications in various fields such as vehicle license plate recognition, postal letter sorting, Cheque Truncation System (CTS) scanning, and historical document preservation, among others, where accurate recognition, low computational complexity, and consistent performance are paramount. Deep neural architectures, including convolutional neural networks (CNNs), are favored over shallow architectures due to their ability to automatically extract important features from data without human intervention. CNNs, a specific type of deep neural network, have widespread applications in image classification, object recognition, signal processing, natural language processing, and face recognition, among others. Their hierarchical feature learning capability enables efficient processing of complex data, making them highly effective in various recognition tasks.

Principal
Samskruti College of Engg. & Technology
Kondapur (V), Ghatkesar (M), Medchal Dist

The convolutional neural network (CNN), a variation of the multi-layer perceptron (MLP) network, was introduced in 1980 and is inspired by human visual perception. Similar to how humans learn to recognize objects by exposure to various images, CNNs analyze visual imagery efficiently. Notable CNN architectures include GoogLeNet, AlexNet, VGG, and ResNet, integrating feature extraction and classification steps with minimal pre-processing efforts. CNNs automatically extract rich and interconnected features from images, requiring less prior knowledge of features and enabling excellent recognition accuracy even with limited training data. They leverage topological information in input data, making them robust to variations like rotation and translation, unlike MLP models. MLPs struggle with complex problems and high-resolution images due to the "curse of dimensionality." CNNs have been extensively used for handwritten digit recognition from the MNIST database, with reported accuracies reaching 99%. While ensemble models have achieved high accuracies, they come with increased computational costs and testing complexity. The proposed work aims to achieve comparable accuracy using a pure CNN architecture by optimizing learning parameters and thoroughly investigating CNN architecture parameters for MNIST digit recognition, outperforming ensemble models in recognition accuracy and computational complexity.

Handwriting recognition holds significant practical value, aiding tasks from digitizing historical documents to assisting individuals with disabilities in engaging with technology. This project endeavors to elevate handwritten text recognition by harnessing machine learning and deep learning methodologies, thereby contributing to the evolution of more effective and dependable systems. The core objective involves tackling the inherent complexities associated with handwritten text, such as diverse styles, distortion, noise, and the absence of standardized fonts, which traditional optical character recognition (OCR) systems often struggle with. Through advanced machine learning and deep learning models, the project aims to surmount these challenges and achieve heightened levels of precision and consistency. Additionally, the project seeks to furnish a versatile solution adaptable to various languages, scripts, and writing styles. By training the model on diverse datasets and employing techniques like data augmentation and transfer learning, the system can effectively generalize across different handwriting styles and environments. This adaptability proves vital for real-world scenarios where input data can significantly vary. Moreover, emphasis is placed on user-friendliness and accessibility, with the aim of crafting an intuitive interface facilitating seamless interaction with the handwritten text recognition system. This encompasses features like real-time transcription, batch processing, and integration with existing document management systems. By enhancing technology accessibility, the project endeavors to democratize access to handwritten text recognition capabilities, empowering users across diverse domains and industries. Ultimately, the project's overarching goal is to propel the field of handwritten text recognition forward through the application of machine learning and deep learning methodologies, prioritizing accuracy, adaptability, and usability. By delivering a dependable and efficient system, the project aims to streamline the digitization and processing of handwritten documents, thereby enhancing productivity and accessibility across various sectors.

II. LITERATURE SURVEY

Handwritten Digit Recognition using Machine and Deep Learning AlgorithmsAuthors: Ritik Dixit, Rishika Kushwah, Samay Pashine. (2021)

The project entitled "Handwritten Digit Recognition using Machine and Deep Learning Algorithms," led by Ritik Dixit, Rishika Kushwah, and Samay Pashine, aims to create a system capable of accurately identifying handwritten digits. Employing a blend of machine learning and deep learning techniques, the project encompasses preprocessing stages to refine image quality, followed by feature extraction and classification processes. Both traditional machine learning methods like Support Vector Machines (SVM) or k-Nearest Neighbours (k-NN) and advanced deep learning models such as Convolutional Neural Networks (CNNs) may be utilized to enhance accuracy. The system's design prioritizes flexibility, scalability, and efficient inference, rendering it suitable for real-time applications. By synergizing the capabilities of machine learning and deep learning, the project endeavors to achieve heightened precision and resilience in recognizing handwritten digits. The authors' contributions center on implementing, experimenting with, and evaluating various algorithms to ascertain their effectiveness in accurately identifying handwritten digits.

Handwritten Text Recognition using Deep Learning with TensorFlow
Authors: Yugandhar Manchala, Jayaram kinthali, Kowshik Kotha, Kanithi Santosh Kumar. (2021).

The project titled "Handwritten Text Recognition using Deep Learning with TensorFlow," led by Yugandhar Manchala, Jayaram Kinthali, Kowshik Kotha, and Kanithi Santosh Kumar, aims to create a system for recognizing handwritten text through deep learning techniques implemented with TensorFlow. The project endeavors to harness the power of deep learning models to accurately transcribe handwritten text from images. By leveraging TensorFlow, a widely utilized deep learning framework, the project facilitates efficient development and deployment of the recognition system. Preprocessing steps are employed to enhance image quality, followed by feature extraction and classification utilizing deep neural networks. Through rigorous experimentation and training, the system achieves heightened accuracy in recognizing various handwriting styles and languages. The project's outcomes contribute to the advancement of handwritten text recognition technology, offering a scalable and adaptable solution applicable to diverse uses such as document digitization, data entry automation, and historical document preservation.

A Computationally Efficient Pipeline Approach to Full Page Offline Handwritten Text Recognition
Authors: Jonathan Chung, Thomas Delteil. (2020).

In their 2020 project titled "A Computationally Efficient Pipeline Approach to Full Page Offline Handwritten Text Recognition," Jonathan Chung and Thomas Delteil present an innovative method for offline handwritten text recognition (HTR) that prioritizes computational efficiency while maintaining accuracy. The project introduces a pipeline approach comprising several stages: image preprocessing, text line segmentation, handwriting recognition, and language modeling. Through meticulous optimization of each stage, the proposed system achieves competitive performance while conserving

Principal
Samskruti College of Engg. & Technology
Kondapur (V), Ghatkesar (M), Medchal Dist.

computational resources. Notable features include adaptive binarization, robust text line segmentation using a modified U-Net architecture, and an efficient deep learning model for handwriting recognition. Additionally, the project underscores the significance of leveraging hardware resources such as Graphics Processing Units (GPUs) to enhance inference times. Experimental findings validate the effectiveness of the proposed approach on benchmark datasets, highlighting its potential for real-world applications in document digitization, archival, and text transcription tasks. Overall, the project presents a promising solution for full-page offline handwritten text recognition that strikes a balance between computational efficiency and high accuracy.

Comparing Transformer-based to RNN-based Models in a Handwritten Text Recognition Task Authors: L.R.B Schomaker, M. Ameryan. (2022).

The 2022 project titled "Comparing Transformer-based to RNN-based models in a Handwritten Text Recognition task," conducted by L.R.B Schomaker and M. Ameryan, delves into assessing the efficacy of Transformer and Recurrent Neural Network (RNN) architectures in handwritten text recognition (HTR). This study undertakes a comparative analysis of the performance of these two model types in accurately recognizing handwritten text, taking into consideration metrics such as accuracy, computational efficiency, and adaptability to various handwriting styles and languages. Through empirical evaluations and experimentation, the researchers aim to offer insights into the strengths and weaknesses of Transformer and RNN models in HTR tasks. This comparative examination serves to advance understanding regarding the most suitable architectures for HTR applications, thereby providing valuable guidance to researchers and practitioners in the development of more efficient and effective handwritten text recognition systems.

Deep Learning for Handwritten Text Recognition (ConvNet & RNN) Authors: Manisha Gupta. (2021).

In Manisha Gupta's project, "Deep Learning for Handwritten Text Recognition (ConvNet & RNN)," the focus lies on leveraging deep learning methodologies to enhance handwritten text recognition. The project primarily revolves around the utilization of Convolutional Neural Networks (ConvNet) and Recurrent Neural Networks (RNN) to accurately recognize and transcribe handwritten text. ConvNets play a crucial role in extracting features from input images, capturing spatial patterns and structures, whereas RNNs excel in handling sequential data and comprehending context. By amalgamating these architectures, the project endeavors to address challenges posed by diverse handwriting styles and languages. Gupta's research significantly contributes to the advancement of optical character recognition (OCR), facilitating automated digitization of handwritten documents, streamlining data entry processes, and improving accessibility for individuals with disabilities. Through thorough experimentation and evaluation, the project showcases the efficacy of deep learning models in handwritten text recognition tasks, thereby laying the groundwork for practical implementations across various domains such as document processing, archival digitization, and intelligent data extraction.

III. METHODOLOGY

In the current system, data preprocessing is predominantly conducted on structured data. Despite its significant time consumption within an ML pipeline, there's a notable lack of automation in this area. While existing data preprocessing methods suffice for structured data, there's a need for further advancements to accommodate unstructured data. Integrating data mining techniques could address this gap, enabling AutoML pipelines to construct models capable of learning from diverse internet sources. Moreover, in feature engineering, it's observed that most methods employed thus far are tailored to supervised learning scenarios. However, given the high specificity of datasets, AutoML pipelines should strive for greater generality to accommodate varied datasets effectively. Consequently, there's a gradual shift towards incorporating unsupervised learning paradigms to enhance the versatility and adaptability of AutoML pipelines.

Proposed System :

The envisioned handwritten text recognition system aims to harness the capabilities of both machine learning and deep learning methodologies to enhance accuracy, efficiency, and resilience. This comprehensive system will entail preprocessing stages to refine input image quality, followed by feature extraction and classification utilizing a blend of traditional machine learning techniques and advanced deep learning models like Convolutional Neural Networks (CNNs), Recurrent Neural Networks (RNNs), or Transformer-based architectures. To mitigate errors and enhance overall efficiency, the proposed system advocates for the utilization of Convolutional Neural Networks (CNNs) in implementing handwritten digit recognition systems. Specifically, our approach incorporates CNNs with multiple pooling and convolutional layers, employing a 3x3 kernel size. During the training phase, our model leverages a dataset comprising 60,000 grayscale images sized at 28x28 pixels. Through standard training procedures encompassing 5 epochs, our model achieves an impressive accuracy rate of approximately 99.16%. This performance surpasses that of conventional algorithms such as Support Vector Machines (SVM), Multilayer Perceptron, Bayes Net, Random Forest, among others, typically employed in handwritten digit recognition systems.

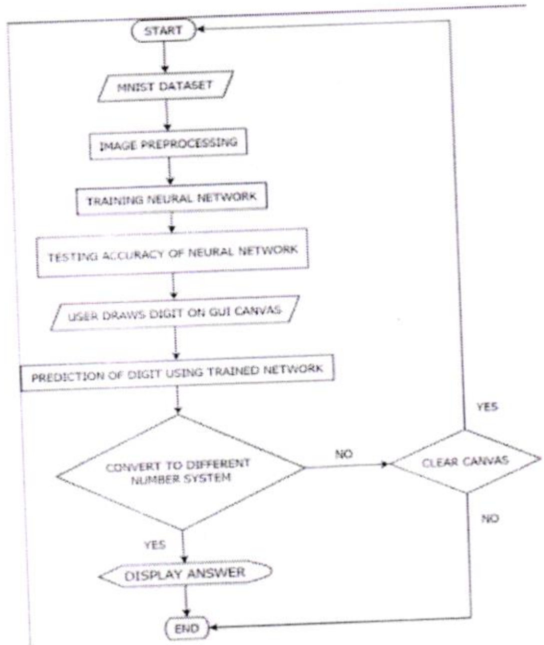


Fig. 1: Activity diagram of our proposed project

In our proposed project, the objective is to recognize handwritten digits specified by the user and determine the entire number, which defaults to the decimal number system. This number will then be converted to binary, octal, or hexadecimal number systems based on the user's preference. We plan to develop a graphical user interface (GUI) for this purpose, featuring a canvas widget where users can draw sequences of handwritten

Principal
Samskruti College of Engg. & Technology
Kondapur (V), Ghatkesar (M), Medchal Dist.

digits for recognition and subsequent conversion. Following each recognition process, the canvas can be cleared to facilitate further input.

Dataset

MNIST dataset is used for training the proposed model. It consists of 70,000 digital images that can be used for training and testing the model. These training and testing datasets are devised on the basis of a specific ratio. This image data is then cleaned and preprocessed for further progression.

Image Preprocessing

Image preprocessing is the process of implementing various methods such as resizing the images, converting them to grayscale format, and augmentation of images for enabling the digital image data to be used within the machine learning model effectively.

Training Neural Network

After completing data preprocessing, the CNN model will be created which consists of various convolutional and pooling layers alongside a 3x3 sized kernel. The model will then be trained on the basis of training and validation data with the help of several python libraries such as TensorFlow, Pillow, OpenCV, Tkinter, Numpy that were preloaded to perform these specific tasks.

Testing Accuracy of Neural Network

After the model is trained using the training dataset, we use the testing dataset to evaluate how well it works. A particular part of the overall MNIST dataset is used as the testing dataset on the basis of which the accuracy is computed for the proposed model.

User Draws Digit on GUI Canvas

After the model is evaluated i.e. trained and tested using the MNIST dataset, the trained model is then used via a Graphical User Interface (GUI) based canvas where a user draws digits using the mouse cursor by clicking and dragging the mouse accordingly.

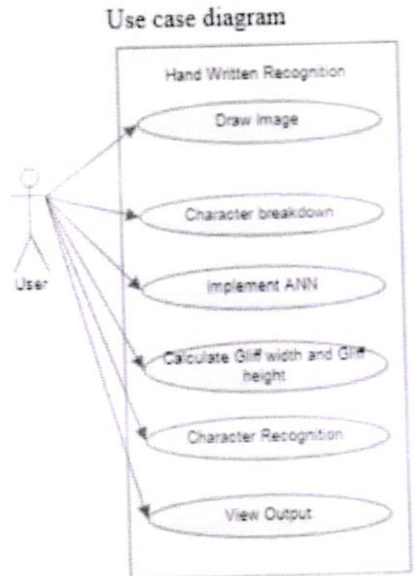


Fig. 2: Use Case Diagram

Recognize Number/Clear Canvas

After the user draws digits on the GUI canvas according to his/her choice, the user is proposed with two options

- Recognize Number: This option uses the CNN model to predict the string of digits drawn by the user.
- Clear Canvas: This option allows the user to clear the canvas and draw more digits for further continuation.

Convert to Different Number System

After the prediction of the digits happens, the user is proposed with three options

Principal
Samskruti College of Engg. & Technology
Kondapur (V), Ghatkesar (M), Medchal Dist.

• Convert to Binary: This option converts the recognized decimal number to its binary equivalent.

• Convert to Hexadecimal: This option converts the recognized decimal number to its hexadecimal equivalent. Convert to Octal: This option converts the recognized decimal number to its octal equivalent.

• **Direct Word Classification:** Utilizing Convolutional Neural Networks (CNNs), we train models capable of accurately classifying entire words.

• **Character Segmentation:** Leveraging Long Short-Term Memory networks (LSTMs) with convolution, we construct bounding boxes for each character within a word. These segmented characters are then passed to a CNN for classification, allowing us to reconstruct the entire word based on the results of both classification and segmentation.

IV. RESULTS

Step 1: It will redirected to the home page. Click on Word Recognition.

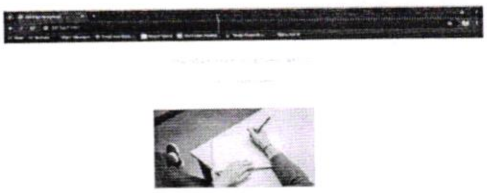


Fig. 3: Click on Word Recognition

Step-2: Select Choose file option.

Fig. 4: Click on Choose file option

Step-3: Provide any image as input.

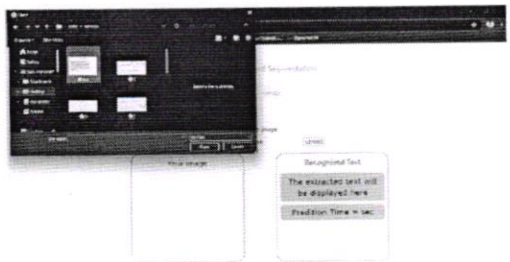


Fig. 5: Provide INPUT

Step-4: System detected the text.

Fig. 6: Detected and analyzed text

Step-5: You can listen the detected text.

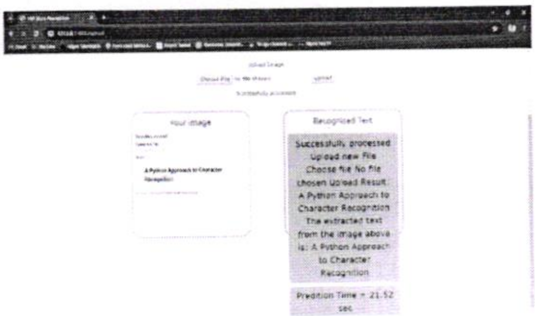


Fig. 7: Listening to detected text.

V. CONCLUSION

In this study, our objective was to enhance the performance of handwritten digit recognition by evaluating various convolutional neural network (CNN) variants. Our focus was to eliminate the need for complex pre-processing, costly feature extraction, and intricate ensemble methods commonly used in traditional recognition systems. Through extensive experimentation using the MNIST dataset, we investigated the impact of different hyper-parameters on recognition accuracy. We found that fine-tuning these parameters is crucial for optimizing the CNN architecture's performance. Using the Adam optimizer, we achieved a remarkable recognition rate of 99.89% for the MNIST database, surpassing all previous reported results. Our experiments clearly demonstrate how increasing the number of convolutional layers in the CNN architecture influences handwritten digit recognition performance. The novelty of our work lies in the comprehensive exploration of all CNN architecture parameters to achieve the highest recognition accuracy for the MNIST dataset, surpassing the capabilities of peer researchers who relied on ensemble CNN architectures. While some researchers have used ensemble methods to improve recognition accuracy, our pure CNN model achieves comparable accuracy without the added computational complexity. Looking ahead, we suggest investigating hybrid CNN architectures such as CNN-RNN and CNN-HMM models, as well as domain-specific recognition systems. Additionally, exploring evolutionary algorithms for optimizing CNN learning parameters, including the number of layers, learning rate, and kernel sizes, holds promise for further improving recognition performance.

VI. REFERENCES

[1] Ritik Dixit, Rishika Kushwah, Samay Pashine. (2021).Handwritten Digit Recognition using Machine and Deep Learning Algorithms

[2] Yugandhar Manchala, Jayaram kinthali, Kowshik Kotha, Kanithi Santosh Kumar. (2021). Handwritten Text Recognition using Deep Learning with Tensorflow.

[3] Jonathan Chung, Thomas Delteil.(2020). A Computationally Efficient Pipeline Approach to Full Page Offline Handwritten Text Recognition.

[4] Lalitha Kumari, Sukhdeep Singh, VVS Rathore (2022). Lexicon and Attention based Handwritten Text Recognition System. Rohini G.Khalkar, Adarsh Singh Dikhit, Anirudh Goel,

[5] Manisha Gupta. (2021). Deep Learning for Handwritten Text Recognition (ConvNet & RNN)

[6] L.R.B Schomaker, M. Ameryan. (2022). Comparing Transformer based to RNN based models in a Handwritten Text Recognition task.

[7] Hanadi Hassen Mohammed, Junaid Malik, Somaya Al-Madeed, Serkan Kiranyaz.. (2022). 2D self - Organized ONN Model For HandWritten Text Recognition.

[8] Evans Ehiorobo, Rukayat Koleoso and Charles Uwadiaa. (2022). Training of Offline Handwritten Text Recognisers using Computer-Generated Text.

[9] Salvador Espana-Boquera, Maria Jose Castro-Bleda, Jorge Gorbe-Moya, and Francisco Zamora-Martinez.(2018). Improving Offline Handwritten Text Recognition with Hybrid HMM/ANN Models.

[10] Dr. Saraswathi and Sana Mohamed sherif. (2021). Handwritten text recognition system using Machine Learning

[11] Manoj Sonkusare and Narendra Sahu. (2016). A survey on HandWritten Character Recognition (HCR) Techniques for English Alphabets.

[12] Sarayut Gonwirat and Olarik Surinta. (2022). Efficient data augmentation strategy for handwritten text recognition in historical documentation images.

[13] Neelisetty Nikith, Anand Sai M, Kumaravel P, V Gowthami (2022). Handwritten Text Recognition using Neural Network.

[14] Ramin Barati (2022). Incorporating locally linear embedding and multi-layer perceptron in handwritten digit recognition.

A DEEP LEARNING APPROACH TO ELECTRICITY THEFTDETECTION

[1]Mr.SachinKumar Chawhan, [2]T.Radhika,[3]E. Mahesh, [4]J.Ganesh, [5]G.Ajay Kumar

[1]Assistant Professor, Department of Computer Science and Engineering (Artificial Intelligence and Machine Learning), Samskruti College of Engineering and Technology, Kondapur

[2,3,4,5]B. Tech Scholar, Department of Computer Science and Engineering (Artificial Intelligence and Machine Learning), Samskruti College of Engineering and Technology, Kondapur

Abstract: Electricity theft is a global issue that adversely impacts both utility companies and consumers. It hinders the economic development of utility companies, creates electrical hazards, and increases energy costs for users. Smart grids play a crucial role in detecting electricity theft as they generate extensive data, including customer consumption information, which can be analyzed using machine learning and deep learning techniques. This paper presents a theft detection method that leverages comprehensive features from both time and frequency domains within a deep neural network-based classification framework. To address dataset weaknesses, such as missing data and class imbalance, we employ data interpolation and synthetic data generation techniques. We evaluate the contribution of features from both time and frequency domains, conduct experiments in combined and reduced feature spaces using principal component analysis, and utilize a minimum redundancy maximum relevance scheme to validate the most significant features. We enhance the performance of electricity theft detection by optimizing hyperparameters with a Bayesian optimizer and employ an adaptive moment estimation optimizer to experiment with different parameter values to find the optimal settings for best accuracy. Our method demonstrates its competitiveness by achieving a 97% area under the curve (AUC), which is 1% higher than the best existing AUC, and a 91.8% accuracy, ranking second-best on the benchmark dataset.

Keywords: Deep neural network, electricity theft, machine learning, minimum redundancy maximum relevance, principal component analysis, smart grids.

I. INTRODUCTION

Electricity theft poses a significant challenge for utility companies globally, with Non-Technical Losses (NTLs) accounting for over $96 billion in losses annually. Among these losses, electricity theft stands out as a major contributor. Sub-Saharan Africa, for instance, experiences particularly high rates, with reports indicating that 50% of generated energy is stolen, according to the World Bank. The primary objective of electricity thieves is to consume energy without incurring charges from utility companies or to pay significantly lower bills than the actual consumption. Consequently, utility companies face substantial revenue losses due to electricity theft. For example, in 2015 alone, India reported losses of $16.2 billion, Brazil suffered losses of $10.5 billion, and Russia experienced losses of $5.1 billion. In South Africa, it is estimated that approximately $1.31 billion (R20 billion) in revenue is lost annually due to electricity theft, particularly through entities like Eskom. In addition to causing revenue losses, electricity theft has adverse effects on the stability and reliability of power grids. It can result in issues like power surges, overloads in electrical systems, and pose safety hazards such as electric shocks to the public. Moreover, electricity theft contributes to increases in energy tariffs, impacting all customers. The introduction of smart grids presents numerous opportunities to address the issue of electricity theft. Smart grids typically consist of conventional power grids, smart meters, sensors, and computing facilities for grid monitoring and control, all interconnected via communication networks. Smart meters and sensors play a crucial role by gathering data on electricity usage, grid status, electricity prices, and other relevant information.

To combat electricity theft within traditional grids, utility companies have historically relied on methods such as scrutinizing meter installations and configurations and inspecting power lines for bypasses. However, these approaches are costly, inefficient, and incapable of detecting cyberattacks. In recent years, researchers have explored the use of machine learning classification methods with data from smart meters to detect electricity theft. These detection methods offer a more cost-effective alternative. Nevertheless, current classification techniques primarily focus on time-domain features and overlook frequency-domain features, thereby constraining their effectiveness. Despite ongoing research efforts to address electricity theft, it remains a persistent issue. One significant reason for the delay in resolving this problem could be attributed to the discrepancy in smart grid deployment between developed and developing nations. Developing countries often face challenges such as inadequate communication infrastructure and concerns regarding user privacy related to data collected by smart meters. Nevertheless, there are reports indicating that both developed and developing nations are increasingly considering the adoption of smart meters as part of their efforts to combat electricity theft. It is projected that the global market for smart grids will expand significantly between 2017 and 2023, with key regions such as North America, Europe, and Asia leading the deployment of smart grid technologies.

In this study, we introduce a robust method for detecting electricity theft by leveraging Deep Neural Network (DNN) classification with carefully selected features. Our approach emphasizes the inclusion of frequency-domain features alongside traditional time-domain features, which significantly enhances the classification performance. To validate our method, we utilize a comprehensive electricity consumption dataset obtained from the State Grid Corporation of China (SGCC), spanning from January 2014 to October 2016. The key contributions of our research are outlined as follows: We propose a novel DNN-based classification approach for electricity theft detection, incorporating both time-domain and frequency-domain features to improve accuracy. We employ Principal Component Analysis (PCA) to streamline classification by reducing the feature space, comparing outcomes with those using all input features to simplify future training procedures. Through the Minimum

Principal
Samskruti College of Engg. & Technology
Kondapur (V), Ghatkesar (M), Medchal Dist.

Redundancy Maximum Relevance (MRMR) scheme, we identify the most influential features, validating the importance of frequency- domain characteristics over time-domain attributes in detecting electricity theft. We optimize model hyperparameters using a Bayesian optimizer to achieve overall performance enhancement. Additionally, we utilize an adaptive moment estimation (Adam) optimizer to determine optimal parameter values for efficient model training. Finally, our results demonstrate a 1% increase in Area Under the Curve (AUC) and competitive accuracy compared to existing data-driven methods for electricity theft detection evaluated on the same dataset, underscoring the efficacy of our approach.

The fundamental goal behind the development of an electricity theft detection system based on Deep Neural Network (DNN) objectives within smart grids is to bolster the integrity and dependability of the power distribution network. Through the utilization of advanced machine learning methodologies, the objective is to swiftly and accurately identify instances of electricity theft or manipulation. This involves scrutinizing extensive historical data encompassing various parameters like electricity usage patterns, voltage fluctuations, and other pertinent features extracted from smart meters and grid sensors. The overarching aim is to devise a robust

DNN framework adept at discerning intricate patterns and correlations within the data, thereby enabling the system to differentiate between normal consumption behavior and irregularities suggestive of potential theft. To accomplish this goal, the model undergoes training using distinct objectives and loss functions specifically tailored to address the unique characteristics of the issue at hand. These objectives include binary classification, anomaly detection, and regression, each contributing to different aspects of the overall detection process. Binary classification aids in categorizing instances as either normal or potentially indicative of theft, while anomaly detection is focused on identifying deviations from established consumption patterns. The regression objective enables the model to forecast electricity usage and identify disparities from the anticipated values. By employing a thoughtfully curated combination of these objectives and their corresponding loss functions, the DNN is trained to identify subtle, context-specific indicators that may suggest unauthorized interference with the grid.

II. LITERATURE SURVEY

Q. Louw and P. Bokoro explored an alternative method for detecting and addressing electricity theft in South Africa in their article published in the SAIEE African Research Journal in December 2019. Additionally, M. Anwar, N. Javaid, A. Khalid, M. Imran, and M. Shoaib presented their research on electricity theft detection using a pipeline in machine learning at the International Wireless Communications and Mobile Computing Conference (IWCMC) in June 2020. Electricity theft and the illicit connections of ground surface conductors are prevalent issues in South Africa, leading to revenue loss, equipment damage, and significant safety hazards. Despite extensive research over many years, a comprehensive solution to non-technical losses remains elusive due to the complexity of the problem. The study focuses on utilizing zero-sequence current-based detection as a strategy for mitigating unauthorized ground surface conductor connections. Simulation and experimental data are used to validate the effectiveness of this technique and its resilience to seasonal variations in soil resistivity.

In their paper titled "Wide and Deep Convolutional Neural Networks for Electricity-Theft Detection to Secure Smart Grids," Z. Zheng, Y. Yang, X. Niu, H.-N. Dai, and Y. Zhou address the detrimental impact of electricity theft on power grids. They highlight the potential of smart grids to combat this issue by leveraging the wealth of data they generate, thereby integrating energy and information flows. By analyzing data from smart grids, which can reveal anomalous patterns in electricity usage associated with theft, these grids offer a promising avenue for identifying instances of theft. However, existing methods have limitations, particularly in their reliance on one-dimensional (1-D) electricity consumption data, which often fails to capture the periodic nature of electricity usage. As a result, these methods exhibit poor accuracy in detecting instances of electricity theft. In this study, we introduce a novel approach to detecting electricity theft using a wide and deep CNN model. This model consists of two main components: a deep CNN component and a wide component. The deep CNN component, when applied to 2-D electricity consumption data, effectively identifies both the periodic patterns of normal usage and the irregularities indicative of theft. Simultaneously, the wide component captures the global characteristics of 1-D electricity consumption data. As a result, the wide and deep CNN model demonstrates superior performance in electricity theft detection. Through extensive experimentation on real-world datasets, we validate that our proposed model outperforms existing methods currently employed for this purpose.

Electricity theft is a significant contributor to nontechnical losses (NTLs) in distribution networks, posing challenges to power grid reliability and operational profitability. To address this issue and enhance efficiency in electricity inspection, we propose a hybrid convolutional neural network-random forest (CNN-RF) model for automatic theft detection in Advanced Metering Infrastructure (AMI). This model aims to assist utility companies in identifying instances of irregular power consumption more effectively. Additionally, large-scale detection of NTLs is crucial for economic sustainability, with potential losses reaching up to 40 percent in some countries. Traditional methods relying on costly on-site inspections are not always feasible, highlighting the importance of leveraging machine learning techniques for accurate NTL estimation. However, existing studies often overlook factors such as imbalanced data and varying NTL shares, hindering practical application of the results. In this study, we propose a comprehensive approach integrating Boolean rules, fuzzy logic, and support vector machine (SVM)

Principal
Samskruti College of Engg. & Technology
Kondapur (V), Ghatkesar (M), Medchal Dist

for developing three distinct NTL detection models. Using a real-world dataset of 100,000 consumers, we evaluate the performance of these models across various NTL scenarios.

Non-technical loss (NTL) in electricity transmission poses a significant challenge in developing countries, where service providers struggle to identify and address the issue effectively. Primarily attributed to electricity theft, NTL impacts the quality of service, strains production companies, and leads to tariff adjustments for law-abiding consumers. This paper explores the motivations behind electricity theft by consumers and examines various techniques for detecting and evaluating theft incidents in order to mitigate its adverse effects.

Smart grid technology offers significant advantages for energy management through bidirectional information exchange. However, the integration of smart infrastructure like smart meters has rendered the grid susceptible to various communication threats. The data collected from smart meters can be analyzed to identify malicious activities, tampering, and data manipulation. This paper presents a pattern- based and context-aware approach for detecting electricity theft (PCETD) aimed at addressing the challenges posed by theft- related Non-Technical Losses (NTLs). The proposed method considers calendar context and daily electricity demand features to calculate the likelihood of customer malfeasance. It employs a combination of dynamic time warping (DTW) and k-nearest neighbors (kNN), utilizing DTW to accurately capture the relationship between consumption patterns and kNN to rank daily anomalousness. Various forms of theft attacks are introduced and evaluated for the effectiveness of the proposed approach. Results demonstrate an overall F1-score of 94%, a True-Positive Rate (TPR) of 93%, and a False-Positive Rate (FPR) of 1.1%, indicating the model's efficiency in detecting electricity theft. These findings suggest that the approach surpasses previous contributions in terms of detection accuracy and false-positive rates, enabling electric utilities to assign anomaly scores and plan targeted inspections to apprehend fraudulent customers.

III. METHODOLOGY

Developing an efficient electricity theft detection system within smart grids, utilizing Deep Neural Networks (DNNs), requires tackling a diverse range of challenges. Initial efforts involve thorough data collection, incorporating labeled datasets that encompass both typical usage patterns and instances of documented electricity theft. Feature engineering assumes a central role in identifying pertinent characteristics, including temporal trends and user behaviors, crucial for distinguishing between legitimate consumption and potential theft. Selecting an appropriate DNN architecture becomes paramount, considering factors such as model complexity and the characteristics of the available data. During data preprocessing, normalization and addressing class imbalances emerge as critical steps for optimizing model performance. The training phase requires meticulous attention to selecting appropriate loss functions and fine-

Principal
Samskruti College of Engg. & Technology
Kondapur (V), Ghatkesar (M), ...

tuning hyperparameters to enhance the model's capacity to detect instances of theft effectively. Evaluation metrics like precision, recall, F1-score, and AUC-ROC offer a thorough assessment of the model's performance. Seamless deployment and integration entail continuous real-time monitoring of electricity consumption, smooth incorporation with smart meter systems, and the implementation of robust security protocols, including data encryption and privacy-preserving mechanisms. Ensuring the interpretability of the model's decisions is crucial, particularly in applications involving critical infrastructure. It's essential to establish mechanisms for continual improvement based on new data and evolving patterns of theft. Compliance with industry standards and regulations, scalability to accommodate an increasing number of smart meters, and the inclusion of human-in-the-loop verification mechanisms further enhance the system's effectiveness. In summary, designing an electricity theft detection system in smart grids based on DNNs requires a comprehensive approach that addresses technical, security, privacy, interpretability, and regulatory considerations to ensure robust and dependable performance in real-world scenarios.

The project on electricity theft detection in smart grids, based on Deep Neural Network (DNN) objectives, encompasses several key goals. Firstly, it seeks to bolster the security of the smart grid infrastructure by developing an intelligent system capable of detecting and mitigating instances of electricity theft. Secondly, the project aims to curb electricity theft to prevent unfair billing practices and revenue losses for utility companies, ensuring consumers are accurately billed for their actual electricity consumption. This safeguards the financial viability of utility services, maintaining the integrity of the power distribution network and ensuring reliable electricity delivery. Additionally, the project contributes to optimizing operational efficiency by automating the detection process through deep learning techniques, reducing reliance on manual inspections and interventions and allowing for more efficient resource allocation. Leveraging advanced machine learning models enables the system to analyze large volumes of historical and real-time data, surpassing the capabilities of traditional rule-based systems. Moreover, by minimizing revenue losses associated with theft, the project indirectly promotes sustainable practices in the energy sector, allowing for continued investment in renewable energy sources and grid modernization. Overall, the project aims to develop and deploy an advanced electricity theft detection system within smart grids, utilizing DNN objectives to enhance security, promote fair billing practices, optimize operational efficiency, and contribute to the ongoing evolution of intelligent and sustainable energy grids. Hardware-based methods typically involve the installation of specialized hardware devices, such as microcontrollers, sensors, and circuits, on power distribution lines to detect instances of electricity theft. These methods are primarily focused on identifying physical tampering with distribution components, such as distribution lines and electricity meters, and are unable to detect cyber attacks aimed at manipulating energy consumption data. An example of such a hardware-based method involves the redesign of an electricity meter, incorporating components like a Global System for Mobile Communications module, a microcontroller, and an Electrically Erasable Programmable Read-Only Memory. Through simulations, this meter was capable of sending Short Message Service notifications whenever an illegal load was connected by bypassing the meter. The approach was limited to detecting physical tampering with distribution components and was tested to detect instances such as bypassing the phase line, meter bypass, disconnecting the neutral line, and tampering with the meter for unauthorized modifications. Additionally, authors designed a smart meter based on the ADE7953 chip, sensitive to current and voltage tampering, and mechanical tampering. This smart meter detected irregularities such as overvoltage, dropping voltage, over current, and load absence, sending alerts to a Microcontroller Unit for tampering status reporting. Mechanical tampering was addressed by connecting a tampering switch to the MCU's IO ports to signal any tampering attempts. Another method involved using a circuitry comprising a step-down transformer, voltage divider circuit, microchip, and other hardware components to detect theft by comparing forward current on the main phase line with reverse current on the neutral line, installed before the meter. This circuitry, tested both on simulation software and actual hardware, detected bypassing of the meter, triggering an alarm. Furthermore, a circuit designed specifically to detect bypassing of the meter utilized a GSM controller to notify operators via SMS in such instances.

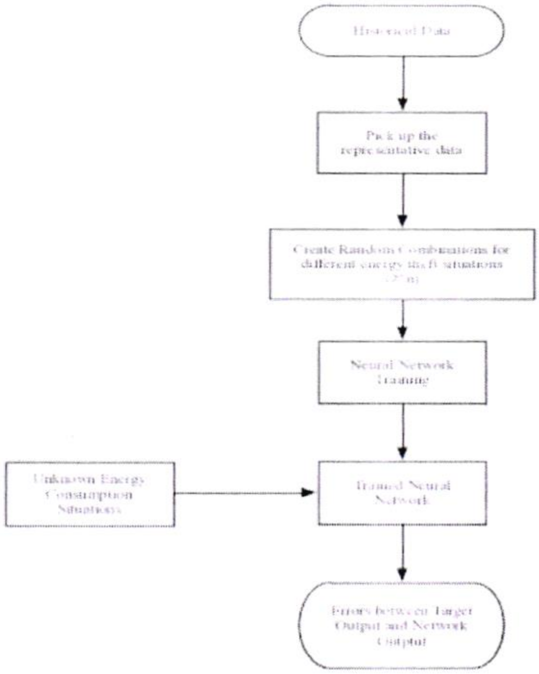


Fig. 1: Activity Diagram

Drawing from existing literature, we introduce a pioneering approach to detect electricity theft using a DNN classification framework, which leverages a comprehensive set of time-domain features. Additionally, we propose integrating frequency-domain features to further enhance the system's performance. Employing Principal Component Analysis (PCA), we streamline feature space for classification and contrast the outcomes with those obtained using all input features, aiding in result interpretation and facilitating future training endeavors. Moreover, we apply the Minimum Redundancy Maximum Relevance (MRMR) scheme to pinpoint the most influential features, affirming the superiority of frequency-domain attributes over time- domain ones in electricity theft

Principal
Samskruti College of Engg. & Technology
Kondapur (V), Ghatkesar (M), Medchal Dist.

detection. To refine model performance, we optimize hyperparameters through a Bayesian optimizer and fine-tune other key parameters using an adaptive moment estimation (Adam) optimizer, ensuring optimal training speed and efficacy. Ultimately, our approach yields a notable 1% enhancement in Area Under the Curve (AUC) and competitive accuracy compared to existing data-driven methods for electricity theft detection, as demonstrated on the same dataset analyzed in the literature.The proliferation of vast datasets, sourced from cloud providers and various businesses, has become increasingly prevalent, facilitating the effective training of Deep Neural Networks (DNNs). This surge in data availability is coupled with notable advancements in machine learning and signal/information processing research, catalyzing the refinement of techniques aimed at enhancing accuracy and expanding the scope of DNN applications across diverse domains.

In input design, the focus lies on selecting and preprocessing relevant data to ensure both accuracy and user-friendliness. This involves optimizing feature selection and data preprocessing to bolster anomaly detection efficiency. Key considerations encompass meticulous feature engineering, where input features such as power consumption profiles, voltage irregularities, and meter tampering indicators are chosen to encapsulate the nuanced patterns characteristic of electricity theft, thus facilitating effective DNN training. Additionally, prioritizing preprocessing steps like normalization, outlier removal, and time alignment enhances input data quality, promoting smoother model convergence and augmenting the DNN's capacity to discern theft-related anomalies. Leveraging temporal data transformations such as rolling averages, seasonality decomposition, and lagged variables unveils subtle variations in consumption behavior over time, empowering the DNN to identify suspicious deviations indicative of theft patterns. Moreover, incorporating spatial features like geographic coordinates, proximity to known theft hotspots, and network infrastructure characteristics enriches the input representation, enabling the DNN to detect spatially localized anomalies associated with electricity theft. Lastly, the fusion of diverse data modalities including smart meter readings, demographic information, and external factors like weather conditions and holidays provides the DNN with a comprehensive view of the environment, enabling it to discern complex theft patterns and minimize false alarms.

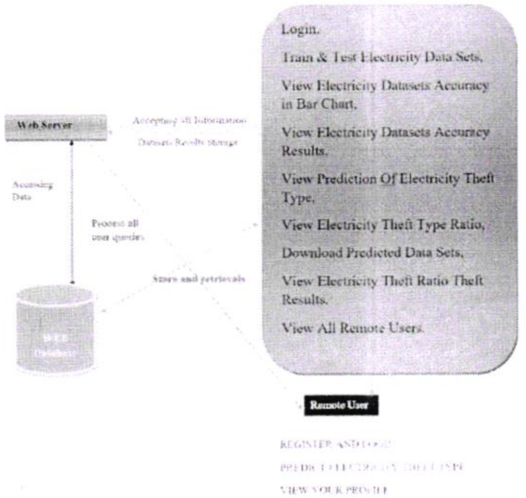


Fig. 2: System Architecture

List of modules:

Principal
Samskruti College of Engg. & Technology
Kondapur (V), Ghatkesar (M), Medchal Dist.

1. Service Provider
2. View and Authorize Users
3. Remote User

In the Service Provider module, authentication is required for access, wherein the Service Provider logs in using valid credentials. Upon successful login, various operations can be performed, including accessing datasets, training and testing electricity data sets, viewing dataset accuracy represented in a bar chart, examining accuracy results, predicting electricity theft types, viewing theft ratios, downloading predicted datasets, and managing remote users. The View and Authorize Users module enables the admin to oversee registered users, reviewing their details such as username, email, and address, and granting authorization. Within the Remote User module, numerous users can register and subsequently access functionalities after successful login with authorized credentials. Operations available to registered users include registration, login, predicting electricity theft types, and viewing user profiles.

Output design is centered on delivering clear, meaningful, and actionable information to users or other systems, with a focus on effective communication of detected anomalies. Key considerations involve crafting visualizations or alerts that facilitate prompt decision-making and response. This includes generating anomaly scores for each data point to quantify the likelihood of electricity theft, thus enabling prioritization of suspicious events for further investigation. Dynamic threshold levels based on historical data and real-time trends are set to classify output scores into theft and non-theft categories, facilitating automated decision- making. Visualizations such as heat maps or histograms are employed to display output scores, offering actionable insights and enabling quick identification of potential theft incidents. A real-time alerting mechanism is implemented, triggered by output scores surpassing predefined thresholds, facilitating timely response and intervention to mitigate theft risks. Additionally, integration of DNN output with existing utility management systems or analytics platforms streamlines workflows and incorporates theft detection insights into broader operational strategies.

IV. RESULTS

The output interface displays immediate alerts regarding suspicious electricity consumption patterns identified by the deep neural network, enabling rapid response. Additionally, it offers succinct overviews of detected incidents, assisting operators in quickly evaluating and resolving potential theft occurrences.

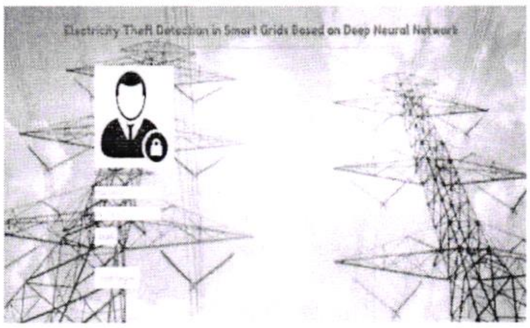


Fig. 3: Service Provider Page

Principal
Samskruti College of Engg. & Technology
Kondapur (V), Ghatkesar (M), Medchal Dist

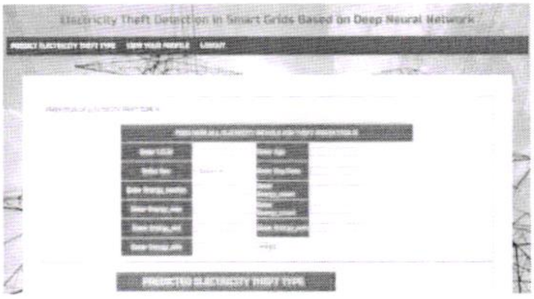


Fig. 4: Upload Page

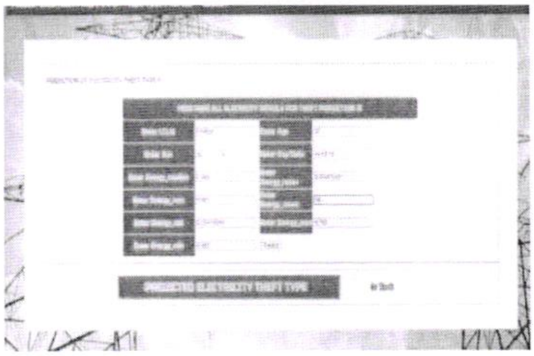


Fig. 5: Prediction is faithfull

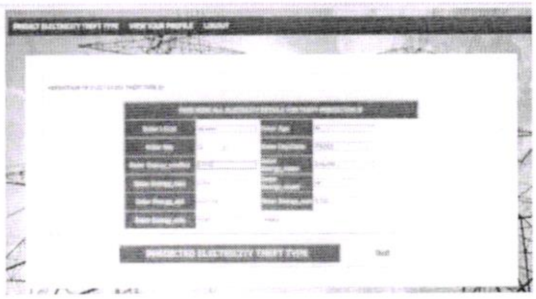


Fig. 6: Prediction is unfaithful

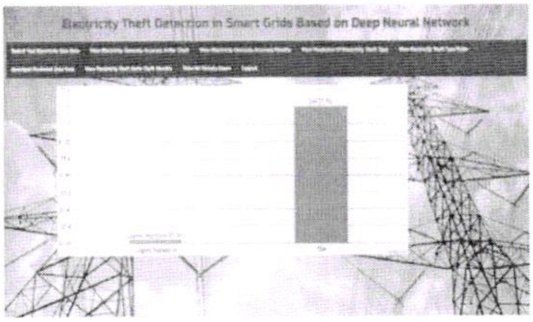


Fig. 7: Bar Chart

V. CONCLUSION

In our investigation of electricity theft detection in smart grids using deep neural networks, we analyzed both time-domain and frequency-domain features. Our findings revealed that the integration of features from both domains yielded better results compared to using them separately, with frequency- domain features exhibiting superior performance. By employing techniques such as PCA and Bayesian optimization, we optimized our classifier and achieved an accuracy of 87.3% and an AUC-ROC of 93% during testing, surpassing the performance of existing methods. The significance of our approach extends beyond power distribution networks, potentially benefiting anomaly detection in various domains. Future research endeavors aim to enable real-time theft detection and validate the effectiveness of our method across diverse datasets for robustness and scalability. This study contributes to the advancement of energy theft detection methods and underscores the potential of DNN-based approaches in bolstering grid security.

VI. REFERENCES

[1] S. Foster. (Nov. 2, 2021). Non-Technical Losses: A $96 Billion Global Opportunity for Electrical Utilities. Available: https://energycentral.com /pip/non- technical-losses96-billion- global opportunity-electrical-utilities

[2] Q. Louw and P. Bokoro, ``An alternative technique for the detection and mitigation of electricity theft in South Africa," SAIEE Afr. Res. J., vol. 110, no. 4, pp. 209_216, Dec. 2019.

[3] M. Anwar, N. Javaid, A. Khalid, M. Imran, and M. Shoaib, ``Electricity theft detection using pipeline

in machine learning," in Proc. Int. Wireless Commun. Mobile Comput. (IWCMC), Jun. 2020, pp. 2138_2142.

[4] Z. Zheng, Y. Yang, X. Niu, H.-N. Dai, and Y. Zhou, ``Wide and deep convolutional neural networks for electricity-theft detection to secure smart grids," IEEE Trans. Ind. Informat., vol. 14, no. 4, pp. 1606_1615, Apr. 2018.

[5] P. Pickering. (Nov. 1, 2021). E-Meters Offer Multiple Ways to Combat Electricity Theft and Tampering. [Online]. Available: https://www.electronicdesign.com/technolog ies/meters

[6] X. Fang, S. Misra, G. Xue, and D. Yang,``Smart grid_The new and improved power grid: A survey," IEEE Commun. Surveys Tuts., vol. 14, no. 4, pp. 944_980, 4th Quart., 2012.

[7] M. Ismail, M. Shahin, M. F. Shaaban, E. Serpedin, and K. Qaraqe, ``Ef_-cient detection of electricity theft cyber attacks in AMI networks," in Proc. IEEE Wireless Commun. Netw. Conf. (WCNC), Apr. 2018, pp. 1_6.

[8] A. Maamar and K. Benahmed, ``Machine learning techniques for energy theft detection in AMI," in Proc. Int. Conf. Softw. Eng. Inf. Manage. (ICSIM), 2018, pp. 57_62.

REAL-TIME POTHOLE DETECTION USING YOLOV5 ALGORITHM: A FEASIBLE APPROACH FOR INTELLIGENT TRANSPORTATION SYSTEMS

[1]Mr. S. Vamshi Krushna, [2]P. Chandana Reddy, [3]A. Vinay Kumar, [4]M. Siddhartha Reddy, [5]M. Lakshman
[1]Assistant Professor, Department of Computer Science and Engineering (Data Science), Samskruti College of Engineering and Technology, Kondapur
[2,3,4,5]B. Tech Scholar, Department of Computer Science and Engineering (Data Science), Samskruti College of Engineering and Technology, Kondapur

Abstract: This study focuses on utilizing YOLO V5, a cutting-edge deep learning model, to address the problem of potholes, which pose significant safety and efficiency concerns for daily commuters. The research evaluates the performance of YOLO V5 on a diverse dataset comprising images capturing potholes under varying road conditions and lighting conditions, as well as real-time video footage from a moving vehicle. The objective is to enable the detection of potholes in real time, particularly in the context of moving vehicles, necessitating both high accuracy and swift processing speeds. The findings indicate that YOLO V5 proves effective for pothole detection, demonstrating both impressive accuracy and rapid processing capabilities, thereby rendering it suitable for deployment on edge devices. This capability holds promise for enhancing road safety by promptly identifying potholes and mitigating the risk of accidents. Notably, YOLO V5's lightweight nature allows it to run efficiently on edge devices with limited computational resources. These outcomes underscore the potential of leveraging YOLO V5 for real-time pothole detection, laying the groundwork for the development of intelligent transportation systems equipped to automatically detect and alert drivers to Roadway hazards.

Keywords: Artificial Intelligence (AI), Pothole Detection, Traffic Flow, Deep Learning, YOLO V5, Machine Learning.

I. INTRODUCTION

Potholes, which come in various sizes and shapes, are common road defects formed primarily by the expansion and contraction of groundwater beneath the pavement, exacerbated by specific weather and traffic conditions. For instance, they often emerge following spring rainfalls when temperatures fluctuate frequently. These road hazards pose significant dangers, leading to traffic accidents and vehicle damage. In the United States alone, potholes are estimated to cause approximately $3 billion in car damages annually. Instances of severe accidents or vehicle damage often occur when drivers either attempt to navigate around potholes or fail to do so, particularly affecting stressed or fatigued drivers. In response to these challenges, automobile manufacturers are actively enhancing automated driving assistance systems, prioritizing safety above all else. This necessitates the detection of road conditions to enable vehicles to autonomously implement safety measures, with automatic pothole detection being particularly crucial. Additionally, untreated potholes can exacerbate road damage, leading to increased road maintenance costs. Detecting and addressing potholes promptly has consistently remained a top priority for road service agencies. Conventional road maintenance methods involve either regular road inspections or reliance on drivers reporting potholes. However, scheduled inspections may not promptly identify newly

Princ
Samskruti College of
Kondapur (V), Ghatkesar (M), Medchal Dist

formed potholes, as they involve data collection, identification, and classification processes that are time-consuming and labor-intensive. These tasks typically require skilled personnel, leading to significant time and labor costs. As a result, there can be delays of months or even years between inspections, depending on the inspection frequency.Conversely, reacting to reports from drivers can be swifter, but these reports often come after drivers have already experienced damage to their vehicles. Consequently, smaller potholes or those situated away from the center of driving lanes may not be reported promptly unless vehicle damage occurs. Moreover, the manual process of reporting leads to inaccuracies in the information provided, further contributing to delays and increased costs.Precise identification of potholes by autonomous vehicles offers the potential for early detection and reporting via crowdsourcing and Internet-of-Things platforms, presenting a transformative shift in road maintenance practices. Various methods have been explored to tackle the pothole detection challenge, encompassing approaches such as 3D scene reconstruction, vibration-based models, and 2D image-based models.The affordability of cameras and advancements in image processing techniques have spurred the creation of 2D image-based models leveraging deep learning technology. These models utilize object detection algorithms rooted in machine learning, such as You Only Look Once (YOLO), Single Shot Detection (SSD), and Region-based Convolutional Neural Networks (R-CNNs).Existing models for pothole detection show that YOLO effectively addresses the challenge with its efficient detection speed and accuracy. However, reliable pothole detection in 2D images faces obstacles due to the diverse shapes and sizes of potholes, leading to increased false positives when objects resembling potholes, like patches, shadows, or water, are present. Consequently, enhancing accuracy often involves sacrificing computational complexity and detection time. This study explores a newer iteration of YOLOv5, as proposed in [reference], which achieves superior precision and significantly enhanced speed compared to prior solutions for pothole detection. In this project, we aim to utilize India as a case study to exemplify our argument. We intend to extract insights from historical data to forecast whether road infrastructure contains potholes or not in the future. Additionally, we aim to develop a straightforward classifier model by implementing YOLO-V5 algorithms on the refined dataset.

II. LITERATURE SURVEY

Pothole detection and volume estimation using stereoscopic cameras
Authors: M. V. Thekkethula and S. Reshma

Assessing pavement condition is crucial for road network maintenance planning. While much of the data collection process is automated, detecting pavement distress like cracks and potholes is predominantly manual, requiring significant time and effort. Current methods often entail high equipment and computational expenses or rely on acceleration data, offering only preliminary surveys. In this study, we introduce an automated approach for pothole detection in asphalt pavement images. Initially, the image is resized, converted to grayscale, and histogram equalized. Subsequently, thresholding and basic edge detection employing the Sobel filter are conducted. Morphological operations, including dilation, erosion, and median filtering, are applied to reduce noise. Combining these outcomes yields a relative pothole shape. Further, a structuring element defines and opens the pothole, creating its

Principal
Samskruti College of Engg. & Technology
Kondapur (V), Ghatkesar (M), Medchal Dist.

skeleton. Bifurcation processes remove any branches, and the resulting operation outcome is utilized to multiply image matrices, thereby extracting the pothole. Results suggest that this method effectively identifies potholes in asphalt pavement images with reasonable accuracy.

A Modern Pothole Detection technique using Deep Learning
Authors: Kumar, Chakrapani, D. J. Kalita and V. P. Singh

Detecting and preventing road accidents poses significant challenges in India, mainly due to the utilization of inferior construction materials in the road drainage system, leading to premature road damage and the formation of potholes. These factors contribute to a high incidence of accidents on Indian roads, with approximately 4,64,910 accidents reported annually, as per a report from the Ministry of Road Transport and Highways transport research wing in New Delhi in 2017. To address this issue, this study proposes a deep learning-based model capable of early pothole detection using images and videos, aiming to reduce accident risks. The model relies on Transfer Learning, Faster Region-based Convolutional Neural Network (F-RCNN), and Inception-V2. While existing pothole detection models often utilize accelerometers without leveraging images and videos, fewer models solely employ machine learning techniques for detection. The findings of this research demonstrate the superiority of the proposed model over existing pothole detection methods.

Machine learning approach for predicting bumps on road
Authors: M. Ghadge, D. Pandey and D. Kalbande

With the escalating number of vehicles, the likelihood of accidents has surged, emphasizing the need for road condition awareness to ensure safety. Many existing methods necessitate the installation of specialized hardware in vehicles, incurring high costs. Therefore, we have devised a smartphone-based solution utilizing the accelerometer and GPS sensors to assess road conditions. Termed as the Bumps Detection System (BDS), this system employs the accelerometer for pothole detection and GPS for pinpointing pothole locations on Google Maps. By leveraging this system, drivers can receive prior notifications regarding the number of potholes on their route. During system design, we established certain threshold values on the z-axis, derived experimentally. To validate these thresholds, we employed a machine learning approach. Utilizing the k-means clustering algorithm, we developed a model using training data. Subsequently, we evaluated this model on test data using the Random Forest classifier to enhance prediction accuracy.

Pothole Detection Using Machine Learning Algorithms
Authors: A. K. M. Jobayer Al Masud, S. T. Sharin, K. F. T. Shawon and Z. Zaman

Potholes pose a significant challenge on the roads of Bangladesh, primarily caused by stagnant water and overloaded vehicles, leading to surface degradation and erosion of underlying rocks, resulting in hazardous potholes that increase the risk of accidents for the public. A solution is imperative to detect potholes, not only to warn drivers but also to notify authorities. This study focuses on pothole detection using image data of potholes and normal road conditions. Initially, data collection was conducted, followed by preprocessing involving resizing and rescaling. MobileNetV2 was employed to extract features, and the dimensionality of features was reduced using PCA, LDA, and t-SNE techniques.

Principal
Samskruti College of Engg. & Technology
Kondapur (V), Ghatkesar (M), Medchal Dist.

Subsequently, five Machine Learning classification algorithms, including Support Vector Machine (SVM), Logistic Regression, Random Forest, Elastic Net, and Decision Tree, were applied for training. Results indicate that Logistic Regression, Elastic Net, and Support Vector Machine (SVM) performed relatively better than the others. Upon comparison, Support Vector Machine (SVM) emerged as the most effective for our system, achieving an accuracy of 99%.

III. METHODOLOGY

Given the growing necessity for safer roads and efficient transportation systems, real-time pothole detection is crucial for preventing accidents and infrastructure damage. This specification details the requirements, objectives, and methodologies for implementing a pothole detection system utilizing the YOLOv5 algorithm.The YOLOv5 algorithm, short for "You Only Look Once," is an advanced object detection algorithm capable of identifying multiple objects in images or videos in real-time.

A vision-based method utilizes images or videos as input data to detect potholes on the road surface through image-processing and deep-learning technologies. This approach is more cost-effective than the 3D reconstruction method and can determine the number and approximate shape of potholes. However, it has limitations in measuring the volume and depth of potholes due to its reliance on two-dimensional information, and it is affected by lighting and shadow conditions. On the other hand, a vibration-based method detects the presence of potholes and estimates their depth using data from the vehicle's acceleration sensor. This method is the most cost-effective of the three, requires minimal storage for data acquisition, and supports real-time data processing.Real-time detection demands substantial computational power, and variations in lighting, weather conditions, and the size or depth of potholes can impact detection accuracy. Additionally, there may be some latency between when a pothole appears in the camera feed and when it is detected, particularly when processing multiple frames or under adverse conditions.

Our proposed solution aims to detect potholes in real-time from dash camera images with high accuracy and fast detection speeds, meeting safety requirements for autonomous decision-making. In the following subsections, we describe the image dataset format, data augmentation methods, the architecture of trained CNN models, and the performance metrics evaluated in our solution. Initially, the dataset is collected and each image is explicitly annotated. The annotated data is then divided into training and testing samples before being fed into deep learning models like the YOLOv5 family. After training, the model's performance on testing data is evaluated using positive weights. Figure 1 illustrates the block diagram of the proposed real-time pothole detection methodology.Immediate identification of potholes enables prompt action, reducing the risk of accidents and vehicle damage. YOLOv5's advanced algorithms ensure high accuracy in detecting potholes, minimizing both false positives and false negatives.

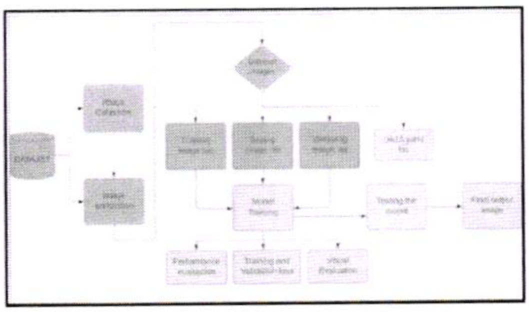


Figure 1: Proposed System Methodology Block Diagram

Pothole datasets are sourced from Kaggle, a platform that enables users to find datasets for AI model development, publish their own datasets, and collaborate with other data scientists and machine learning engineers. The effectiveness and reliability of the models depend on the quality of the training dataset, necessitating the inclusion of realistic pothole photographs. Therefore, the most recent publicly available pothole image dataset is used. This dataset comprises 1265 training images, 401 validation images, and 118 test images. Finally, it is validated to ensure maximum accuracy in real-time applications.Images of potholes and non-potholes are collected and labeled to create a dataset for pothole detection. This dataset is divided into training, validation, and testing sets. The training set is used to train the model, the validation set to tune hyperparameters, and the testing set to evaluate model performance. Preprocessing is applied to ensure normalization and enhance model robustness. The quality of the dataset is crucial for ensuring the accuracy of the pothole detection model. Data preprocessing is a crucial step in data mining that involves modifying, removing, or adding data to ensure and enhance performance. The saying "garbage in, trash out" is especially relevant to data mining and machine learning projects. In a real-time detection system, images are automatically extracted from live camera recordings and then processed using the YOLOv5 algorithm, which has been trained as a model. The proposed system utilizes the YOLOv5 algorithm, which stands for "You Only Look Once." This deep learning-based object detection algorithm employs a single convolutional neural network (CNN) to simultaneously predict bounding boxes and class probabilities for objects in an image. Implementing YOLO involves several steps: preparing a dataset, selecting a YOLO model, fine-tuning the model, evaluating its performance, and deploying it to predict new images or video streams. This approach leverages deep learning principles for object detection using YOLO.

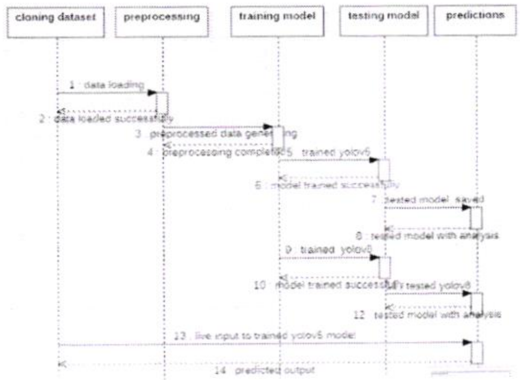


Figure 2: Sequence Diagram

The sklearn, metrics module provides various functions for assessing classification performance, including loss, score, and utility metrics. Certain metrics may necessitate probability estimates of the positive class, confidence values, or binary decision values. Additionally, some metrics are specific to binary classification scenarios.

precision_recall_curve(y_true, probas_pred, *)	Compute precision-recall pairs for different probability thresholds.
balanced_accuracy_score(y_true, y_pred, *[, ...])	Compute the balanced accuracy.
confusion_matrix(y_true, y_pred, *[, ...])	Compute confusion matrix to evaluate the accuracy of a classification
accuracy_score(y_true, y_pred, *[, ...])	Accuracy classification score.
classification_report(y_true, y_pred, *[, ...])	Build a text report showing the main classification metrics.

The accuracy score function calculates the accuracy of predictions, either as a fraction (by default) or as a count (when normalize=False), representing the proportion of correct predictions. In the context of multi-label classification, it computes the subset accuracy, where a score of 1.0 indicates that the entire set of predicted labels for a sample matches precisely with the true set of labels, and 0.0 otherwise. This calculation is based on comparing predicted values (^y_i) with corresponding true values (y_i) for each sample, resulting in the fraction of correct predictions over the total number of samples (n).

$$accuracy(y, \hat{y}) = \frac{1}{n_{samples}} \sum_{i=0}^{n_{samples}-1} 1(\hat{y}_i = y_i)$$

IV. RESULTS

Figure 3: Home Page

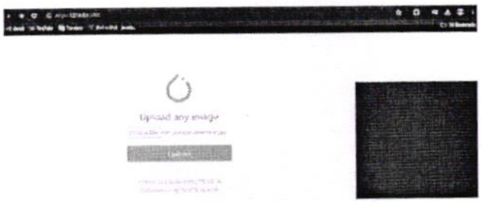


Figure 4: Image Uploaded

Figure 5: Output

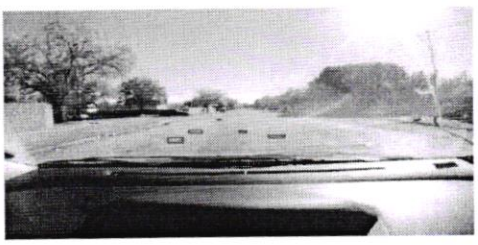


Figure 6: Potholes

V. CONCLUSION

Our YOLOv5-based solution for pothole detection achieved a satisfactory detection accuracy, with mean Average Precision (mAP) values exceeding 93% at an average detection rate of 2 milliseconds per image. Experimental results indicate improvements in both detection accuracy and speed compared to previous approaches. Although there are instances of improper detection, such as identifying potholes on sidewalks or failing to detect them altogether, enhancements in accuracy and speed enable the deployment of pothole detection for safer autonomous driving and efficient road maintenance. A comparative analysis between two deep learning-based object detection algorithms, CNN and YOLOv5, was conducted. The CNN model, previously tested, required significant training data for high accuracy and exhibited varying accuracy levels based on model complexity, training data size and quality, and testing techniques, ranging from 55% to 98% on real-time data. In contrast, YOLOv5 emerged as the most effective algorithm, facilitating faster development, deployment, and scalability of applications. YOLOv5 operates in a single stage, dividing images into grids and achieving state-of-the-art performance on object detection benchmarks with an average accuracy ranging from 50% to 96% at a considerably lower computational cost.

VI. REFERENCES

[1] M. V. Thokkethala and S Reshma, "Pothole detection and volume estimation using stereoscopic cameras", Proc. Int. Conf. Mixed Design Integr. Circuits Syst., pp. 47-51,2016.

[2] Kumar, Chakrapani, D. J. Kalta and V. P. Singh, "A Modem Pothole Detection technique using Deep Learning." 2nd International Conference on Data,

Engineering and Applications (IDEA), Bhopal, India, 2020, pp. 1-5,doi: 10.1109/IDEA49133.2020.9170705.

[3] M. Ghadge, D. Pandey and D. Kalbande, "Machine learning approach for predicting bumps on road", Proc. Int. Conf. Appl Theory. Compute. Communication. Technol., pp. 481-485, Oct. 2015.

[4] C. Ng.T. Law, F. Jakarni, and S. Kulanthayan."Road structure development and economic growth,"inIOPference series: materials science and engineering, vol 512, no. 1. Article ID 012045, TOP Publishing. 2019.

[5] V. Pereira, S. Tamura, S. Hayamizu and H. Fukai, "A Deep Learning- Based Approach for Road Pothole Detection in Timor Leste", In 2018 IEEE International Conference on Service Operations and Logistics and Informatics (SOLI), pp. 279-284, 2018, July.

[6] Alfred Daniel, J. Chandru Vignesh, C, Muthu, BA. et al Fully convolutional neural networks for LIDAR-camera fusion for pedestrian detection in autonomous vehicle. Multimedia Tools Appl (2023). https://doi.org/10.1007/s11042-023-14417-x

[7] Raj Mohan G. Chinnappan CV, John William AD, Chandrakrishan Balakrishnan S. Anand Muthu B. Manogaran G. Revamping land coverage analysis using aerial satellite image mapping. Transactions on Emerging Telecommunications Technologies. 2021 Jul;

[8] Daniel A, Subburathinam K, Anand Muthu B, Rajkumar N, Kadry S Kumar Mahendran R. Pandian S Procuring cooperative intelligence in autonomous vehicles for object detection through data fusion approach. IET Intelligent Transport Systems.

[9] Muhammad Haroon Asad, Saran Khaliq, Muhammad Haroon Yousaf, Muhammad Obaid Ullah, Afaq Ahmad, "Pothole Detection Using Deep Leaming: A Real-Time and Al-on-tho-Edge Perspective", Advances in Civil Engineering, vol 2022. Article ID 9221211, 13 pages, 2022.

A Road Accident Prediction Model Using Data Mining Techniques

[1]Dr. AmitaJohar, [2]D. Divya, [3]S. Moseen, [4]M. Nayeem Uddin, [5]D. Mani Raaja

[1]Assistant Professor, Department of Computer Science and Engineering, Samskruti College of Engineering and Technology, Kondapur

[2,3,4,5]B. Tech Scholar, Department of Computer Science and Engineering (Data Science), Samskruti College of Engineering and Technology, Kondapur

Abstract: Given the escalating number of vehicles on the roads, the frequency of accidents is also surging dramatically. Amidst this surge in traffic incidents and fatalities, it becomes crucial for transportation authorities to predict the occurrence of accidents over specific periods to make informed decisions. Analyzing accident patterns can provide insights into devising strategies to mitigate them. While accidents often exhibit uncertainty, there is a discernible pattern observed over time in specific areas. Leveraging this pattern, we can develop predictive models for accident occurrences. This paper explores the correlation between road accidents, road conditions, and environmental factors, employing data mining techniques like the Apriori algorithm and Support Vector Machines. Utilizing Bangalore road accident datasets spanning from 2014 to 2017, this study aims to offer valuable insights for stakeholders such as government agencies, public works departments, contractors, and automobile industries. These insights can aid in optimizing road design and vehicle manufacturing processes based on accident occurrence estimations.

Keywords: Predictive models, Data mining techniques, Apriori algorithm, Support Vector Machines (SVM),Road conditions

I. INTRODUCTION

Globally, road accidents pose a substantial threat, resulting in casualties, property loss, and broader societal repercussions. It's imperative to tackle road safety comprehensively to mitigate both the occurrence and impact of accidents. The "Road Accident Prediction Model Using Data Mining Techniques" is an initiative crafted to utilize data mining methodologies for in-depth analysis of past accident records. Through this approach, the project aims to uncover underlying patterns within historical data, thereby predicting potential accident hotspots. By employing sophisticated data analytics, the project endeavors to contribute to proactive measures for accident prevention and enhance overall road safety standards. Road accidents represent a pressing global challenge, with their consequences extending beyond mere statistics to encompass human lives, property, and societal well-being. Effectively addressing this issue demands a multifaceted approach that encompasses preventive measures, enforcement, and infrastructure improvements. The project discussed focuses on leveraging data mining techniques to delve into vast repositories of historical accident data. By scrutinizing these datasets, the project aims to discern patterns, trends, and contributing factors behind accidents. This analytical insight enables the identification of areas prone to accidents, thus facilitating the formulation of targeted intervention strategies. Additionally, by forecasting potential accident hotspots, authorities can

Principal
Samskruti College of Engg. & Technology
Kondapur (V), Ghatkesar (M), Medchal Dist.

proactively allocate resources and implement preventive measures, thereby reducing the likelihood and severity of accidents. Ultimately, through the application of advanced data analytics, the project seeks to contribute significantly to the overarching goal of enhancing road safety on a broader scale.

The persistent threat of road accidents demands a proactive approach to public safety, emphasizing the need for a deeper comprehension of the factors and trends involved. Conventional methods of addressing road safety tend to react to incidents as they occur. However, this project advocates for a shift towards a proactive strategy, leveraging data mining methodologies to anticipate areas at risk of accidents using past data as a foundation. The ever-present risk posed by road accidents underscores the necessity for a more forward-thinking approach to safeguard public well-being. While traditional methods often focus on responding to accidents as they happen, this project aims to revolutionize road safety practices by adopting a proactive stance. By harnessing the power of data mining techniques, the project endeavors to analyze historical accident data comprehensively. Through this analysis, the project seeks to uncover underlying patterns, trends, and risk factors associated with accidents. By identifying potential accident hotspots before incidents occur, authorities can preemptively implement targeted interventions and preventive measures. This proactive approach not only helps reduce the frequency and severity of accidents but also fosters a safer and more secure environment for all road users. Ultimately, by embracing data-driven insights, the project aims to catalyze a paradigm shift towards more effective and proactive road safety strategies.

Design and build a predictive system capable of examining past accident records to detect recurring patterns and emerging trends. Utilize advanced data mining methods to extract meaningful information from a variety of datasets pertaining to road accidents. Determine key factors and variables that play a substantial role in accident occurrences. Develop an intuitive interface for stakeholders to access and interpret predictive analytics. Support traffic management agencies, law enforcement, and urban planners in deploying tailored preventive strategies. Preemptive Safety Measures: Utilizing the predictive model allows authorities to proactively introduce safety measures in areas identified as high-risk, thereby diminishing accident probabilities. Resource Allocation Efficiency: Focusing resources on anticipated hotspots enables law enforcement and emergency services to optimize their deployment strategies. Informed Policy Development: Insights obtained through data mining support the creation of evidence-based policies aimed at enhancing road safety. Community Engagement: This initiative promotes community awareness about potential risks, encouraging collaborative efforts to enhance road safety. Data Gathering: Collect historical road accident data, encompassing variables like weather conditions, road characteristics, time of occurrence, and past accident sites. Data Preparation: Cleanse and preprocess the data to address missing entries, anomalies, and uphold data integrity. Feature Identification: Determine pertinent features that exert notable influence on accident occurrences. Model Construction: Employ data mining methodologies, including machine learning algorithms like decision trees and neural networks, to construct a predictive model. Verification and Evaluation: Validate the model against

Principal
Samskruti College of Engg. & Technology
Kondapur (V), Ghatkesar (M), Medchal Dist.

ISSN NO: 0022-1945

historical data and assess its precision in forecasting accidents.

II. LITERATURE SURVEY

Data Mining Applications in Road Safety
Authors: S. Kumar,A. Sharma

This paper investigates different data mining methods employed in road safety, underscoring the significance of predictive modeling. The authors analyze the hurdles and potential advantages associated with leveraging historical accident data for preemptive safety initiatives.

Predictive Modeling for Traffic Accidents:
Authors: J. Li, Y. Wang

The research examines the creation of predictive models for traffic incidents, centering on machine learning algorithms. The authors underscore the importance of selecting relevant features and validating models to attain precise predictions.

Geographic Information Systems (GIS) in Road Safety Analysis
Authors: A. Smith, B. Johns

This article explores the fusion of Geographic Information Systems (GIS) with data mining methods to examine and depict spatial trends in road accidents. The authors underscore the influence of geographical variables on accident forecasting.

Decision Support Systems for Traffic Management:
Authors: M. Chen, H. Zhang

The paper investigates the advancement of decision support systems for traffic management through the application of data mining. It explores how these systems can assist authorities in making well-informed decisions by leveraging historical accident data.

Feature Selection Techniques in Accident Prediction Models:
Authors: R. Gupta, S. Singh

This study emphasizes the significance of feature selection methods in constructing accurate accident prediction models. The authors conduct a comparative analysis of different techniques to determine the most pertinent features.

Big Data Analytics for Road Safety:
Authors: L. Wang, X.Zhang

The paper discusses the role of big data analytics in road safety and accident prediction. It explores the challenges and opportunities associated with handling large volumes of diverse data for effective modeling.

Real-time Traffic Data and Accident
Authors: H. Chen, G. Wang

The research delves into combining real-time traffic data with accident prediction models. It examines the obstacles and advantages of integrating dynamic data to enhance the accuracy and timeliness of predictions.

III. METHODOLOGY

The project, "Detect DUI," aims to create a contactless and non-invasive system for real-time monitoring of drink driving in a continuous driving environment. Its primary objectives include enhancing road safety by addressing a major cause of accidents and fatalities, providing seamless monitoring without inconveniencing the driver, ensuring accurate detection using vital signs and

Principal
Samskruti College of Engg. & Technology
Kondapur (V), Ghatkesar (M), Medchal Dist.

psychomotor coordination, maintaining user privacy and comfort through non-invasive methods, and validating its effectiveness through rigorous experimental testing. Overall, the project focuses on developing an advanced, practical solution for detecting and managing drink driving with an emphasis on precision and user convenience. In the current system, there are two stages: accident detection and accident prevention. The authors noted the utilization of IR sensors and Arduino Uno technology; however, they found these components to yield inaccurate results and incur high costs. In another study, an accident detection system employing an Inertial Measurement Unit (IMU) and 3G cellular module was discussed.

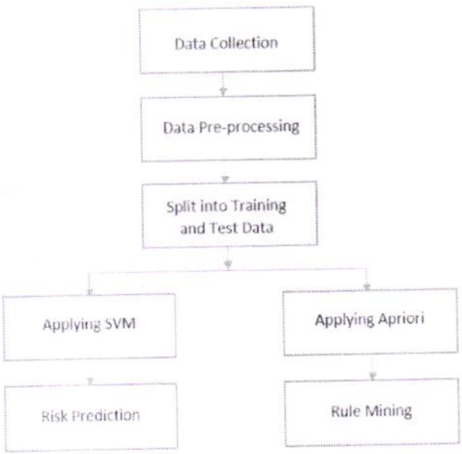


Fig. 1: Architecture Diagram

However, issues were encountered with the IMU, which suffered from accumulated errors. Given the absence of an available dataset, we generated one comprising both accident and non-accident images. When an accident occurs, a nearby control unit receives an alert message. The system underwent training with this dataset. Subsequently, the trained system is integrated with cameras to capture video footage of vehicles on the road. By computing probabilities, the system determines the likelihood of an accident occurrence. If an accident is detected, an alert is dispatched to control rooms via the GSM module. Cameras are strategically positioned, primarily in areas prone to accidents. Whenever our deep learning model predicts an accident, an alert message is promptly transmitted to nearby control units.

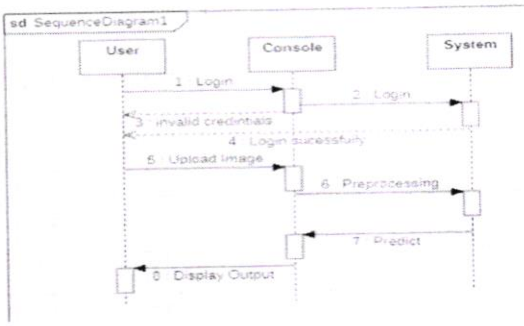


Fig. 2: Sequence Diagram

IV. RESULTS

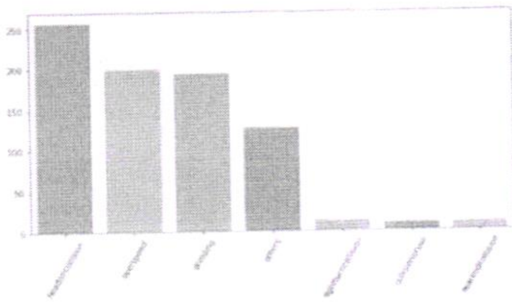


Fig. 3: Graph analysis

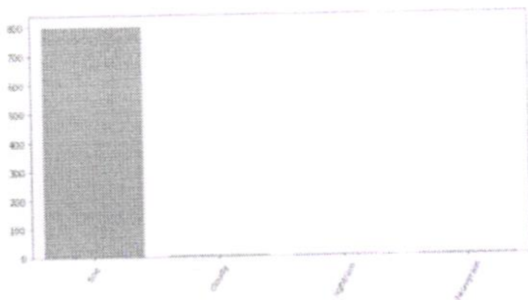


Fig. 4: Result analysis 1

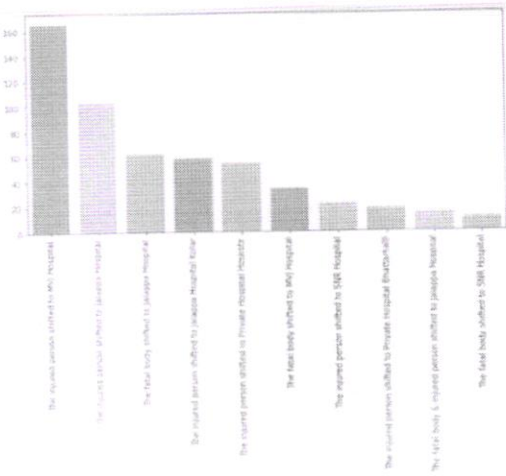


Fig. 5: Result analysis 2

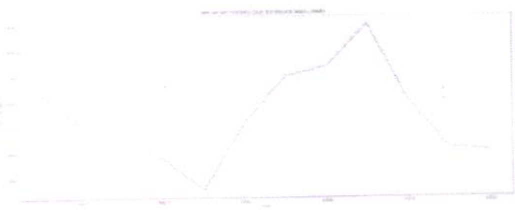


Fig. 6: Result analysis 3

A road accident prediction model has been developed and put into practice, focusing on various potential causal factors. The selected factors primarily include road conditions, weather conditions, and accident causes, with the exclusion of the driver's emotional state and experience, as noted in previous literature. The study includes figures depicting parameters utilized in model creation. Figure 3 presents a comparative analysis of reported accidents by type, such as head-on collisions, overspeeding, and skidding. Figure 4 illustrates observed weather conditions during reported accidents, while Figure 5 shows the responses initiated following each accident. Figure 6 displays a graphical representation of increasing accident cases involving heavy-duty vehicles. These datasets are integrated into the study. The model has been integrated into an application capable of predicting accident risk probability in user-defined areas. The application's user interface generates graphical representations of factors contributing to accidents in specified areas. Based on this data, the application categorically predicts high or low accident risk for user-selected areas. The model provides insights into fatal accident scenarios by analyzing combinations of contributing factors. Additionally, an option is available to input details of new accident cases to enhance the dataset for future use.

V. CONCLUSION

Each accident holds the potential to drastically alter numerous lives, underscoring the collective responsibility to curb their escalating occurrence. While not all accidents stem from identical causes, mitigating measures must be adopted, encompassing safe driving practices, strategic road infrastructure planning by authorities, and the development of safer vehicle models by the automotive industry. Within our capacity lies the ability to forecast potential accidents based on historical data and observations, aiding both authorities and industries in preemptive action. This project achieved success by creating an application capable of efficiently predicting road accidents, considering factors such as vehicle types, driver age, vehicle age, weather conditions, and road structures. Leveraging various data mining and machine learning algorithms on a dataset specific to Bangalore, the model has demonstrated high accuracy in predicting accident risk probabilities across diverse areas.

VI. REFERENCES

[1]https://www.statista.com/topics/5982/road-accidents-in-india/

Principal
Samskruti College of Engg. & Technology
Kondapur (V), Ghatkesar (M), Medchal Dist.

[2] Srivastava AN, Zane-Ulman B. (2005). Discovering recurring anomalies in text reports regarding complex space systems. In Aerospace Conference, IEEE. IEEE 3853-3862.

[3]Ghazizadeh M, McDonald AD, Lee JD. (2014). Text mining to decipher freeresponse consumer complaints: Insights from the nhtsa vehicle owner's complaint database. Human Factors 56(6): 1189-1203 http://dx.doi.org/10.1504/IJFCM.2017.089439.

[4] Chen ZY, Chen CC. (2015). Identifying the stances of topic persons using a model-based expectationmaximization method. J. Inf. Sci. Eng 31(2): 573-595. http://dx.doi.org/10.1504/IJASM.2015.068609.

[5]Williams T. Betak J, Findley B. (2016). Text mining analysis of railroad accident investigation reports. In 2016 Joint Rail Conference. AmericanSocietyofMechanicalEngineersV00106A009-V001T06A009. http://dx.doi.org/10.14299/ijser.2013.01.

[6]Suganya, E. and S. Vijayarani. "Analysis of road accidents in India using data mining classification algorithms." 2017 International Conference on Inventive Computing and Informatics (ICICI) (2017):1122-1126.

[7]Sarkar S. Pateshwari V. Maiti J. (2017). Predictive model for incident occurrences in steel plant in India. In ICCCNT 2017, IEEE. pp. 1-5. http://dx.doi.org/10.14299/ijser.2013.01.

[8]Stewart M, Liu W, Cardell-Oliver R. Griffin M. (2017). An interactive web-based toolset for knowledge discovery from short text log data. In International Conference on Advanced Data Mining and Applications.Springer, pp. 853-858. http://dx.doi.org/10.1007/978-3- 319-69179-4_61.

[9] Zheng CT. Liu C, Wong HS. (2018). Corpus based topic diffusion for short text clustering.Neurocomputing275:2444-2458. . http://dx.doi.org/10.1504/IJIT.2018.090859.

[10] ArunPrasath, N and Muthusamy Punithavalli. "A review on road accident detection using data mining techniques." International Journal of Advanced Research in Computer Science 9 (2018): 881-885.

Principal
Samskruti College of Engg. & Technology
Kondapur (V), Ghatkesar (M), Medchal Dist.

An Efficient Artificial Intelligence based machine human interaction system

[1]Mr. V. Pranay, [2]K. Mounika, [3]V. Devi Siddharth Roshan, [4]V. Jayanth, [5]N. Prasad Nayak

[1]Assistant Professor, Department of Computer Science and Engineering, Samskruti College of Engineering and Technology, Kondapur

[2,3,4,5]B. Tech Scholar, Department of Computer Science and Engineering (Data Science), Samskruti College of Engineering and Technology, Kondapur

Abstract: In contemporary computer systems, the mouse plays a crucial role as an input device. Touch interfaces, which we interact with regularly and frequently, become breeding grounds for bacteria and pathogens over time. Despite the convenience of wireless mice in eliminating tangled wires, users still have a tendency to touch the device. In response to the ongoing epidemic, this proposed method utilizes either an external webcam or an integrated image sensor to capture arm gestures and detect fingertip movements. This enables users to perform standard mouse functions such as left-clicking, scrolling, and other activities. The algorithm, trained using machine learning techniques with the image sensor, efficiently identifies fingers. Consequently, relying on physical gestures to control the computer system eliminates the need for direct human-machine interaction. Therefore, the suggested approach aims to mitigate the spread of Covid-19.

Keywords: Virtual mouse, OpenCV, Mediupipe, Machine learning, Human-machine interaction, Artificial intelligence

I. INTRODUCTION

The advent of technologies like Bluetooth and other wireless solutions, there has been significant growth in the fields of augmented reality (AR) and various input-output devices, which we use regularly. Additionally, many such devices have become more compact and versatile over time. The proposal outlined here suggests the implementation of a computer vision-based artificial intelligence mouse system. This system would replicate mouse functions on a computer by recognizing hand movements and predicting fingertip positions. The primary objective of this proposed system is to offer traditional mouse functionalities such as clicking and scrolling, but instead of using a conventional mouse device, it would utilize an integrated or external webcam. Hand gestures and fingertip detection would enable interaction with the computer, allowing fingertip tracking for cursor movement and facilitating scrolling and other cursor-related tasks through the computer's webcam.

This system utilizes various Python packages such as AutoPy, Mediapipe, and PyAutoGUI, along with OpenCV, an open-source library known for its capabilities in interacting with images and performing computer vision tasks like facial recognition and object tracking. Through these tools, users can perform actions like clicking, scrolling, and pointing while navigating through applications. Importantly, this proposed approach can be implemented in real-world manufacturing settings without requiring the processing power of GPUs (Graphics Processing Units). The model demonstrates high accuracy and performs effectively. This study emphasizes the

Principal
Samskruti College of Engg. & Technology
Kondapur (V), Ghatkesar (M), Medchal Dist.

utilization of computer vision for controlling the mouse pointer on a computer screen using hand gestures and movements, rather than relying on Bluetooth or other wireless technologies like USB receivers. By analyzing these hand motions, the computer's built-in camera tracks the movements and processes the frames to identify mouse actions such as scrolling, clicking, minimizing, maximizing, and more.

Consumer behavior is a field of study that delves into the mental processes and behavioral patterns exhibited by consumers throughout their journey of acquiring, utilizing, consuming, and disposing of products and services. In the realm of marketing, understanding consumer behavior is pivotal, as marketing endeavors aim to influence these behaviors. However, with the continuous evolution of the Internet and mobile devices, electronic commerce (E-commerce) has pervaded every aspect of people's lives, making online shopping the predominant mode of consumption. According to recent statistics from the China Internet Network Information Center, the number of online shoppers in China surged to 710 million by March 2020, marking a 16.4% increase from the end of 2018 and constituting 78.6% of the total Internet user base. In 2019 alone, online retail sales in China soared to 10.63 trillion yuan, with physical goods accounting for 8.52 trillion yuan, representing 20.7% of the total retail sales of consumer goods. Notably, from January to February 2020, online retail sales of physical goods in China recorded a 3.0% year-on-year increase, defying the downward trend and comprising 21.5% of the total retail sales of consumer goods, marking a 5.0% increase over the same period the previous year. The Internet, coupled with the advent of mobile shopping platforms, has bestowed immense convenience upon consumers, enabling them to peruse goods at their leisure and fulfill their needs with ease. However, this shift has also presented challenges in comprehending the intricacies of consumer psychological dynamics within the E-commerce landscape. Consequently, there is a proposition to leverage artificial intelligence (AI) technology to gain insights into the evolving nuances of consumer psychological behavior in the realm of E-commerce.

The advancement of AI has opened up numerous opportunities across various domains, particularly through its integration with business operations. Whether in finance or the Internet sector, the collaboration between AI and business has ushered in a new era of possibilities for enterprise growth. Experts have observed that the widespread adoption of AI in 2018 led to significant enhancements in consumer experiences. AI not only facilitates daily interactions but also enables individuals to immerse themselves in cutting-edge experiential technologies through related devices. For instance, Amazon's recommendation engine leverages AI to enhance its original recommendation services, ensuring consumers receive highly appealing product suggestions. This technology has become a trusted shopping advisor, providing users with personalized recommendations tailored to their preferences. Furthermore, the ongoing advancements in human-computer interaction (HCI) and deep learning have expanded the horizons of data acquisition and analysis, offering robust technical support for marketing endeavors and catering to the evolving needs of a broader audience. Given these advancements, integrating AI technology into the curriculum of consumer behavior courses can offer students hands-on experiential learning opportunities. This approach enables students to gain timely insights into

Principal
Samskruti College of Engg. & Technology
Kondapur (V), Ghatkesar (M), Medchal Dist.

shifts in user perceptions and behaviors, empowering them with the skills needed to navigate the dynamic landscape of consumer psychology effectively.

II. LITERATURE SURVEY

The field of human-machine interaction employs an artificial mouse equipped with fingertip and finger motion detection capabilities using live video frames. This research proposes cursor control through hand tip recognition and hand gesture detection facilitated by colored caps and hand gesture tracking. A convex hull is generated around the detected contour for hand gesture tracking, with hand features extracted based on the area ratio of the hull and contour. An AI mouse application is developed in this study, which tracks various hand motions using a built-in camera to follow the user's hands and trigger appropriate mouse events based on identified movements. This system utilizes both Ty AutoGUI and OpenCV. While previous studies have investigated the effects of different lighting settings, background conditions, and skin tones individually, this approach offers a comprehensive solution considering all of these factors simultaneously.

In this context, the method referred to is known as Leap Motion, leveraging hand gestures as a smooth and intuitive means of communication. Instead of a traditional mouse, a basic camera was utilized to control cursor functions. Various hand movements were employed for tasks like dragging and clicking, with the webcam being the sole input device required by the system. Python and OpenCV are also integral to its operation. The system's interface displayed the camera feed for calibration purposes. The article primarily focuses on advancing human-computer interaction by employing hand gestures in three-dimensional space. Hand gestures are mapped to approximate screen coordinates, enabling actions such as pointing to navigate through the interface. This method essentially turns hand motions into a virtual mouse, facilitating interactions like selecting folders or objects. The concept of managing computer systems through hand gestures in front of a webcam is termed hand gesture detection, representing a contemporary form of man-machine interaction.

This study introduces the development of an optical mouse and keyboard utilizing hand movements and computer vision. By analyzing images of different hand gestures captured by the computer's camera, the mouse or pointer mimics the user's hand movements, allowing for both left and right clicks through various gestures. A webcam serves as the primary hardware component, while Anaconda and Python coding are employed for implementation. The paper addresses the algorithm's shortcomings in mapping mouse and keyboard functions, proposing the generation of convex hull defects as a solution. It presents an HCI-based AI mouse system utilizing hand movements and computer vision. Gestures recorded by a webcam or integrated camera undergo color segmentation and detection processing. Users wearing colorful caps on their fingertips can manipulate cursor functions. The system captures frames using the camera, processes them to enable tracking, identifies different user motions, and executes corresponding mouse functions.

The showcased system utilizes hand gestures captured by a webcam, employing an HSV color detection algorithm to manipulate the mouse cursor. Real-time computer vision techniques implemented in Python, alongside the OpenCV package, drive the system. The monitor displays the

Principal
Samskruti College of Engg. & Technology
Kondapur (V), Ghatkesar (M), Medchal Dist.

camera's output. Users navigate by wearing colored tapes or caps on their hands, which are detected by the computer's webcam.

III. METHODOLOGY

Existing System :

In the current circumstances, transactions primarily occur through direct interaction between customers and ATM machines. However, given the heightened risk of disease transmission, particularly with COVID-19, it is imperative to minimize contact with high-touch surfaces. Traditional methods involving physical interactions pose significant challenges in this regard. Existing alternatives include virtual screens with touch capabilities or button mechanisms for physical input. To effectively mitigate the spread of COVID-19, it's essential to implement measures that reduce contact with high-risk surfaces. This is where our system becomes crucial.

Proposed System :

The device provides a seamless way to engage with computer systems using hand movements and fingertip gestures to replicate mouse functions such as pointing, scrolling, and clicking, thereby eliminating the need for physical contact. The main objective of the AI virtual mouse is to offer an alternative to conventional optical mice. It achieves this through a computer vision-enabled webcam capable of identifying hand gestures and fingers, analyzing captured frames, and employing a machine learning algorithm to execute designated mouse actions like scrolling, cursor movement, and clicking. This project entails the utilization of various libraries.

Block Diagram: In Figure 1, users input hand gestures to the camera module, which is subsequently integrated into the ATM system. Once installed, the camera's input is directed to the software system for further processing. The software utilizes Python library tools to process the camera input and employs AI to anticipate hand movements for mouse-like actions. Furthermore, the software assumes control over the system's touch inputs, enabling touchless interaction between users and the system.

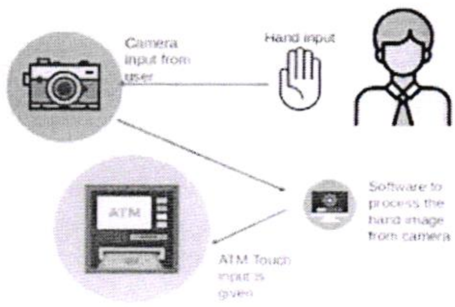


Fig. 1: Proposed Block Diagram

Methodology

The user provides hand input to the camera module, which will be installed within the ATM system. Following the installation of the camera in the ATM, its input is transmitted to the software system for further processing. The software receives the camera data, processes it using Python library tools, and employs AI to predict hand movements in response to the user's actions. Touch inputs of the system are managed by the software, enabling touchless interaction for users.

The software acquires camera samples, preprocesses them using OpenCV and mediapipe to distinguish between the hand and the background environment. Mediapipe plays a crucial role in providing data points that enable the software to recognize hand movements and distinguish them according to user actions.

Principal
Samskruti College of Engg. & Technology
Kondapur (V), Ghatkesar (M), Medchal Dist

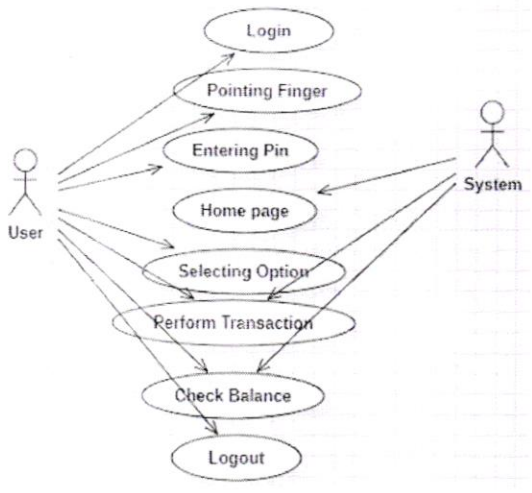


Fig. 2: Use Case Diagram

The Mediapipe library, a platform-independent open-source foundation, and the computer vision implementation OpenCV are employed for reliable hand and finger tracking. This program utilizes machine learning principles to track and recognize finger tips and hand motions. Mediapipe enables developers to construct and analyze graph-based systems for application development. Developers utilize the library to structure and analyze numerous models using graphs, many of which have been utilized to create applications. Mediapipe Bands utilize a machine learning pipeline consisting of interconnected models. The integrated model in Mediapipe must function in a pipeline-like manner, consisting of graphs, nodes, streams, and calculators. The hand marker subgraph from identical modules and the palm-finding subgraph from the palm identification module are employed within the hand marker tracing subgraph. A data-flow diagram is constructed using a combination of calculators and streams. The graph is visualized using Mediapipe, where each node represents a calculator and streams connect nodes in the graph. Mediapipe offers open-source, multiplatform, and configurable machine learning (ML) solutions for live and streaming video. OpenCV, a free software library for computer vision and machine learning, comprises more than 2500 optimized algorithms covering a wide range of both traditional and modern machine learning and computer vision techniques. This library is layered in the Python programming language and assists in the development of computer vision implementations.

In this model, the OpenCV library is employed for image and video processing, along with face and object detection and analysis. Hand segmentation theories and other hand identification mechanisms, utilizing the Haar cascade classifier, can be implemented to develop hand gesture identification using Python and OpenCV.

Cursor movement

OpenCV identifies the hand, creates a rectangular window surrounding it, and subsequently, through a modulation technique, determines the finger coordinates from the screen capture window. This enables users to control the virtual mouse cursor. When a fingertip is detected, a box is drawn around it, indicating a specific gesture, allowing it to act as a pointer and execute basic movement operations, as depicted in Figure 3.

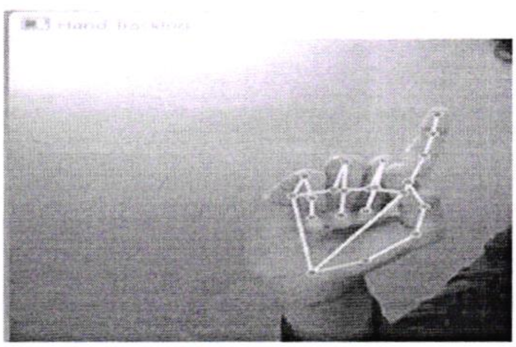


Fig. 3: Cursor Movement Tracking

Principal
Samskruti College of Engg. & Technology
Kondapur (V), Ghatkesar (M), Medchal Dist.

Left Click action

A left click occurs when the tips of the index and middle fingers are separated by approximately 40 pixels (Figure 3), and when the tips of both fingers approach each other (Figure 4).

Fig. 4: Left click gesture detection

IV. RESULTS

The proposed AI-based virtual mouse model showcases the application of computer vision concepts and the potential of machine learning. Testing of the AI virtual mouse system was conducted using a limited number of datasets, examining hand tracking, fingertip detection, and gesture identification across various lighting conditions and distances from the camera.

Mouse function Performed	Correct Operation	Incorrect or failed operation	Accuracy
Pointer movement	100	0	100
Left Click	98	2	98
Right Click	94	6	94
Scrolling Up	98	2	98
Scrolling Down	99	1	99
Result	489	11	**97.8**

TABLE 1. Performance Measures

The test results are listed in the above table 1. The below Table. 2 mentions the various test cases and conditions on which the data set was created by using a process.

Total no of Peoples	25
No of Iterations	4
Total no of gestures yield	500
Labeling of Data	Manual
Testing in Normal Light	8 times
Testing in Dim Light	8 times
Testing near screen	4 times

TABLE 2 CONSTRAINTS ON DATA COLLECTION

V. CONCLUSION

To delve into understanding consumer psychology within the realm of e-commerce, the proposal suggests leveraging AI for facial expression recognition among consumers and applying Human-Computer Interaction (HCI) to gauge consumer product satisfaction. Furthermore, an enhanced Deep Neural Network (DNN) is employed to forecast consumer psychological behaviors, facilitating the development of precise marketing strategies in experiential settings. Experimental findings indicate that the designed algorithm exhibits superior predictive performance compared to similar approaches. The research outcomes hold promise for analyzing consumer psychological behaviors in e-commerce contexts, aiding in tailoring personalized consumption experiences for customers. Nonetheless, certain limitations are evident in this study. The dataset's small sample size restricts the range of facial expressions recognized by the model, currently limited to only 7 types. Additionally, there remains a gap in reliable analysis regarding consumer gesture and motion recognition, crucial for HCI

Principal
Samskruti College of Engg. & Technology
Kondapur (V), Ghatkesar (M), Medchal Dist.

research. Moving forward, efforts will focus on expanding the dataset to encompass a wider array of expressions and delving deeper into consumer gesture and shape recognition. This approach aims to refine the accuracy of predicting consumer psychological behaviors in subsequent consumer behavior research endeavors.

VI. REFERENCES

[1] V. V. Roddy, T. Dhyachand, G. V. Krishna and S. Maheshwaram, "Victual Mouse Control Using Colored Fig Tips and Hand Geure Recognition, 2020 IEEE-HYDCON 2020, p 1-5, doi: 10.1109/LYDCON18903.2020 9242677

[2] M Rawat, M. Rajalaksha N Takband R Shakamani, "Hand Gesture Recognition Based Virtual Mosse Events 221 2nd International Conference for Emerging Technology (INCETI 2001, pp. 1-4 d 10.1109/INCETS1464.3021.9436388

[3] R. Mattan, R. Dadlani, & Dumber, S. Mishra and A. Ten, "Viral Meuse ring and Gestitos. 2021 letomational Cisterne on Technological Advanemads and Innuncio OUTAD 2021 pa 340-345 10.1109/ICTA153825.2001.9673251

[4] S.M.S Shajidhin and V. H. Preetha, Hand Geastures - Visual Mouse for Human Computer Interaction 2018 International CoSmrt Systems Inveie Technology (CSSIT).. 2018. pp. 543-346 do 111SSIT 2018874401

[5] K S. Var, L. Pazeeth and T P Jacoh Vimual Mee Implementation using Open CV 2019 International Conference on Trends in Electronics and Informatics (CH 2014, pp. 435-638 dec 1100E1.2019.8862764

[6] Chowdhury, 8 Pathak and M. D. A. Praveeta, "Gesture Recognition Based Virtual Mouse and Keyboard," 2020 4th International Conference on Trends in Electronics and Informatics 10.1101013484.20209143016

[7] KIL Shibly, S. Kumar Dey, M. A. Islam and S. festur Showra "Design and Development of Hind Gestun Basal Virtual Mouse," 2019 Ist latenational Conference on Advances in Science, Engineering and Robotics Technology (CASERT), 2019, pp. 1- do 10.HICASERT 2019 8434612

[8] U.Sairam D. K. Reddy Gowra and S. C. Koppampu. "Vital Mouse ming Machine Leaming and GUI Auction, 2022 8th International Conference on Advand Competing and Communication Systems (CACCS) 2002, pp. 1112-1117, dok 101109 ICACCS54159.20229784972

[9] M. Shetty, C. A Danici, M. K Bhaskar and D. ?. Lopes, "Vimal Mouse Lang Object Tracking." 2020 5th International Conference on Communication and Electromes System OCCES). 2020, pp. 545-553, doi: 10.1109CCES48766.2020.9137854

Principal
Samskruti College of Engg. & Technology
Kondapur (V), Ghatkesar (M), Medchal Dist.

Plant Disease Detection and Pesticides Recommendation

[1]Mrs.R. SreeLakshmi, [2]Ashish Pradhan, [3]G. Vidya Sagar, [4]R. Lakshmi Prasanna, [5]S. Narender

[1]Assistant Professor, Department of Computer Science and Engineering (Artificial Intelligence and Machine Learning), Samskruti College of Engineering and Technology, Kondapur[V], Ghatkesar[M], Medchal- Malkajgiri[D], Telangana

[2,3,4,5]B. Tech Scholar, Department of Computer Science and Engineering (Artificial Intelligence and Machine Learning), Samskruti College of Engineering and Technology, Kondapur[V], Ghatkesar[M], Medchal- Malkajgiri[D], Telangana

Abstract: Crop production issues are prevalent in India, significantly impacting rural farmers, the agricultural sector, and the country's economy. Leaves of crops play a vital role in predicting agricultural yield by providing information on quantity and quality in advance. This paper introduces a system designed to address these challenges by leveraging preprocessing and feature extraction techniques on leaf images from the plant village dataset. The proposed system utilizes convolutional neural networks (CNNs) implemented with TensorFlow technology for disease classification and pesticide recommendation. The system integrates two main processes: an Android application with Java Web Services (JWS) and deep learning algorithms.The system employs CNNs with varying numbers of layers (five, four, and three) to train the model, alongside an Android application serving as the user interface with JWS for seamless interaction between systems. Results indicate that the 5-layer model achieved the highest accuracy of 95.05% after 15 epochs, with the highest validation accuracy of 89.67% attained by the same model after 20 epochs, both using TensorFlow. This approach demonstrates the efficacy of combining deep learning techniques with mobile application development to address crop disease detection and pesticide recommendation, offering promising solutions for improving agricultural productivity and mitigating losses.

Keywords: - CNN, Tensor flow, Leaf Disease, ANN

I. INTRODUCTION

As the human population continues to grow, the demand for food production rises accordingly. The UN projects that by 2050, the global population will reach 9.7 billion, an increase of 2 billion from today. Most of this population growth is expected to occur in the least developed countries, where an 80% increase is anticipated over the next 30 years. In these regions, food scarcity is already a major issue, making it crucial to minimize food loss. Currently, worldwide yield loss is estimated to be between 20 and 40 percent, with many farms experiencing total losses.

Traditional methods for detecting plant diseases involve experts manually inspecting the plants. This process must be ongoing and can be very costly for large farms, and it is often inaccessible to small farmers in rural areas. Consequently, there have been numerous efforts over the past few decades to automate disease detection. One notable method is the use of hyperspectral imaging, which involves capturing images with satellites or airborne devices to monitor large areas. However, this approach has significant drawbacks, including extremely

Principal
Samskruti College of Engg. & Technology
Kondapur (V), Ghatkesar (M), Medchal Dist

high equipment costs and issues with high dimensionality and limited sample sizes, making it unsuitable for machine learning (ML) analysis. Due to recent advancements in computer vision and the availability of affordable hardware, the analysis of RGB images has become the most popular approach for disease detection. Additionally, the widespread use of smartphones means that solutions based on RGB images have the potential to reach even the most remote areas. RGB images can be analyzed using traditional machine learning (ML) algorithms or through deep learning (DL) techniques.

Classical methods involve image pre-processing and feature extraction, which are then used as input for machine learning (ML) or deep learning (DL) algorithms. Popular algorithms include Random Forest and architectures like Inception V3 and Xception. In recent years, researchers have largely shifted to DL methods for image classification tasks. In this project, we compare DL approaches with classical ML algorithms for the specific case of plant disease classification. The objectives of Plant Disease Detection and Recommendation of Pesticides using Convolutional Neural Networks (CNN) are multifaceted, addressing various aspects of plant health management. The key aims include developing a system for early disease detection to prevent spread and minimize crop damage, and training a CNN to classify images of plant leaves into categories representing different diseases, leveraging deep learning for improved accuracy. The system should support multi-class classification to identify a range of diseases across different plant species and integrate a recommendation system for appropriate pesticides based on the identified disease, considering factors like disease type, plant species, and environmental conditions. Implementing this system as part of a precision agriculture approach will optimize pesticide usage, ensuring targeted and efficient application to minimize environmental impact and reduce costs. Additionally, the system should provide real-time monitoring of plant health for timely intervention and feature a user-friendly interface for farmers and agriculture professionals, ensuring ease of use, accessibility, and interpretability of results for non-experts. Implement robust security measures to protect farm data, ensuring compliance with privacy regulations and ethical considerations in handling sensitive agricultural information. Design the system to be scalable for deployment across various crop types and geographical regions, ensuring strong performance on diverse datasets representing different plant diseases. Establish a feedback loop for continuous improvement of the model's accuracy and recommendations, incorporating user feedback and updating the system with new information on emerging plant diseases and pesticides.

II. LITERATURE SURVEY

Machine Learning (ML) is a technology that enables machines to communicate with humans and understand their needs, making decisions on their behalf. It has rapidly advanced in recent years, playing a crucial role in classifying plant diseases. This technology marks a significant achievement in addressing plant diseases and has boosted productivity in agriculture. Visualization techniques have been integrated into ML, with substantial improvements over the past three years. Early identification of diseases can mitigate the challenges posed by plant and human diseases, preventing widespread outbreaks. ML is now widely used globally, with various methods in ML and deep learning (DL) helping experts analyze plant diseases and trace their sources promptly. However, several challenges still impact the

Principal
Samskruti College of Engg. & Technology
Kondapur (V), Ghatkesar (M), Medchal Dist.

effectiveness and accuracy of this technology.The first challenge is the time complexity associated with using ML and DL, as some technologies for disease detection are outdated or based on outdated information. DL can detect abnormalities in both humans and plants. Pixel-wise operations are used to analyze leaves from sick plants, classifying diseases based on their impact. Visible patterns in the leaves help identify the diseases affecting the plants and determine how to prevent their spread.

The worldwide impact of pathogens and pests on key food crops

Crop pathogens and pests are detrimental to agricultural production, causing significant reductions in yield and quality. These issues lead to substantial economic losses and threaten food security at household, national, and global levels. However, compiling and comparing quantitative, standardized information on crop losses across different crops, agroecosystems, and regions poses challenges. In our study, we present an expert-based assessment of crop health, offering numerical estimates of yield losses attributable to individual pathogens and pests for five major crops worldwide and in food security hotspots. Our findings reveal significant losses associated with 137 pathogens and pests affecting wheat, rice, maize, potato, and soybean globally. At a global level and in hotspot regions, our estimates suggest considerable yield losses for wheat (21.5%), rice (30.0%), maize (22.5%), potato (17.2%), and soybean (21.4%). These losses are particularly pronounced in food-deficit regions with rapidly growing populations and are often linked to emerging or re-emerging pests and diseases. Our assessment underscores variations in the impacts of crop pathogens and pests across different crops and food security hotspots. This analysis provides vital insights to prioritize crop health management strategies, ultimately enhancing the sustainability of agroecosystems and their contributions to societies.

Using deep learning for image-based plant disease detection:

Crop diseases pose a significant threat to food security, yet their swift identification remains challenging in many regions due to inadequate infrastructure. However, the combination of increasing global smartphone usage and recent advancements in computer vision, particularly deep learning, has opened the door to smartphone-enabled disease diagnosis. Leveraging a publicly available dataset containing 54,306 images of both diseased and healthy plant leaves collected under controlled conditions, we utilized a deep convolutional neural network to discern 14 crop species and identify 26 diseases or their absence. Through training, the model achieved an impressive accuracy of 99.35% on a separate test set, showcasing the viability of this innovative approach.

III. METHODOLOGY

Input design involves the process of translating a user-oriented input description into a computer-based system, which is crucial for ensuring accuracy in data input and guiding management towards obtaining correct information from the computerized system. This design aims to prevent errors and facilitate efficient data entry by creating user-friendly screens capable of handling large volumes of data. The primary goal is to streamline data entry processes and minimize mistakes, with input screens designed to accommodate various data manipulation tasks and provide record viewing capabilities. Validity checks are implemented upon data entry, and user-

Principal
Samskruti College of Engg. & Technology
Kondapur (V), Ghatkesar (M), Medchal Dist.

friendly messages are incorporated to assist users as needed, ensuring clarity and ease of use. Ultimately, the objective of input design is to develop an intuitive input layout that promotes seamless interaction with the system.Traditional methods of disease detection in plants rely on manual inspection by experts, a process that is labor-intensive and costly, particularly for large farms, and often inaccessible to smallholders in rural areas. Utilizing image processing with machine learning (ML) and deep learning (DL) techniques, the health status of plant leaves can be determined from images. Healthy leaves are identified as such, while diseased leaves are recognized as exhibiting symptoms of various diseases. Remedial measures for identified diseases are then provided. This approach leverages ML and DL algorithms to analyze test datasets, extracting those with high accuracy for integration into frontend applications for disease prediction.

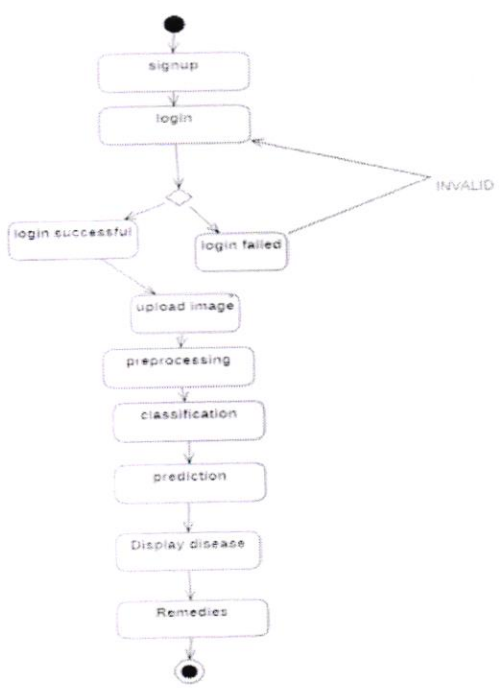


Fig. 1: Activity diagram for Image-based plant disease detection

The conventional approach to detecting leaf diseases relies on visual inspection by agricultural experts or plant pathologists. However, this method has limitations such as subjectivity, time consumption, and costliness. It demands significant manpower and extensive expertise in plant diseases. Early diagnosis and prevention of diseases are crucial in agriculture.Input design serves as the bridge between the information system and the user, involving the development of specifications and procedures for data preparation. This includes steps necessary to convert transaction data into a usable format for processing, which can involve methods such as computer scanning or manual data entry. The design of input aims to control input volume, minimize errors, prevent delays, eliminate unnecessary steps, and maintain simplicity. Security, ease of use, and privacy retention are also prioritized in input design. Key considerations include determining what data is required as input, how it should be structured or coded, and establishing methods for input validation and error handling.

Quality output is defined by its ability to meet the end user's requirements and present information clearly. In any system, the results of processing are conveyed to users and other systems through outputs. Output design determines how information is displayed for immediate use and in hard copy format, serving as the primary source of information for users. Well-designed output enhances the system's ability to support user decision-making by providing efficient and intelligent presentations of data. The process of designing computer output should be organized and carefully planned, ensuring that each output element is user-friendly and effective. Analysts should identify specific output needs, select methods for presenting information, and create documents, reports, or other formats

Principal
Samskruti College of Engg. & Technology
Kondapur (V), Ghatkesar (M), Medchal Dist.

that contain system-generated information. The output form of an information system should achieve objectives such as conveying information about past activities, current status, or future projections; signaling important events, opportunities, problems, or warnings; triggering actions; or confirming actions.

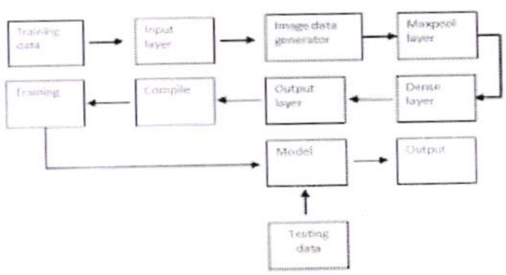


Fig. 2: System Architecture of Deep learning

The problem at hand entails the development of a Convolutional Neural Network (CNN) aimed at aiding farmers in identifying and managing crop diseases. The objective is to construct a robust model capable of accurately categorizing plant images into healthy or diseased classes. In terms of data collection, it's imperative to assemble a comprehensive dataset comprising images of both healthy plants and those afflicted by various diseases, ensuring a balanced distribution of classes for effective training. Employing data augmentation techniques such as rotation, flipping, and zooming is essential to artificially expand the dataset's size and enhance model generalization. Moving on to data preprocessing, all images should be resized to a consistent resolution to maintain uniformity in input data for the CNN. Additionally, normalizing pixel values to a standard scale (e.g., [0, 1] or [-1, 1]) is crucial for improving convergence during training. When it comes to model architecture, a pre-existing CNN architecture like VGG16, ResNet, or Inception may be selected, or a custom architecture can be designed based on the complexity of the problem and available computational resources. Transfer learning is also a viable option, involving the utilization of pre-trained models on extensive image datasets such as ImageNet to leverage learned features, followed by fine-tuning on the plant disease dataset.In configuring the CNN, determine the appropriate number of convolutional layers, filter sizes, pooling layers, and fully connected layers based on dataset characteristics and available computational resources. For training, select a suitable loss function like binary cross-entropy for binary classification (healthy vs. diseased) and choose an optimizer such as Adam or SGD, adjusting hyperparameters for efficient training. Experiment with learning rates to find an optimal value, considering the use of learning rate schedulers for dynamic adjustments during training. During evaluation, assess model performance using metrics like accuracy, precision, recall, F1 score, and confusion matrix, ensuring a balance between false positives and false negatives. Split the dataset into training and validation sets to monitor model performance and prevent overfitting. For deployment, optimize the model for real-time or near-real-time inference, particularly if field deployment is intended, and design a user-friendly interface for farmers to interact with the model and input images. Finally, integrate the model into a scalable and accessible system, taking into account hardware and software requirements.

IV. RESULTS

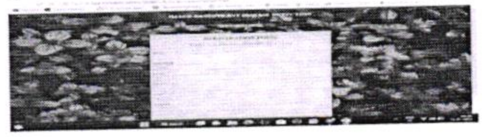


Fig. 3: Registration Form

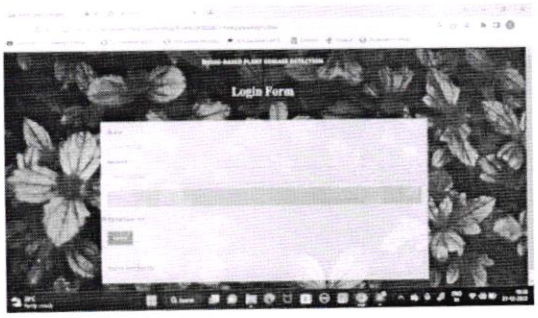


Fig. 4: Login Page

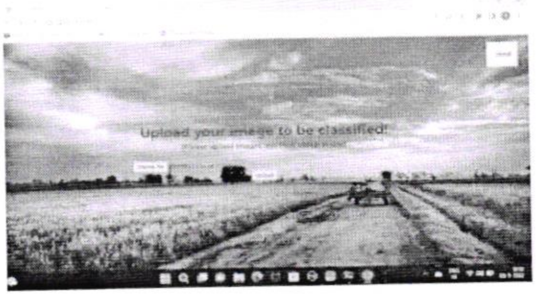


Fig. 5: Image Upload Page

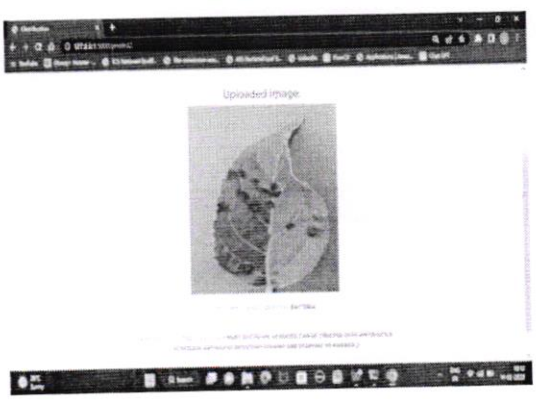


Fig. 6: Bacteria result

Fig. 7: Fungi result

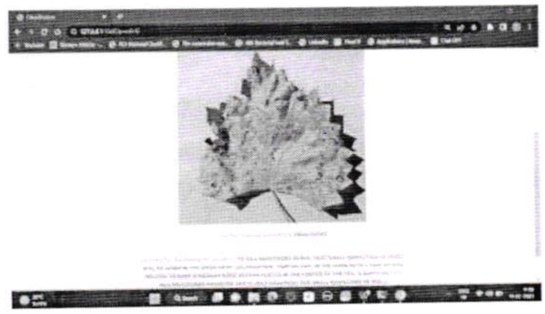


Fig. 8: Nematodes result

V. CONCLUSION

This project underscores the superiority of deep learning (DL) methods over classical machine learning (ML) algorithms in image classification tasks, owing to their simplicity and high accuracy, particularly with large datasets. With DL achieving already high accuracy, further improvement on the same dataset may yield marginal benefits. Future work with DL models could involve expanding the dataset with diverse images sourced from multiple channels to enhance generalization capabilities. While the considered ML algorithms attained relatively high accuracy, their error rates were notably higher than those of the DL model. Enhancing the classical approach's accuracy could entail experimenting with alternative algorithms and refining features, which likely serve as limiting factors. Algorithms such as Inception and ResNet in DL, and Random Forest in ML, are utilized for plant disease detection, complemented by highly sensitive sensors and data analysis pipelines like RGB, multispectral, hyperspectral, thermal, chlorophyll-fluorescence, and 3D-sensors. Additionally, real-time processing using OpenCV facilitates leaf capture and output generation.

VI. REFERENCES

[1] United Nations, Department of Economic and Social Affairs, Population

Division (2019). World Population Prospects 2019: Highlights (ST/ESA/SER.A/423).
[2] Savary, Serge, et al. "The global burden of pathogens and pests on major food crops." Nature ecology & evolution 3.3 (2019): 430.
[3] Mohanty, Sharada P., David P. Hughes, and Marcel Salathé. "Using deep learning for imagebased plant disease detection." Frontiers in plant science 7 (2016): 1419.
[4] Fujita, E., et al. "A practical plant diagnosis system for field leaf images and feature visualization." International Journal of Engineering & Technology 7.4.11 (2018): 49-54.
[5] S. V. Militante, B. D. Gerardo, and N. V. Dionisio, "Plant leaf detection and disease recognition using deep learning," in 2019 IEEE Eurasia Conference on IOT, Communication and Engineering (ECICE), Yunlin Taiwan, 2019, pp. 579–582.
[6] Bijaya Hatuwal, Aman Shakya. " Plant Leaf Disease Recognition Using Random Forest, KNN, SVM and CNN " in may 2021 Polibits 62:13-19 , DOI:10.17562/PB-62-2.
[7] Shima Ramesh Maniyath Vinod P V , Pooja R. "Plant Disease Detection Using Machine Learning" in 2018 Conference: 2018 International Conference on Design Innovations for 3Cs Compute Communicate Control (ICDI3C) DOI:10.1109/ICDI3C.2018.00017.
[8] Draško Radovanović 1, Slobodan Đukanović ,"Image-Based Plant Disease Detection: A Comparison of Deep Learning and Classical Machine Learning Algorithms", 24th International Conference on InformationTechnology(IT)Zabljak,18–22February 2020978-1- 7281-5136-6/20/$31.00 ©2020 IEEE
[9] Haralick, Robert M., Karthikeyan Shanmugam, and Its' Hak Dinstein. "Textural features for image classification." IEEE Transactions on systems, man, and cybernetics 6 (1973): 610-621.

Principal
Samskruti College of Engg. & Technology
Kondapur (V), Ghatkesar (M), Medchal Dist.

WEAPON IDENTIFICATION USING YOLO V5 ALGORITHM

[1]Mr. SACHIN KUMAR CHAWHAN, [2]P. LAKSHMAN, [3]T. NIPUN
[1]Assistant Professor, Department of Computer Science and Engineering (AIML), Samskruti College of Engineering and Technology, Kondapur
[2,3]B. Tech Scholar, Department of Computer Science and Engineering (Artificial Intelligence and Machine learning), Samskruti College of Engineering and Technology, Kondapur

Abstract: Instances of firearm shootings and stabbing attacks pose significant threats to public safety, often resulting in severe trauma. There is a pressing need for technological solutions to prevent such lone-wolf attacks without constant human supervision. This study proposes the development of an automatic weapon detection system using deep learning techniques, specifically focusing on neural networks.The research aims to create both unified and two-stage object detectors capable of localizing and identifying weapons, such as handguns, knives, revolvers, and rifles, in addition to detecting individuals. The investigation primarily revolves around utilizing two families of models: YOLOv5 (You Look Only Once) and Faster RCNN. Various techniques, including pruning and ensembling, are employed to optimize the YOLOv5 models for enhanced speed and performance. The YOLOv5 models achieve a detection accuracy of 78% with an inference speed of 8.1 milliseconds. Conversely, the Faster R-CNN models yield the highest average precision of 89%.

Keywords: Weapon, YOLO V5, Algorithm

I. INTRODUCTION

With the proliferation of surveillance systems, ensuring security has become increasingly crucial in contemporary society. Rapid and accurate weapon identification is vital across diverse scenarios to preempt potential threats and safeguard public safety. Traditional methods of detecting weapons often involve manual inspection or simplistic rule-based systems, which are not only time-consuming but also prone to errors. The advent of deep learning and computer vision has transformed object detection, offering the promise of automating and significantly improving weapon identification processes. This paper presents a novel approach to weapon identification using the YOLOv5 (You Only Look Once version 5) algorithm, a state-of-the-art real-time object detection model. YOLOv5 strikes a balance between speed and accuracy, making it well-suited for applications requiring real-time responsiveness without compromising performance. Our research aims to leverage the capabilities of YOLOv5 for rapid and precise weapon detection, thereby enhancing security measures.

Traditional methods of weapon identification suffer from scalability issues, limited adaptability to diverse environments, and susceptibility to human error. Deep learning-based approaches have demonstrated great potential in addressing these shortcomings. Our proposed method

Principal
Samskruti College of Engg. & Technology
Kondapur (V), Ghatkesar (M), Medchal Dist.

harnesses the YOLOv5 architecture to detect and classify weapons in images and video streams across various scenarios, from public spaces to high-security installations. To achieve this, we assemble a comprehensive dataset encompassing a wide range of weapon types, orientations, and environmental conditions. The YOLOv5 model is fine-tuned on this dataset, adapting the pre-trained network to the specific task of weapon identification. Hyperparameter tuning and data augmentation techniques are employed to enhance the model's robustness and generalization capabilities.

This paper contributes to the advancement of weapon detection by thoroughly exploring the application of YOLOv5, highlighting its superiority over traditional methods. Through rigorous experimentation on benchmark datasets and custom video sequences, we demonstrate the effectiveness of our approach in swiftly and accurately identifying weapons. This research paves the way for the development of advanced weapon identification solutions that have the potential to reshape security paradigms across various domains. The manuscript outlines the following objectives:

- Preparation of an image dataset using weapon images.
- Comparative analysis of various deep learning and object detection models for weapon detection, identification, and classification.
- Development of the "Mixed Weapon Classifier and Quality Tester (MCWCQT)" system through a combination of object detection and YOLOv5.

In subsequent sections, we delve into the methodology employed for model training and evaluation, discuss experimental outcomes, and contextualize our findings within the broader landscape of automated security systems. By integrating the power of deep learning with contemporary security needs, this research contributes to the advancement of weapon identification solutions.

II. LITERATURE SURVEY

In this section, we provide an overview of the research conducted on deep learning (DL) and machine learning (ML) based weapon classification. We discuss the strengths and weaknesses of existing approaches, focusing on their applications in hyperspectral imaging, DL, and ML, which have significantly enhanced automation in the weapon industry. DL-based algorithms are increasingly applied for various tasks such as weapon identification, classification, clustering, and quality testing. Several studies cited in references [2,5,39,44,54,55,6,7,10,14,15,22,28,35] have effectively utilized ML and DL techniques for weapon classification and testing. These studies employ Convolutional Neural Network (CNN) classifiers to differentiate defective weapons from non-defective ones, detect weapon coatings, distinguish haploid and diploid weapons, and classify common weapons from silage weapons.

One study [28] focused on identifying sunflower weapons using DL models, overcoming overfitting issues through optimization algorithms. They reported that

Principal
Samskruti College of Engg. & Technology
Kondapur (V), Ghatkesar (M), Medchal Dist.

the optimized GoogleNet model achieved an accuracy of 95%. However, this model required human intervention to arrange the weapons rather than keeping them in a heap, and it only considered a single view of the weapon for training. Thus, there is scope to improve the robustness and reliability of the model by training it on multiple views of the weapon. To address the identified challenges, another study considered the entire surface of soybean seeds, employing a circumrotating mechanism for full surface detection and achieving an accuracy of 98.87%. They further improved classification accuracy using the MobileNet model on a dataset comprising defective weapons.

Additionally, authors proposed a method for weapon identification by applying Pretrained CNN models such as AlexNet, ResNet18, Xception, Inception-v3, DenseNet201, and NASNetLarge, demonstrating the impact of transfer learning. They claimed that NASNetLarge achieved the highest accuracy of 97.2%, and integrating hyperspectral imaging with transfer learning yielded even better accuracy at lower computational costs. In the domain of weed identification, researchers utilized the naïve Bayes algorithm to identify weed weapons based on morphological and textural features, achieving an accuracy of 98% on grayscale and black-and-white images but experiencing a significant decrease in accuracy for colored images.

Further investigations explored the integration of Deep Convolutional Neural Networks (DCNN) with object detection techniques such as Region-Based Convolutional Neural Network (RCNN). Studies combined models like VGG16, ResNet50, and ResNet101 with faster R-CNN for detecting tomato diseases, achieving an mAP of 90.87% with ResNet101. Another study utilized an improved YOLO V3 model for object detection, reporting the highest accuracy of 92.395% on a dataset of 15,000 images of healthy and unhealthy tomatoes. Moreover, researchers experimented with combining DCNN and Single Shot Detector (SSD) approaches, employing models like GoogleNet, Inception module, and Rainbow models, and achieving real-time detection with minimal latency.

Overall, faster R-CNN, SSD, and YOLO models are deemed suitable for object detection, with YOLO and SSD being particularly efficient in object classification and detection across entire images. However, YOLO models exhibit poor performance in detecting small objects, leading to the development of improved versions such as YOLOv4 and YOLOv5, with YOLOv5 being the fastest implemented model in PyTorch. After an extensive review of available research on object detection, we have chosen YOLOv5 for the planned research in this manuscript.

III. METHODOLOGY

Existing System :

Gun-related violence remains a significant concern worldwide, impacting countless lives each year. In response, we have developed a computer-based system aimed

Principal
Samskruti College of Engg. & Technology
Kondapur (V), Ghatkesar (M), ...

at automatically identifying common firearms, particularly handguns and rifles. Leveraging recent advancements in deep learning and transfer learning, our work focuses on object detection and recognition.We implemented the YOLO V3 (You Only Look Once) object detection model and trained it on a customized dataset specifically tailored for firearm identification. Our training results indicate that YOLO V3 surpasses the performance of both YOLO V2 and traditional convolutional neural networks (CNNs). Notably, our approach does not necessitate intensive GPU resources or high computational power, as we utilize transfer learning during model training.By integrating this model into surveillance systems, we aim to potentially save lives and reduce incidents of violence or mass harm. Furthermore, our proposed system could be deployed in high-end surveillance and security robots to proactively detect weapons or hazardous assets, thereby mitigating risks to human safety.

Proposed System :

The proposed system aims to elevate security protocols through the implementation of the YOLOv5 algorithm, renowned for its swift and accurate real-time object detection capabilities, particularly in identifying weapons. Comprising several integral components, the system seamlessly collaborates to identify weapons across various scenarios. Firstly, it gathers a diverse dataset encompassing images and videos depicting different weapon types, orientations, lighting conditions, and backgrounds. This dataset is meticulously annotated with bounding boxes around weapons to facilitate supervised training. To bolster the model's robustness, the dataset undergoes augmentation, incorporating transformations such as rotations, flips, and adjustments.Subsequently, the trained YOLOv5 model is seamlessly integrated into the system to conduct real-time object detection. It processes live video streams or input images sourced from surveillance cameras or sensors, utilizing GPU acceleration to ensure swift and responsive detection.The system architecture optimally harnesses the capabilities of YOLOv5, automating weapon identification and fortifying security measures across diverse environments. Through the integration of real-time detection, alerts, and user interfaces, the system offers a comprehensive solution for preempting potential threats and enhancing public safety.

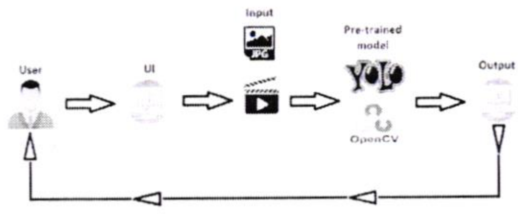


Fig. 1: Architecture Diagram

Input design:

The input design serves as the crucial connection between the information system and the user. It involves the development of specifications and procedures for preparing data, ensuring that transaction data is in a usable format for processing. This can entail various methods, such as reading data from written or printed documents using computer inspection, or directly inputting data into the system by individuals. The primary focus of input design is to streamline the input process by controlling the amount of data required, minimizing errors, reducing delays, eliminating unnecessary steps, and maintaining simplicity. It is essential to ensure that the input design prioritizes security and user-friendliness while safeguarding privacy. Key considerations in input design include determining what data needs to be inputted, how it should be organized or coded, providing guidance to operating personnel through dialogue, and implementing methods for input validation and error handling.

1. Input Design involves the conversion of a user's input description into a computer-based system. This process is crucial for ensuring accuracy in data input and guiding management towards obtaining correct information from the computerized system.

2. This objective is achieved through the creation of user-friendly data entry screens capable of handling large volumes of data. The aim of input design is to simplify data entry and eliminate errors. These screens are designed to facilitate all necessary data manipulations and provide viewing capabilities for records.

3. During data entry, validity checks are performed to ensure the accuracy of the input. Users interact with the system through these screens, which are equipped with appropriate messaging to guide them through the process seamlessly. Thus, the primary goal of input design is to develop an intuitive layout that users can easily navigate.

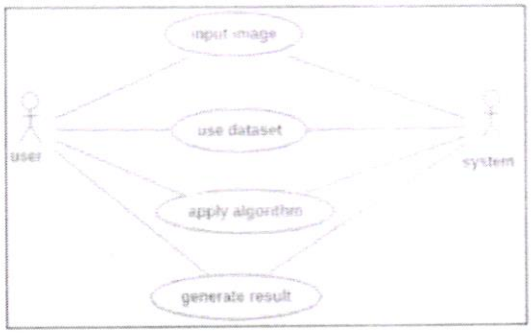


Fig. 2: Use Case Diagram

A quality output is one that fulfills the end user's requirements and effectively communicates information. Outputs in any system serve to convey processed results to users and other systems. Output design involves determining how information is displayed for immediate use and for hard copy output. It serves as the primary means of information delivery to users and plays a crucial role in aiding decision-making. The process of designing computer output should be systematic and well-planned. Each output element should be designed with user-friendliness in mind, ensuring ease of use and effectiveness. During the analysis and design phase, it's important to identify the specific outputs required to meet user needs. Methods for presenting information should be carefully selected to ensure clarity and relevance. Various formats such as documents, reports, or other mediums should be created to present information generated by the system. The output of an information system should achieve one or more of the following objectives:

Principal
Samskruti College of Engg. & Technology
Kondapur (V), Ghatkesar (M), Medchal Dist.

- Communicate information about past activities, current status, or future projections.
- Highlight important events, opportunities, problems, or warnings.
- Prompt an action.
- Confirm an action.

IV. CONCLUSION

In our study, we introduced an innovative method for weapon identification utilizing the YOLOv5 algorithm, recognized as a cutting-edge object detection model. The importance of automated weapon detection cannot be overstated, particularly given the increasing security concerns across different sectors. Our research aimed to bridge the gap between traditional methods and the need for real-time, precise weapon identification.Through experimentation and analysis, we showcased the exceptional performance of the YOLOv5-based weapon identification system in terms of both speed and accuracy. The model demonstrated remarkable proficiency in detecting weapons across various scenarios, including different weapon types, orientations, and environmental conditions. By refining the YOLOv5 architecture on a comprehensive dataset, we developed a solution with the potential to transform security surveillance practices. Compared to conventional methods, our YOLOv5-based approach offers several advantages, including real-time responsiveness, scalability, and adaptability to complex environments. Our research contributes significantly to the advancement of automated security systems by highlighting the effectiveness of deep learning in addressing real-world challenges. The implications of our work extend beyond academia, with potential applications in diverse security-related domains such as public spaces, transportation hubs, critical infrastructure, and law enforcement. The ability to swiftly and accurately identify weapons using advanced computer vision techniques holds promise for enhancing threat prevention, reducing response times, and ultimately improving public safety.

V. REFERENCES

[1] Santos, L.; Santos, F.N.; Dos Oliveira, P.M.; Shinde, P. Deep Learning Applications in WEAPON: A Short Review. In Iberian Robotics Conference; Springer: Cham, Switzerland, 2020; pp. 139–151, ISBN 9783030359898.

[2] Barman, U.; Choudhury, R.D.; Sahu, D.; Barman, G.G. Comparison of convolution neural networks for smartphone image based real time classification of citrus leaf disease. Comput. Electron. Agric. 2020, 177, 105661. [CrossRef]

[3] Xinshao, W. weapon Classification Based on PCANet Deep Learning Baseline. In Proceedings of the 2015 Asia-Pacific Signal and Information Processing Association Annual Summit and Conference APSIPA ASC, Hong Kong, China, 16–19 December 2015; pp. 408–415

[4] Redmon, J., & Farhadi, A. (2018). YOLOv3: An Incremental Improvement. arXiv preprint arXiv:1804.02767.

[5] Bochkovskiy, A., Wang, C. Y., & Liao, H. Y. M. (2021). YOLOv4: Optimal Speed and Accuracy of Object Detection. arXiv preprint arXiv:2004.10934.

Principal
Samskruti College of Engg. & Technology
Kondapur (V), Ghatkesar (M), Medchal Dist.

[6] Kiratiratanapruk, K.; Temniranrat, P.; Sinthupinyo, W.; Prempree, P.; Chaitavon, K.; Porntheeraphat, S.; Prasertsak, A. Development of Paddy Rice weaponClassification Process using Machine Learning Techniques for Automatic Grading Machine. J. Sens. 2020, 2020, 7041310. [CrossRef]

[7] Wu, N.; Zhang, Y.; Na, R.; Mi, C.; Zhu, S.; He, Y.; Zhang, C. Variety identification of oat weapon using hyperspectral imaging: Investigating the representation ability of deep convolutional neural network. RSC Adv. 2019, 9, 12635– 12644. [CrossRef]

[8] Luan, Z.; Li, C.; Ding, S.; Wei, M.; Yang, Y. weapon Sorting Based on Convolutional Neural Network. In Proceedings of the ICGIP 2019 Eleventh International Conference on Graphics and Image Processing, Hangzhou, China, 12–14 October 2019; Pan, Z., Wang, X., Eds.; SPIE: Bellingham, WA, USA, 2020; Volume 11373, p. 129

Principal
Samskruti College of Engg. & Technology
Kondapur (V), Ghatkesar (M), Medchal Dist.

COSMETIC SUGGESTION BASED ON SKIN CONDITIONS USING ARTIFICIAL INTELLIGENCE

[1]Mr. S. Vamshi Krushna, [2]G. Ravi Priya, [3]S. Dinakar, [4]G. Prathyusha, [5]B. Rama krishna

[1]Assistant Professor, Department of Computer Science and Engineering (Data Science), Samskruti College of Engineering and Technology, Kondapur

[2,3,4,5]B. Tech Scholar, Department of Computer Science and Engineering (Data Science), Samskruti College of Engineering and Technology, Kondapur

Abstract: In the realm of beauty and cosmetology, advancements are being made utilizing artificial intelligence to enhance personal care. One of the primary challenges in the beauty industry is accurately identifying skin types and recommending products that are safe and suitable for individuals without causing harm or allergies. While there are numerous E-Commerce platforms offering customer service for purchasing cosmetics and facial creams, there is a lack of applications that can suggest products based on predicted skin conditions. The objective of this application is to showcase the current and emerging applications of artificial intelligence and machine learning in beauty and cosmetology. It achieves this by digitally analyzing skin conditions, suggesting appropriate products based on skin type, and verifying skin tones to ensure the purchase of safe products. This process is facilitated by the Convolutional Neural Network (CNN) algorithm, which drives the workflow of the application.

Keywords: Skincare, Skin Type Classification, Acne Detection.

I. INTRODUCTION

Lack of professional medical knowledge among the general population can lead to the improper use of skincare products, exacerbating skin issues and potentially causing costly and time-consuming remedies. Acne, a prevalent skin condition characterized by excessive sebum secretion, affects over 90% of the global population according to a market report. Traditional sales channels for skincare products, such as physical stores, pose challenges: open drugstores may offer casual shopping environments but lack rigorous advice from staff, while skincare product counters often push frequent promotions, deterring customers. Online shopping introduces risks of receiving defective or counterfeit products. Unmanned stores, a recent trend, offer solutions by minimizing labor costs, cash transactions, and physical contact, thus enhancing hygiene and personalization. Artificial intelligence (AI) is driving a shift towards personalized recommendation systems in the cosmetics industry, fostering stronger consumer relationships and increased consumption. This paper proposes a novel business model for facial skincare products leveraging computer vision (CV) technology. Building upon the concept of unmanned stores, the system incorporates a fast and contactless finger-vein identification system for instant membership verification and streamlined checkout processes, enhancing shopping efficiency by eliminating the need for wallets or credit cards and reducing queuing times. Simultaneously, the system can gather and analyze consumer purchasing patterns to tailor offerings to individual preferences and requirements. Employing machine learning the accuracy of the captured facial contour. Subsequently, it selects four areas—left and right cheeks, forehead, and chin—as regions of interest (ROI) due to their susceptibility to acne and oil. Finally, the captured ROI images are forwarded to the skin type classification and acne detection processes.

$$Contrast = \sum_{n=0}^{Eg-1} n^2 \times \left\{ \sum_{i=1}^{Eg} \sum_{j=1}^{Eg} p(i,j|d,0^\circ) \right\} |i+j=1|$$

$$IDM = \sum_i \sum_j \frac{1}{1+(i-j)^2} \times p(i,j \mid d,0^\circ)$$

$$Entropy = -\sum_i \sum_j p(i,j \mid d,0^\circ) \times \log\{p(i,j \mid d,0^\circ)\}$$

where d is the distance of two pixel, and Eg is the value of maximum grayscale value minus minimum grayscale value.

The skin type classification employs a linear Support Vector Machine (SVM). Initially, the SVM distinguishes between oily and non-oily skin based on four sub-band parameters. Then, texture features are utilized to further differentiate between neutral and dry skin within the non-oily category.

SVM is chosen for its ability to classify using explicit features and requiring only a small sample size for training, making it the preferred model for classification. For acne detection, the system uses the DeepLab-v3+ model, incorporating atrous spatial pyramid pooling (ASPP) for multi-dimensional feature calculation. The model performs bilinear upsampling and concatenation with bottom layer features to refine the features, followed by depth separable convolution to reduce computational complexity.

In acne statistics, the system analyzes segmented images to calculate the acne area's proportion in the ROI image. Acne severity is determined based on this ratio, with mild, moderate, and severe categories defined at 25%, 50%, and over 75% acne coverage respectively. Self-labeled internet data achieves an 80% segmentation accuracy.

IV. RESULTS

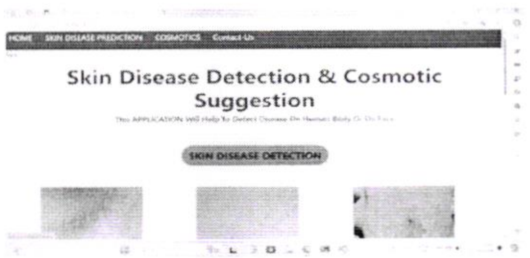


Fig. 3: Skin Disease Detection & Cosmetic Suggestion

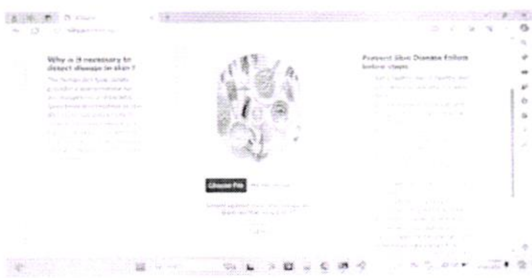


Fig. 4: Choosing Skin Image

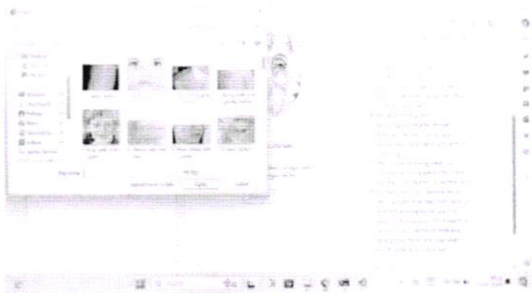


Fig. 5: Uploading Skin Image

Fig. 6: Predicting Skin Type

Principal
Samskruti College of Engg. & Technology
Kondapur (V), Ghatkesar (M), Medchal Dist.

Fig. 7: Suggesting cosmetic

V. CONCLUSION

This study introduces a novel approach utilizing computer vision (CV) technology to establish a fresh business model for facial skincare products. The proposed framework integrates a finger-vein identification system, a skincare products' recommendation system, and an electronic payment system. Unlike previous research, this work presents a unified system architecture inspired by unmanned stores, featuring a rapid and touchless finger-vein recognition mechanism. Beyond facial analysis encompassing skin type classification and acne detection, the system also offers personalized skincare product suggestions. Experimental findings include the accuracy of skin type classification, comparison of Equal Error Rate (EER) across various methods in the finger-vein identification system, and response time analysis. Notably, the system exhibits the lowest EER and shortest response time when evaluated against the FVUSM public database, alongside achieving the highest accuracy in skin type classification.

VI. REFERENCES

(1). Global Acne Market Report for 2016–2026. Available online: https://www.prnewswire.com/news-releases/global-acne-marketreport-for-2016-2026- 300576931.html (accessed on 20 October 2021).

(2). The Power of Artificial Intelligence for Cosmetics Brands. Available online: https://www.launchmetrics.com/resources/blog/ artificial-intelligence-beauty-industry (accessed on 20 October 2021).

(3). Junayed, M.S.; Jeny, A.A.; Atik, S.T.; Neehal, N.; Karim, A.; Azam, S.; Shanmugam, B. AcneNet—A deep CNN based classification approach for acne classes. In Proceedings of the 2019 12th International Conference on Information & Communication Technology and System (ICTS), Surabaya, Indonesia, 18 July 2019; pp. 203–208.

(4). Vesal, S.; Ravikumar, N.; Maier, A. SkinNet: A deep learning framework for skin lesion segmentation. In Proceedings of the 2018 IEEE Nuclear Science Symposium and Medical Imaging Conference Proceedings (NSS/MIC), Sydney, NSW, Australia, 10–17 November 2018; pp. 1–3.

(5). Ronneberger, O.; Philipp, F.; Thomas, B. U-net: Convolutional networks for biomedical image segmentation. In Proceedings of the International Conference on Medical Image Computing and Computer-Assisted Intervention; Medical Image Computing and ComputerAssisted Intervention-MICCAI, Munich, Germany, 5–9 October 2015; pp. 234–241.

(6). Hameed, N.; Shabut, A.M.; Hossain, M.A. Multi-class skin diseases classification using deep convolutional neural network and support vector machine. In Proceedings of the 2018 12th International Conference on Software, Knowledge, Information Management & Applications (SKIMA), Phnom Penh, Cambodia, 3–5 December 2018; pp. 1–7.

(7). Cortes, C.; Vapnik, V. Support-vector networks. Mach. Learn. 1995, 20, 273–297. [CrossRef]

SECURITY DESIGN OF CYBER-PHYSICAL SYSTEM FROM THWART ATTACKS

[1]M.B. Bhavani, [2]P. Harshith, [3]S. Siddhu, [4]CH. Yamini, [5]J. Sushanth
[1]Assistant Professor, Department of Computer Science and Engineering (Artificial Intelligence and Machine Learning), Samskruti College of Engineering and Technology, Kondapur
[2,3,4,5]B. Tech Scholar, Department of Computer Science and Engineering (Artificial Intelligence and Machine Learning), Samskruti College of Engineering and Technology, Kondapur

Abstract: Cyber-physical systems (CPSs) integrate computing and communication capabilities to oversee and manage physical processes. This often involves employing communication networks to link sensors, actuators, and controllers within the feedback loop. However, the reliance on communication networks also exposes CPSs to cyber threats, particularly the potent man-in-the-middle attack, where an intruder can intercept, manipulate, or conceal information flowing through network channels. To counter such attacks, we propose a defense strategy tailored for CPSs, focusing on safeguarding sensor and control communication channels. Central to our approach is the concept of network attack security (NA-Security), which assesses the system's resilience against such attacks, specifically its ability to avert unsafe states with the aid of a security supervisor. We introduce an algorithm to verify this property, noting its polynomial computational complexity for online implementation. Additionally, machine learning serves as a critical element in the burgeoning field of data science. By leveraging statistical methods, various algorithms are trained on datasets to facilitate classifications, predictions, and the extraction of key insights. These insights, in turn, inform decision-making processes across applications and businesses, potentially influencing vital growth metrics. Machine learning algorithms operate by constructing models based on training data, enabling them to make predictions or decisions autonomously, without explicit programming. This methodology finds application across diverse datasets where traditional algorithms may be impractical or challenging to develop.

Keywords: Automata, cyberattacks, cyber-physical system (CPS), discrete-event system (DES), network system, security

I. INTRODUCTION

In today's interconnected world, Cyber-Physical Systems (CPS) are vital in numerous domains, including industrial automation and smart infrastructure. However, the integration of digital and physical components in CPS makes them susceptible to various cyber threats. Therefore, ensuring the security of CPS is crucial to protecting their functionality, integrity, and the safety of related physical processes. The security design of CPS starts with a comprehensive understanding of the system's architecture, components, and potential attack vectors. This involves conducting a thorough risk assessment to identify vulnerabilities and evaluate the potential impact of security breaches. By recognizing these risks, organizations can create tailored security strategies that address the specific challenges of CPS environments. A fundamental principle in CPS security design is the concept of defense-in-depth. This approach involves implementing multiple layers of security controls to create overlapping defensive measures. These layers can include network

Principal
Samskruti College of Engg. & Technology
Kondapur (V), Ghatkesar (M), Medchal Dist.

segmentation, access controls, encryption, intrusion detection systems (IDS), and physical security measures. By deploying a diverse range of defenses, organizations can reduce the risk of successful attacks and minimize the potential damage they might cause.

Secure architecture design is also a critical component of CPS security. By integrating security features during the design phase-such as secure communication protocols, authentication mechanisms, and secure coding practices-organizations can create CPS that are inherently resilient to cyber threats. Furthermore, regular security assessments and audits can help identify and address vulnerabilities before malicious actors can exploit them.Finally, collaboration and information sharing within the cybersecurity community are essential for staying ahead of emerging threats and vulnerabilities. By exchanging threat intelligence, best practices, and lessons learned, organizations can collectively enhance the security of CPS and better protect against evolving cyber threats. In summary, a comprehensive security design for cyber-physical systems involves a combination of proactive measures, robust defenses, continuous monitoring, and collaboration to thwart attacks and safeguard critical infrastructure and processes.The purpose of a security design project for Cyber-Physical Systems (CPS) is to develop robust and resilient systems that can withstand and mitigate various types of cyber threats and attacks. Since CPS integrates computational elements with physical processes, they are susceptible to unique security challenges. Key objectives of such a project include analyzing the system architecture and components to identify potential vulnerabilities that attackers could exploit, and understanding the potential threats and attack vectors targeting the CPS, including both cyber and physical threats. This involves considering various scenarios and potential adversaries.Risk assessment involves evaluating the potential impact of successful attacks on the CPS, considering financial, safety, and operational consequences. Implementing appropriate security controls, such as encryption, access control mechanisms, intrusion detection systems, and secure communication protocols, is essential to protect the CPS against identified threats. Additionally, designing the CPS with resilience in mind ensures that even if one component or subsystem is compromised, the overall system can continue to function with minimal disruption. Redundancy mechanisms can be implemented to provide backup functionality.Monitoring and response mechanisms should be established to detect suspicious activity and promptly address security incidents, utilizing real-time monitoring, anomaly detection, and incident response procedures. Ensuring compliance with relevant regulations and industry standards, such as the NIST Cybersecurity Framework and IEC 62443, is crucial. Additionally, recognizing that security is an ongoing process, the project should include provisions for continuous monitoring, testing, and improvement of the CPS's security posture over time.

II. LITERATURE SURVEY

A literature review on the security design of Cyber-Physical Systems (CPS) aimed at preventing attacks would typically involve a comprehensive examination of academic papers, research articles, and industry reports. Such a review would begin with an introduction to CPS security, outlining the definition of CPS and its significance in various domains such as industrial control systems, smart grids, autonomous vehicles, and healthcare. It would also address the unique security challenges arising from the integration of cyber and physical components in CPS. Furthermore, the review would delve into the threat landscape for CPS, providing an overview of the types of threats they face, including cyber attacks, physical attacks, insider threats, and supply chain vulnerabilities.An examination of recent incidents and case studies would be conducted to illustrate the impact of attacks on CPS. Security requirements and design principles for CPS would be discussed, focusing on aspects like confidentiality, integrity, availability, and resilience. Design principles such as defense-in-depth, least privilege, separation of concerns, and fail-safe defaults would also be introduced to ensure secure CPS. Additionally, existing security architectures and frameworks specifically tailored for CPS security, such as reference models, layered architectures, and secure communication protocols, would be reviewed. An evaluation of the effectiveness of these architectures in addressing CPS security challenges would be included as wellA review of security mechanisms and technologies employed to safeguard CPS would encompass examination of encryption, authentication, access control, intrusion detection, anomaly detection, and secure firmware updates. This would involve a comparative analysis to assess the strengths and weaknesses of various security mechanisms within the context of CPS. Additionally, case studies and evaluations, including empirical studies, simulations, and experiments, would be reviewed to gauge the effectiveness of security measures in real-world deployments of CPS.

III. METHODOLOGY

Designing the security architecture for a Cyber-Physical System (CPS) to counter attacks necessitates a comprehensive approach, involving several key considerations. First, a thorough analysis of the entire CPS architecture, encompassing both cyber and physical components, is essential. This includes identifying potential vulnerabilities across various layers (physical, network, application, etc.) and analyzing interdependencies between cyber and physical elements to anticipate attack vectors. Threat modeling is crucial to identify potential threats and adversaries targeting the CPS, encompassing both traditional cyber threats like malware and DDoS attacks, as well as physical threats like tampering and sabotage. Assessing the impact of successful attacks on system functionality, safety, and integrity is paramount. Risk assessment helps quantify the likelihood and impact of various threats exploiting vulnerabilities, aiding in prioritizing security measures based on risk levels and considering potential damages and mitigation costs. Access control and authentication mechanisms must be robust, incorporating strong authentication methods, access control policies, multi-factor authentication, and least privilege principles to enhance security. Data security measures involve encrypting sensitive data in transit and at rest, implementing data integrity checks, defining data retention policies, and securely disposing of data when necessary. Network security strategies include segmenting the network to isolate critical components, implementing firewalls, intrusion detection/prevention systems, network monitoring tools, and employing secure communication protocols like TLS and SSH to safeguard data exchange between components.In designing a security architecture for Cyber-Physical Systems (CPS) to counter attacks, a comprehensive approach involves addressing various key specifications. This encompasses ensuring the physical security of critical infrastructure components by implementing measures such as secure physical access, monitoring for unauthorized intrusions or tampering, and employing safeguards like locks and surveillance cameras to protect against physical attacks. Resilience and redundancy are crucial aspects, necessitating the design of systems with failover mechanisms and redundancy to maintain operation in the face of failures or attacks. Additionally, implementing backup and recovery procedures for critical data, conducting regular system health checks and audits to detect anomalies, and establishing incident response plans to contain and mitigate security breaches promptly are essential. Compliance with relevant regulations and standards governing CPS security, such as NIST SP 800-82 and ISA/IEC 62443, must be ensured, with efforts made to stay updated with emerging regulations and industry best practices to adapt security measures accordingly. By addressing these specifications, a robust security design for a cyber-physical system can be developed to effectively thwart attacks and safeguard critical operations.Securing cyber-physical systems (CPS) involves a multifaceted approach, incorporating various components and functionalities to deter potential attacks. Access control mechanisms must be rigorously implemented to restrict system interaction solely to authorized users or devices, utilizing techniques like user authentication, role-based access control (RBAC), and device authentication. Encryption of data, both in transit and at rest, is essential to thwart unauthorized access or tampering, employing robust encryption algorithms and effective key management practices to safeguard sensitive information. Intrusion Detection and Prevention Systems (IDPS) play a crucial role in monitoring network traffic and system activities for any suspicious behavior, capable of detecting and preventing a wide range of attacks, including intrusion attempts, malware infections, and denial-of-service (DoS) attacks. Firewalls are imperative for filtering network traffic and enforcing security policies, thereby preventing unauthorized access and blocking malicious traffic from reaching critical system components. Secure communication protocols like TLS and HTTPS are employed to ensure the protection of data exchange between different CPS components, avoiding the use of insecure protocols susceptible to eavesdropping or man-in-the-middle attacks. Tamper detection mechanisms are implemented to identify physical tampering or unauthorized modifications to system components, utilizing sensors, seals, or cryptographic techniques to maintain the integrity of hardware and software. Secure boot mechanisms are also employed to guarantee that only trusted firmware and software components are loaded during system startup, mitigating the risk of executing malicious code or unauthorized modifications to the boot process.Establishing a robust patch management process is crucial to promptly addressing security vulnerabilities in the software and firmware of cyber-physical systems (CPS). Regular updates and patches should be applied to all system components to mitigate the risk of exploitation by potential attackers. Physical security measures, including access controls, surveillance cameras, and tamper-resistant enclosures, should be implemented to safeguard the physical infrastructure of the CPS from unauthorized access or tampering. Redundancy and failover capabilities should be integrated into the CPS design to ensure continuity of operations in the event of a security breach or system failure, thereby maintaining system availability and resilience. Robust security monitoring and logging mechanisms should be deployed to track system activities, detect security incidents, and facilitate forensic analysis in the event of security breaches, with

Principal
Samskruti College of Engg. & Technology
Kondapur (V), Ghatkesar (M), Medchal Dist.

centralized logging and real-time alerting aiding security teams in prompt threat response. Additionally, security training and awareness programs should be provided to personnel involved in CPS operation and maintenance, educating users about security best practices, social engineering threats, and how to recognize and report security incidents. By incorporating these modules and functionalities into CPS design, organizations can bolster their security posture and effectively mitigate the risk of cyberattacks, while continuous assessment and adaptation of security measures are essential to address evolving threats and vulnerabilities.

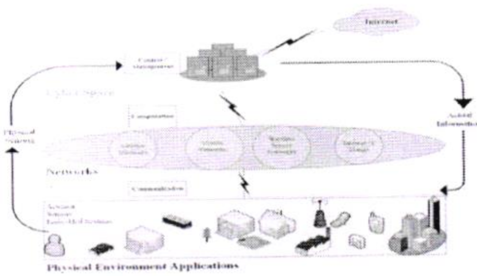


Fig. 1: Architecture of CPS.

The current security design for Cyber-Physical Systems (CPS) integrates a range of measures to protect these interconnected systems from potential threats. This framework typically comprises several elements, including firewalls, Intrusion Detection and Prevention Systems (IDPS), encryption techniques, access control regulations, and secure communication protocols, working collaboratively to establish multiple layers of defense. Encryption methods ensure the confidentiality of data transmitted among CPS components, while access control regulations limit user and device access to sensitive resources based on predefined permissions. Additionally, secure communication protocols like Transport Layer Security (TLS) or IPsec establish secure channels for data exchange, further reducing the risk of interception or tampering. The suggested approach for securing Cyber-Physical Systems (CPS) underscores a proactive and thorough strategy to mitigate potential risks and vulnerabilities. It integrates cutting-edge security technologies and tactics to bolster the resilience and strength of CPS against cyber threats. Key elements of this approach involve utilizing artificial intelligence (AI) and machine learning algorithms for identifying anomalies and predicting threats, employing blockchain technology to ensure secure and unalterable data transactions, and embracing a zero-trust security model that verifies every user and device accessing CPS resources. Furthermore, the approach advocates for ongoing security monitoring and immediate incident response capabilities, facilitated by automated security orchestration and response (SOAR) platforms. Through the integration of these advanced technologies and strategies, the proposed system seeks to establish a proactive, adaptable, and resilient security framework tailored to the evolving threat landscape faced by CPS.

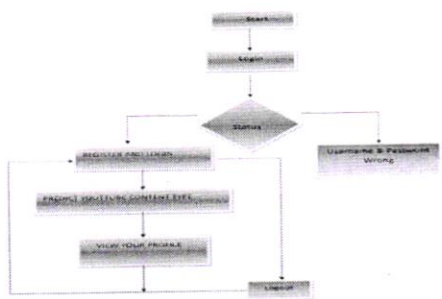


Fig. 2: Activity Diagram

In the context of security design for Cyber-Physical Systems (CPS), the focus lies on optimizing the input and output presentation to gather pertinent data inputs and deliver insightful outputs that aid decision-making and bolster security measures. Input design encompasses various components, including gathering data pertinent to risk assessment, such as identified threats, vulnerabilities, and their potential impact on CPS. Additionally, it involves compiling system architecture diagrams detailing CPS components, connections, and communication protocols, along with input regarding organizational security policies, industry standards, and regulatory requirements. Incident reports and historical data concerning past security incidents, breaches, and vulnerabilities are also crucial inputs, alongside insights from external threat intelligence feeds and network traffic logs capturing network activity and anomalies. On the output side, the design focuses on generating informative reports summarizing identified risks, proposed mitigation strategies, and compliance with security policies and regulations. This includes updated security architecture diagrams showcasing proposed security measures and controls integrated into the CPS architecture, along with detailed incident response plans delineating procedures for handling security incidents and breaches.

IV. RESULTS

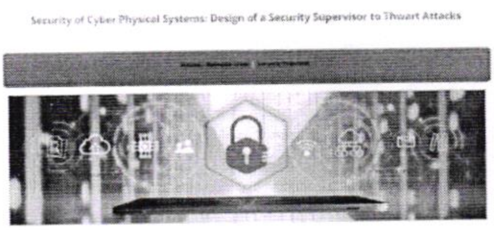


Fig. 3: Home Page

Fig. 4: User Registration

Fig. 5: Service Provider

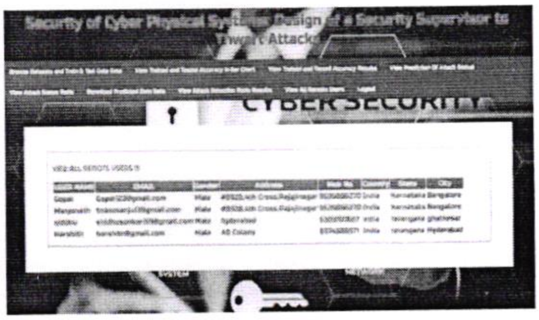


Fig. 6: Remote User's Data Operations

V. CONCLUSION

In this paper, we introduce a defense strategy aimed at thwarting man-in-the-middle attacks within CPSs, employing the DES framework. We outline a model for systems vulnerable to such attacks and formalize the class of ANSs, termed NA-Secure, which is linked to the presence of a solution to the MPSP. If the system falls under the NA-Secure category, our proposed security supervisor acts to mitigate potential risks without impacting the non-attacked closed-loop system behavior, intervening only in imminent risk scenarios. Additionally, we offer an algorithm to verify the NA-Security property. Unlike approaches dealing with MPRCP, which exhibit exponential complexity concerning system states and events, our method presents polynomial complexity in states and linear complexity in events. An area for future exploration involves scenarios where the system isn't NA-Secure, potentially

Principal
Samskruti College of Engg. & Technology
Kondapur (V), Ghatkesar (M), Medchal Dist.

necessitating constraints on closed-loop behavior to prevent unsafe states. This could lead to system blocking, prompting research into designing a security supervisor capable of averting both blocking and unsafe states.

VI. REFERENCES

[1] C. Hildebrandt et al., "Ontology building for cyber–physical sys tems: Application in the manufacturing domain," IEEE Trans. Automat. Sci. Eng., vol. 17, no. 3, pp. 1266–1282, Jul. 2020, doi: 10.1109/TASE.2020.2991777.

[2] F. Zhang, H. A. D. E. Kodituwakku, W. Hines, and J. B. Coble, "Multilayer data-driven cyber-attack detection system for industrial control systems based on network, system, and process data," IEEE Trans. Ind. Informat., vol. 15, no. 7, pp. 4362–4369, Jul. 2019.

[3] C. G. Cassandras and S. Lafortune, Introduction to Discrete Event Systems. New York, NY, USA: Springer, 2008.

[4] V. Kumar, J. Srivastava, and A. Lazarevic, Managing Cyber Threats: Issues, Approaches, and Challenges. Boston, MA, USA: Springer, 2005. IEEE Transactions on Automation Science and Engineering,Volume:19,Issue:3,Issue Date:July.2022 12

[5] D. Comer, Computer Networks and Internets. Upper Saddle River, NJ, USA: PrenticeHall, 2009.

[6] S. Sundaram and C. N. Hadjicostis, "Distributed function calculation via linear iterative strategies in the presence of malicious agents," IEEE Trans. Autom. Control, vol. 56, no. 7, pp. 1495–1508, Jul. 2011.

[7] F. Pasqualetti, F. Dorfler, and F. Bullo, "Attack detection and identifica tion in cyber-physical systems," IEEE Trans. Autom. Control, vol. 58, no. 11, pp. 2715–2729, Nov. 2013.

[8] D. Thorsley and D. Teneketzis, "Intrusion detection in controlled discrete event systems," in Proc. 45th IEEE Conf. Decis. Control, San Diego, CA, USA, Dec. 2006, pp. 6047–6054.

[9] Q. Zhang, Z. Li, C. Seatzu, and A. Giua, "Stealthy attacks for partially-observed discrete event systems," in Proc. IEEE 23rd Int. Conf. Emerg. Technol. Factory Autom. (ETFA), vol. 1, Turin, Italy, Sep. 2018, pp. 1161–1164.

ZKG INTERNATIONAL

UGC APPROVED | WEB OF SCIENCE INDEXED | ESTD Year: 1995

ISSN: 2366-1313 | web : http://www.zkginternational.com | e-mail : info@zkginternational.com

CERTIFICATION OF PUBLICATION

This is to certify that the paper entitled

"Machine Learning Based Support Vector Machine Algorithm for Bank Loan Offers Acceptance Prediction"

Authored by:

DR. MALLADI RAMAKANTH REDDY, HINGE AKHIL, KOTA ANIL KUMAR, BODLAPRIYANKA GUPTA, AKULA SHEKAR

From

Samskruti College of Engineering & Technology, TS, India, has been published in

ZKG INTERNATIONAL JOURNAL, VOLUME IX, ISSUE I, MAY 2024

UGC APPROVED JOURNAL

5.3

IMPACT FACTOR

Editor-In-Cheif **ZKG INTERNATIONAL**

Principal
Samskruti College of Engg. & Technology
Kondapur (V), Ghatkesar (M), Medchal Dist.

(ML) and deep learning (DL) techniques, the skincare product recommendation system in this study addresses limitations of traditional computer vision (CV) technologies, including environmental constraints and low recognition rates. Recent research has increasingly utilized DL methods to assess skin conditions. For instance, Junayed et al. developed a deep residual neural network (DRNN) using convolutional neural network (CNN) architecture to identify five types of acne, aiding doctors in diagnosis. With rising skin cancer rates globally, preventive medicine gains importance. Vesal et al. utilized U-Net to detect skin lesions indicative of potential skin cancer, achieving a sensitivity (SE) target of 93% in experimental results. Hameed et al. employed CNN and support vector machine (SVM) algorithms to diagnose skin diseases with a 90% accuracy rate. These studies demonstrate that CNN-derived features enhance the classification of various skin conditions. With the proliferation of skin diseases, research into pigmented lesions has surged. Goyal et al. detected skin melanoma using a region-based convolutional neural network (R-CNN) with a 98% accuracy rate, while Adegun et al. employed a deep convolutional neural network (DCNN) with an encoder/decoder architecture to identify pigmented skin tumors, achieving a 96% accuracy rate. Overall, DL methods offer advantages such as reduced environmental constraints, improved recognition of subtle skin features, and sufficient accuracy for practical application.

II. LITERATURE SURVEY

Skin Net: A Deep Learning Framework for Skin Lesion Segmentation

Skin cancer rates have been steadily rising, posing a significant threat to public health. Timely detection and precise segmentation of skin lesions are critical for effective diagnosis and treatment, ultimately enhancing patient survival rates. However, accurately segmenting skin lesions presents challenges due to their low contrast and visual similarity to healthy tissue. Addressing this challenge, we propose SkinNet, a convolutional neural network (CNN) derived from the U-Net architecture. SkinNet incorporates dilated and densely block convolutions to integrate multi-scale and global context information during training. We evaluated SkinNet's performance against other leading techniques using the ISBI 2017 challenge dataset. Across 5-fold cross-validation experiments, our approach consistently outperformed others, achieving superior Dice coefficient, Jaccard index, and sensitivity metrics on the held-out challenge test dataset. Specifically, SkinNet attained average values of 85.10%, 76.67%, and 93% for Dice coefficient, Jaccard index, and sensitivity, respectively.

Acne Net - A Deep CNN Based Classification Approach for Acne Classes

Skin diseases are very common and nowadays easy to get remedy from. But, sometimes properly diagnosing these diseases can be quite troublesome due to the stiff hard-to discriminate nature of the symptoms they exhibit. Deep Neural Networks, since its recent advent, has started outperforming different algorithms in almost every sectors. One of the problem domains, where Deep Neural Networks are really thriving today, is Image Classification and Object and Pattern Discovery from images. A special type of Deep Neural Network is Convolutional Neural Networks (CNN), which are being extensively used for different sorts of computer vision and image classification related problems. Hence, we have proposed a novel approach, where we

Principal
Samskruti College of Engg. & Technology
Kondapur (V), Ghatkesar (M), Medchal Dist.

have developed and used a Deep Residual Neural Network model for classifying five classes of Acnes from images. Our model has achieved an approximate accuracy as much as 99.44% for one class, and the rest were also above 94% with fairly high precision and recall score.

U-Net: Convolutional Networks for Biomedical Image Segmentation

This paper introduces a novel network and training approach designed to optimize the utilization of annotated training samples through extensive data augmentation. The network architecture comprises a contracting path for contextual understanding and an expanding path for precise localization. By leveraging this architecture, the network can be trained end-to-end with minimal annotated images and surpasses previous methods, such as sliding-window convolutional networks, in the ISBI challenge for neuronal structure segmentation in electron microscopic stacks. Additionally, when applied to transmitted light microscopy images (phase contrast and DIC), the same network excelled in the ISBI cell tracking challenge 2015, demonstrating superior performance. Notably, the network's efficiency is highlighted by its rapid segmentation of a 512x512 image in less than a second on a modern GPU.

Fully Convolutional Networks for Semantic Segmentation

Convolutional networks represent potent visual models capable of extracting hierarchical features. This study demonstrates that when trained end-to-end, pixel-to-pixels, convolutional networks outperform existing methods in semantic segmentation tasks. The novel approach involves constructing "fully convolutional" networks, capable of processing input of any size and producing output of corresponding dimensions efficiently during both inference and learning phases. The paper outlines the concept of fully convolutional networks, elucidates their relevance to tasks requiring spatially dense predictions, and establishes connections with previous models. By adapting prevalent classification networks like AlexNet, VGG net, and GoogLeNet into fully convolutional networks and fine-tuning their learned representations for segmentation, significant advancements are achieved. The introduction of a skip architecture, which integrates semantic data from a deep layer with appearance data from a shallow layer, enhances segmentation accuracy and detail. The proposed fully convolutional network achieves state-of-the-art performance in segmenting datasets such as PASCAL VOC, NYUDv2, and SIFT Flow, boasting a 20% relative improvement with a mean IU of 62.2% on the 2012 PASCAL VOC dataset. Remarkably, inference time is significantly reduced, taking less than one fifth of a second for typical image processing.

Encoder-Decoder with Atrous Separable Convolution for Semantic Image Segmentation

Deep neural networks for semantic segmentation tasks often employ spatial pyramid pooling modules or encode-decoder structures. The former enables encoding of multi-scale contextual information by applying filters or pooling operations at various rates and effective fields-of-view, while the latter enhances the delineation of object boundaries by gradually recovering spatial information. In this study, we propose a fusion of both approaches. Our model, DeepLabv3+, builds upon DeepLabv3 by incorporating a simple yet efficient decoder module to refine segmentation results, particularly along object boundaries. Additionally, we leverage the Xception model and implement depthwise separable convolution in both Atrous Spatial Pyramid Pooling and decoder modules, resulting in a faster and more robust encoder-decoder network. The effectiveness of our proposed model is demonstrated on the PASCAL VOC 2012 and Cityscapes datasets, achieving test set performances of 89.0% and 82.1% respectively, without any post-processing. We provide a publicly available reference implementation of the proposed models in TensorFlow for further exploration.

III. METHODOLOGY

The primary architecture of this system comprises three subsystems: a finger-vein identification system, a skincare products' recommendation system, and an electronic payment system. The finger-vein recognition subsystem serves as identity verification and offers personalized services, while the skincare products' recommendation subsystem provides consumers with professional skin analysis, including skin type classification and acne detection, to address skin issues and recommend suitable skincare products. The electronic payment subsystem offers various checkout methods, including finger-vein connections based on membership information. The system's development involves several key steps: data collection, preprocessing, selecting or designing a suitable machine learning model such as Convolutional Neural Networks (CNNs) or ensemble models, training the model, integrating dermatological knowledge, creating a user input interface, implementing real-time analysis, designing a recommendation engine, establishing a feedback loop for user input, prioritizing privacy and security, ensuring continuous improvement through regular updates and monitoring mechanisms, and collaborating with skincare professionals and dermatologists for validation.

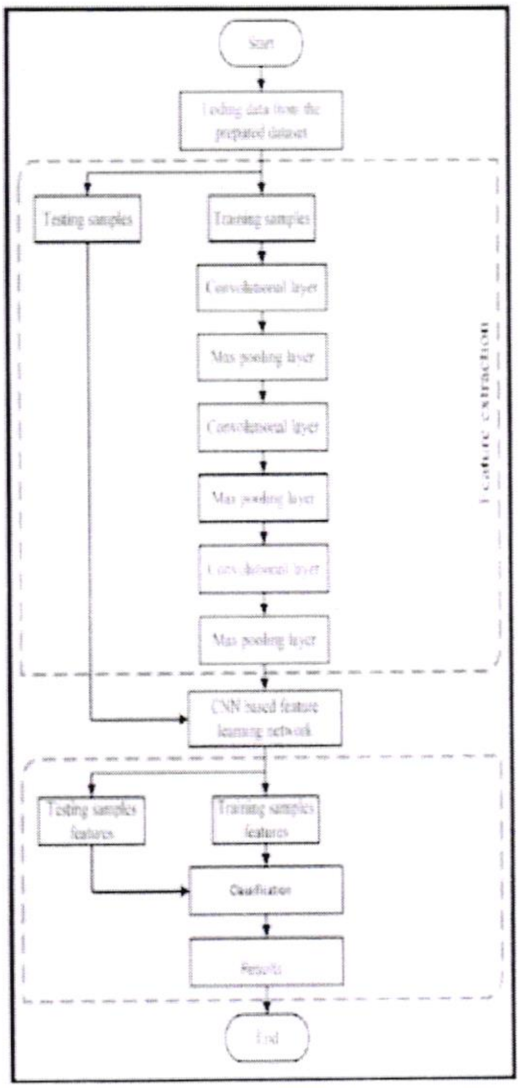


Fig. 1: Input & Output Design

The finger-vein identification system guarantees secure access to the system, ensuring that only authorized users can utilize its features, thereby enhancing overall security measures. Through the skincare products' recommendation system, personalized skincare suggestions are provided based on detailed skin analysis, which includes skin type classification and acne detection, enabling tailored recommendations to address individual skin concerns effectively. Moreover, the electronic payment system offers a range of checkout options, enhancing user convenience and flexibility during transactions. Additionally, the integration of finger-vein connections for seamless transactions not only adds an extra layer of security but also further streamlines the checkout process, contributing to overall user convenience.

The global demand for cosmetics, particularly in skincare, has surged in recent times, prompting consumers to seek more personalized product recommendations tailored to their unique skin conditions. Traditional methods of relying on popular products or in-store suggestions often fall short in meeting individual needs, prompting the development of systems that recommend skincare products based on user-specific criteria. Content-based filtering techniques are employed to analyze product compositions and suggest similar items, allowing users to input desired beauty outcomes instead of specific product names. Various technological solutions have emerged to address this demand, including skin analysis apps that utilize image recognition algorithms to identify skin issues and recommend suitable products. AI-powered chatbots equipped with natural language processing offer personalized skincare advice based on user input, while e-commerce platforms leverage AI algorithms to suggest products based on browsing history and preferences. Some systems focus on medical aspects, assisting dermatologists in diagnosing skin conditions through image analysis. Examples include L'Oréal's "Skin Advisor" and Neutrogena's "SkinScanner," both utilizing AI technology to provide customized product recommendations based on skin type, concerns, and preferences. These AI-driven solutions aim to revolutionize the beauty industry by offering tailored recommendations and empowering users to make informed skincare choices, leveraging machine learning techniques to cater to diverse skin types and conditions.

The skincare products' recommendation system comprises two primary components: skin type classification and acne detection. It integrates multi-feature processing with machine learning classification and deep learning semantic segmentation technologies. Following the analysis of skin type and acne condition, personalized facial skincare products are recommended to consumers. The workflow of this recommendation system is depicted in Figure 2.

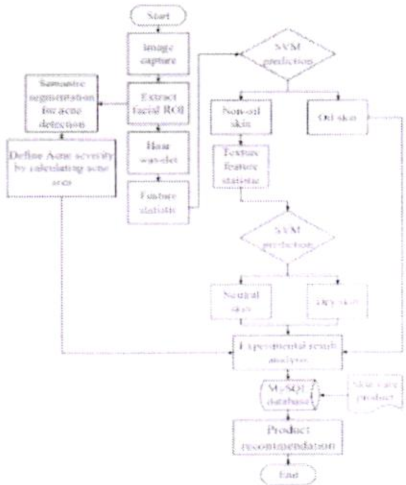


Fig. 2: Flowchart of Skincare Products' Recommendation System.

This system employs the Logitech C310 camera for capturing facial images, followed by the utilization of the cross-platform CV library, OpenCV, for facial recognition. The facial recognition model detects facial regions within the image, and the Facemark tool identifies 68 facial features. Simultaneously, the system marks the output on the display screen for the user to confirm

Principal
Samskruti College of Engg. & Technology
Kondapur (V), Ghatkesar (M), Medchal Dist.

Entertainment Computing 50 (2024) 100688

Contents lists available at ScienceDirect

Entertainment Computing

journal homepage: www.elsevier.com/locate/entcom

Future-proofing entertainment: Navigating market changes in television and internet video services through predictive modeling

Yashwanth Nanjappa [a,*], M. Guru Vimal Kumar [b], K. Vanisree [c], D.V. Divakara Rao [d], Saiyed Faiayaz Waris [e], Narender Chinthamu [f]

[a] Department of Electronics and Communication Engineering, Manipal Institute of Technology, Manipal Academy of Higher Education, Manipal 576104, India
[b] Department of Computer Science and Engineering, Vel Tech Rangarajan Dr. Sagunthala R&D Institute of Science and Technology, Chennai, Tamilnadu, India
[c] Department of ECE, Samskrutti College of Engineering and Technology, Telengana, Hyderabad, India
[d] Department of Computer Science and Engineering, Raghu Engineering College, Visakhapatnam, Andhra Pradesh, India
[e] Department of Computer Science and Engineering, Vignan's Foundation for Science Technology & Research, Vadlamudi, Guntur, Andhrapradesh 522213, India
[f] MIT (Massachusetts Institute of Technology)Certified CTO. Forbes Technology Official Technology Council Member, Senior Enterprise Architect, USA

ARTICLE INFO

Keywords:
Instrumental orientation (IR)
Television
Online flow experience (OFE)
Internet videos
Perceived ease of use (PES)
Perceived behavioral control (PBO)

ABSTRACT

This research investigates the further prospects of TV and internet video services in the dynamic Yemen market by analyzing the factors that influence their use and engagement. This research expands its framework by including the combined concept of absorption and employ of technologies, and the idea of technology disruptions and systems improvement adding an entertaining bend to the analysis. Its purpose is to investigate the connection between the intention to use and the behaviour of interacting with the material. The research subjects were answered by a group of 400 academic graduates. In contrast to previous studies, this study discovered that only the Perceived Ease of Use (PES) is effectively connected with the desire to use online video services. However, it also revealed a significant optimistic connection between customer quality Online Flow Experience (OFE), Perceived Behavioral Control (PBO), and Instrumental Orientation (IR), the purpose to employ internet video services. Findings indicate a decline in TV viewership, while the limited amount of available money may pose a significant obstacle to the expansion of video platforms. This study provides vital insights into the evolving consumer behavior inside Yeman's media network at a period of minimal investigation.

1. Introduction

The television and internet video services industry has seen a significant transformation in recent years, driven by technology improvements, changing customer demands, and rapid innovation. At the current junction of conventional transmission and the digital frontier, the business is faced with the challenge of adapting to a complex array of market developments that fundamentally alter the processes of content creation, distribution, and consumption [1]. To successfully navigate this path, one must possess a deep comprehension of the complex factors influencing this ever-changing environment, and the ability to anticipate and take advantage of new prospects. The rapid ascent of streaming platforms is one of the most significant changes in the television and video services business. Conventional cable and satellite television, which used to dominate the market, are now seeing fierce challenges from on-demand streamed companies that provide a wide range of programming that can be accessed at the viewer's leisure. Entertainment streaming platforms like as Netflix, Amazon Prime Video, Hulu, and Disney + have caused significant disruption in the business, introducing a new age where consumers have unparalleled autonomy in determining consume content [2].

Technological progress is crucial in influencing the dynamics of the industry. The widespread availability of high-speed internet, the introduction of 5G connection, and the ongoing enhancement of streaming techniques have facilitated the smooth transmission of material across many devices. Virtual Reality (VR) and Augmented Reality (AR) are rapidly developing technologies that have the potential to revolutionize the way we view and interact with material, providing highly immersive and engaging experiences [3]. The amalgamation of technology and content production paves the way for new avenues in narrative development and audience involvement. With the market experiencing rapid changes, conventional revenue structures are being questioned.

* Corresponding author.
E-mail addresses: yashwanth.n@manipal.edu (Y. Nanjappa), divakararao.dusi@raghuenggcollege.in (D.V. Divakara Rao).

https://doi.org/10.1016/j.entcom.2024.100688
Received 20 January 2024; Received in revised form 1 April 2024; Accepted 17 April 2024
Available online 18 April 2024

Advertising-supported entertainment streaming services operate alongside subscription-based models, and it is crucial to strike a careful balance to maintain long-term profitability. The emergence of ad-free subscription designs, exemplified by Netflix, poses a threat to the conventional ad-supported TV paradigm, compelling marketers to reconsider their approaches. Meanwhile, streaming platforms are actively exploring novel sources of income, such as incorporating merchandise sales, hosting live events, and expanding their presence in other markets.

The distinction between conventional broadcasters and entertainment streaming companies is becoming more blurry, a sign of the merging of television and online video services. Not only are legacy media businesses adjusting to the new reality, but they are also becoming involved in the digital revolution. They are trying to maintain their current subscriber base while taking advantage of the huge potential of the internet streaming business, hence several have started their own streaming services [4]. The internet's ability to transcend national boundaries has propelled video and television broadcast entertainment shows to a worldwide audience. Streaming services are competing for viewers all across the world, not just in their own countries [5]. With cultural sensitivity, regional preferences, and varied market landscapes to negotiate, the globalization of content presents both possibilities and obstacles. Platforms that succeed are those that manage to serve to a wide audience while still being sensitive to regional preferences [6].

Market participants confront complex possibilities and threats as consumer behaviours are always changing [7]. More money is going into production and collaborations to meet the soaring demand for unique and exclusive content. There is a content arms race going on among entertainment streaming services as they compete to get their hands on the next big movie or TV show that will captivate viewers across the world. At the same time, established broadcasters are looking for new methods to stay relevant, such as developing hybrid models that mix linear TV with on-demand streamed and making use of their huge collections [8,9].

This research investigates the further prospects of TV and internet video services in the dynamic Yemen market by analyzing the factors that influence their use and engagement.

There is a list of related works in Section 2. In Section 3, the recommended methods are presented. The findings are presented in Section 4. The discussion is presented in section 5. The conclusion is presented in section 6.

2. Related works

Study [10] presented a model that analyzed customer and producer behaviour to quantify the deviations in product quality that occur in marketplaces for paid television services that were not fully competitive. The concept of performance overprovision suggested that cable consumers would desired to had smaller cable packages with inferior quality but at a reduced price result in a twofold gain in consumer excess for the typical consumer.

Research [11] examined a people television interacted with advertising television, evaluating the resulting impact on market dominance. The findings indicated a decrease in the market position of public television across all nations, with the exception of Germany.

Author [12] examined the impact on the welfare of the vertical cooperation of "regional sports networks (RSNs)" with content providers in the multiple television industries of the United States. They employed these estimations to assess the effects of replicated vertically merged and disposals of RSNs on innovation and welfare. Additionally, they evaluated the effectiveness of regulatory regulations implemented by the United States.

Article [13] investigatedthat "Over-The-Top (OTT)"entertainment services in prominent nations with a significant television market often used localization planning, partnership tactics, content distinction strategy, revenue improvement strategy, and service optimization approach. Consequently, it has been shown that the rise in fixed broadband subscribers had a numerically substantial influence on the growth of market concentration in the pay-TV industry and the trend of cord-cutting. However, the revenues generated by OTT services do not had an effect.

Paper [14] investigated the correlation amongProduct Efficiency, customer happiness, and behavioral intentions in the "pay television (pay TV)" business. Additionally, it analyzed the impact of switching obstacles on forecasting consumer behaviour. The findings indicated that there were favorable associations among service performance, customer fulfillment, and behavioral intentions.

Study [15] investigatedanonline video-sharing platform, that was widely used internationally as a valuable resource for knowledge on scientific and environmental concerns. The result indicated YouTube, a widely popular online video-sharing platform, was widely used internationally as a valuable resource for scientific and environmental knowledge.

Research analyzed the publicly accessible industry records, trade media protection, and CEO statements to investigate the role of conventional television programme marketing in "subscription video-on-demand (SVOD)" platforms, specifically focusing on Amazon and Netflix. The endeavors of Amazon to construct a streaming service while using network identity personalities, and the aspirations of Netflix to develop its own brand by disregarding such identities, highlighted the need to observe modern television branding as a continuous struggle between existing and emergent practices.

Article [16] investigated the expansion of the internet has given rise to emerging "attention markets," where individuals dedicated more and more duration to absorbing internet material. However, the neurobehavioral processed that underlie involvement in these markets had not been fully explored. These results expanded the existing Neural estimating concept and methods by demonstrating that the activity in brain areas associated with anticipating emotions before starting to watch a video might predict how much time people would spend on it in a real-world online attention market.

Author [17] examined the influence of two assistance, Netflix and its Spanish equivalent Movistar+, on the regional producing environment of Spanish television. However, the introduction of internet-based television services that were either free or subsidized by subscribers in Spain had a substantial impact on the quantity of television production in the nation, and altering the overall characteristics of Spanish television manufacturing.

Paper [18] examined the elements that had influenced Indian consumers to transition from TV serials to online drama. Their research was done before the implementation of the lockdown measures and hence its findings were not influenced by the subsequent impacts of the lockdown.

The Perceived features include PU, RD, PES, and CY. According to the research, the research proposes the subsequent hypothesis:

Hypothesis 1 (H1): There is a positive correlation between the perceived qualities of VPs and the purpose to employ them.
Hypothesis 2 (H2): There is a negative correlation between the perceived qualities of VPs and the purpose to employ television.
Hypothesis 3 (H3): The purpose of employing video platforms will be favorably correlated with customer features.
Hypothesis 4 (H4): Interactional behaviour with the material will positively correlate with VP's purpose to employ.
Hypothesis 5 (H5): Interactional behaviour with the material has a negative correlation with TV usage purposely.

3. Methodology

3.1. Theoretical structure

The structure analyses the Correlation(C) among the perceived features of video platforms (VP) and customer features of public propensity to employ VPs and Television in the Yemen industry. The key features of VPs are "perceived substitutability (PU)", "relative advantage (RD), perceived ease of use (PES), and compatibility (CY)", whereas customer traits comprise "ritualistic orientation (RR)", IR, "subjective norms (SO)", "perceived behavioral control (PBO)", and OFE. The research examines further the correlation between the intentions to use "virtual private networks (VPNs)" or "traditional television (TV)" and material consumption patterns. The use and engagement with material behaviour include the duration spent on the utilization of television or video platforms.

This study proposes to identify the specific features of the VP and consumer factors that have a significant impact on teens' purpose to employ VPs and TV. Furthermore, it analyses the correlation between the employment of VPs or TV and material behaviour. Fig. 1 depicts the Theoretical Structure.

3.2. Perceived features

3.2.1. PU

The current discussion revolves around whether a new medium can replace or precedes existing media, particularly when the new channel offers similar functionality as the old one. To perceive the impact of a novel media on a preexisting one, it is crucial to analyze customer perspectives about the Modern channel and its potential to substitute the current one.

3.2.2. RD

Another determinant is the RD, which refers to the degree to which an innovation is seen as an enhancement over a previous channel. When the RD of a modern substance is better than that of the old one, customers choose the innovative alternative. Investigators have also discovered that RD, or resistance to change, is a substantial indicator of when the public chooses to embrace a Modern transmission channel.

3.2.3. PES

The PES was identified as the most influential factor in determining audience choices to use an internet-based product. PES relates to the extent to which audiences perceive the employ of a certain method as being devoid of physical and mental exertion.

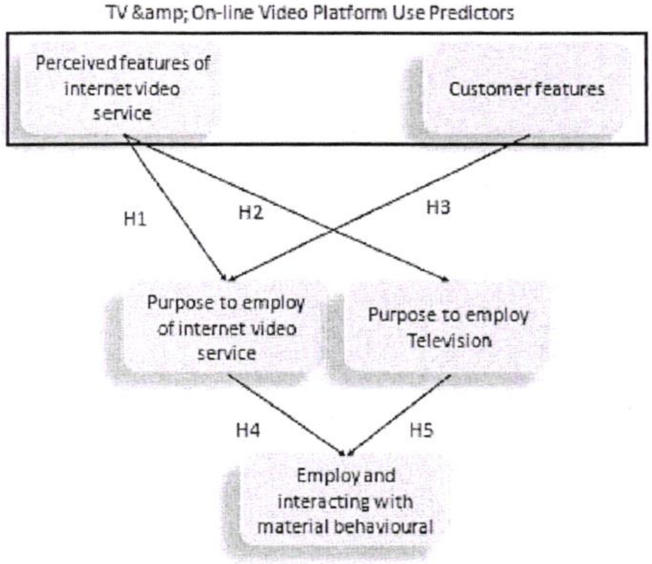


Fig. 1. Schematic flow of Theoretical Structure ().
Source: author

3.2.4. CY

CY is regarded as a crucial factor in determining audience willingness to embrace a novel internet-based technology. The amount of accordance between the new technology and prior experiences is referred to as CY. The study discovered that the CY of VPs reduces the probability of television use. It also revealed that the modern structure is not aligned with the conventional system. Consequently, those who regard VPs as consistent may view television as inconsistent with their opinions and perspectives.

3.3. Customer features

The Customer features involve IR and RR, SO, PBO, and OFE.

3.3.1. IR and RR

The IR variable focuses on audience engagement and the level of interaction with various media outlets. The concept may be categorized into two distinct types symbolic television employ, which refers to the employ of television as a means of filling time without regard to the material, and instrumental television use, which involves purposeful and selected engagement with media for the purpose of accessing particular material. Research on media consumption patterns comparing television and the internet provides varying outcomes. Several studies have shown that the Internet is mostly used for practical purposes, while others have concluded that there is no notable distinction between instrumental and recreational internet usage. The relationship between RR and IR in the context of consuming video material is positively correlated with the purpose of employing television.

3.3.2. SO

Research has also shown that the SO variables have a significant and advantageous impact on the incentive to use a specific innovation, given that social variables have a favorable effect on people's utilization of ICT. This indicates that watching video material is often regarded as a popular means of social engagement and social absorption.

3.3.3. PBO

PBO refers to individuals' belief in their ability to participate and actively engage in certain behaviour, as well as their possession of the necessary resources for such involvement. Multiple studies have shown it as a significant determinant of user engagement on digital platforms. The perceived enjoyment of virtual personalities is directly correlated with the user's desire to interact with virtual personalities.

3.3.4. OFE

It was discovered that OFE is an additional factor that influences audience behaviour. When a website enables the OFE service, it leads to an increase in the frequency and length of users' visits to the website. There is a favorable correlation between the OFE and satisfaction levels. The OFE has a beneficial effect on the desire to embrace online gaming.

The Theoretical Structure examines the correlation between the purpose of employing VPs and TV with the actual employment and engagement (such as watching, collaborating, and producing) with the material.

3.4. Statistics gathering and testing

This investigation used a statistical research methodology by creating an evaluation to gather data from 400 graduates who are now registered at one of the primary private institutions in Yemen. The purpose was to comprehend their utilization habits and examine these behaviors influence public material behaviour. Prior to distributing the main research, a pretest was conducted to confirm the dependability of the concepts and to assess the language and flow of the responses to avoid any potential confusion or ambiguity. Statistics for hypothesis evaluating were gathered between Apr and Dec 2019, and clearance was obtained from the institutional review board (IRO). A total of 400 replies were obtained. For a community of 1,000,000, a sampling number of 390 is appropriate. Additionally, the sample number may be determined by multiplying the amount of factors in the tested models by 10. This research has 20 factors hence a sampling number of 200 may be employed. The age varies from 19 to 23 years. The proportion of male students among the participants was 67 %, while the proportion of female students was 33 %.

Television material refers to content specifically produced for broadcasting on television networks or additional material available on online platforms. Other competent material includes content developed by individuals through various communication mediums such as short videos, trailers, and marketing positions. In this investigation, the word qualified pertains to the source of the material rather than its quality. For instance, we consider a video interaction accessible on a newspaper's website in this category, regardless of its state. The video blends Utilizing material produced by individuals, these are the results of video blends generated by individuals via methods such as dubbing or altering the language of a movie. Amateur film Videos produced by beginners are sometimes referred to as home videos.

3.5. Mathematical analyses

The assumptions suggested in the models were tested using Structural Equation Modeling (SEO). Prior to doing the structural method analysis to examine the association among the independent factors, intermediate factors, and dependent factors, an evaluation of the model fit for the assessment models was performed. Furthermore, "generalized linear multiple regression analysis (GLU)" was conducted to determine the "correlation coefficients (CC)" among the various factors.

The correlation between one dependent factor and two or more independent factors was assessed by multiple regression analyses utilizing the IBM SPSS program. Method Evaluation is a kind of multiple regression mathematical analysis and is considered a specific instance of SEO. The approach used is CA-SEO, which stands for "(covariance-based structural equation modeling)".

3.5.1. Combined durability and validation evaluation

Table 1 presents the Parametric numbers for every design on the Left Side of the Method (LSOM), which includes the factors of perceived features of VP and customer features, as well as the regulating factors of purpose to employ. It also includes the qualitative information for the constructs on the Right Side of the method (RSOM), which consists of the regulating factors of purpose to employ and the dependent factors of use and interaction with the material.

Table 2 demonstrates a high level of dependability and satisfactory independent constancy for both categories. (Values > .6 are acceptable) are considered acceptable. Based on the results of the dependability evaluation, it can be inferred that the measures used in this investigation are dependable for collecting data related to the constructs outlined in the Theoretical Structure. Parallel relevance may be confirmed when the loadings for both the LSOM and RSOM exceed the benchmark of 0.7. Table 3 shows the Network for the RSOM. The findings have established the assessment as a dependable and accurate tool for the specific purposes of this investigation. Table 4 shows the matrices of the LSOM.

A Table 3 serves the purpose of illustrating the connections between various factors or constructs and their corresponding variables, so facilitating comprehension, examination, and interpretation of the data, particularly in the context of factor analysis or structural equation modelling.

The Table 4 displays a correlation matrix that depicts the correlations between various structures (or constructs) and variables. It aids understanding of the relationship between perceived characteristics of online video platforms, customer benefits, and purposes for using online and TV. This helps to analyse the linkages and dependencies between these aspects, which is important for various research or analytical goals such as understanding user behaviour and evaluating platform efficacy.

4. Results and evaluation

4.1. Statistical evaluation

It is crucial to acknowledge that the use of both theories provided a comprehensive understanding of the reasons and methods by which Yemen consumers employ the online or television for video material consumption. By using SEO techniques and computing the route coefficients, the model accounted for 65.1 % of the variability in the Purpose to employ VPs and 23.3 % of the variability in the Purpose to employ television.

The current research used the perceived features of VPs, PU, RO, PES, and CY, as well as Perceived customer feature, namely, RO, IR, SO, PBO, and OFE, to assess the Purpose to employ television and VPs, considering their coexistence in the market.

4.2. 4.1.1Purpose toemployVPs

Ultimately, using Pearson's correlation analysis revealed a favorable and statistically significant link between the perceived features of VPs and the Purpose to employ VPs. The connection between perceived customer features and Purpose to employ VPs is favorable and statistically significant at 0.719.The number is 760**.Table 5 shows the Purpose to employ VPs.

Table 1
Parametric numbers (N = 410) ().

Structures	Factors	SD	M	Structures	Factors	M	SD
Perceived features of Internet Video Service	Perceived adaptability	1.07	3.96	employ	TV viewing duration	1.88	0.83
	RD	1.23	3.85		Time spent using the internet and viewing online videos	4.14	1.26
	PES	1.27	4.18	watching	Multiscreen watching and TV involvement	2.78	0.80
	CY	1.23	3.91		Category of material noticed	3.42	0.79
Customer features	RR	1.21	3.59	collaborating	collaborating views	2.73	1.48
	IR	1.17	3.67		collaborating Videos material	3.36	0.83
	SO	1.28	2.96	producing	Videos material development	1.97	1.10
	OFE	1.26	3.54		Videos Blend	1.45	0.82
Purpose to employ	Purpose to employ of Internet video service	1.34	3.89	Purpose to employ	Purpose to employ of Internet video service	1.34	3.89
	Purpose to employ TV	1.36	2.90		Purpose to employ	2.90	1.36

Source: author

Table 2
Dependability Cronbach's Alpha ().

Structures	Factors	Dependability	Structures	Factors	Dependability
Perceived features of Internet Video Service	PU	.932	employ	TV viewing duration	.659
	RD	.929		Time spent using the internet and watching online videos	.654
	PES	.925	watching	Multiscreen watching and TV involvement	.594
	CY	.927		Category of material noticed	.588
Customer features	RR	.926	collaborating	collaborating views	.635
	IR	.937		collaborating Videos material	.581
	SO	.928	producing	Videos material development	.598
	OFE	.926		Videos Blend	.632
Purpose to employ	Purpose to employ of Internet video service	.944	Purpose to employ	Purpose to employ of Internet video service	.626
Total		.937	Total		.622

Source: author

Table 3
Anti-Image Correlation Network for the RSOM ().

Factors (Structures)	1	2	3	4	5	6	7	8	9	10
1. employ – TV viewing duration	.456	—	—	—	—	—	—	—	—	—
2. employ– Time spent using the internet and watching online videos	.130	.742	—	—	—	—	—	—	—	—
3. watching– Multiscreen watching and TV involvement	.013	−.213	.798	—	—	—	—	—	—	—
4. watching – Category of material noticed	−.113	−.197	−.183	.814	—	—	—	—	—	—
5. collaborating – collaborating views	.024	−.073	−.022	−.077	.94	—	—	—	—	—
6. collaborating – collaborating Videos material	−.020	−.036	−.298	−.335	−.231	.786	—	—	—	—
7. producing – Videos material development	.069	−.015	−.040	−.124	−.022	−.177	.765	—	—	—
8. producing– Videos Blend	−.095	.115	−.235	.032	−.032	.049	−.363	.638	—	—
9. Purpose to employ online	.178	.022	−.011	−.134	−.054	−.019	−.142	.015	.626	—
10. Purpose to employ TV	−.331	.116	−.069	.011	.046	−.098	.032	.049	−.361	.548

Source: author

Table 4
Anti-Image matrices of the LSOM ().

Structures	Variables	PU	RD	PES	CY	RR	IR	SO	PBO	OFE	ONLINE	TV
Perceived characteristics of online video platform	PU	0.963	—	—	—	—	—	—	—	—	—	
	RD	−0.139	0.946	—	—	—	—	—	—	—	—	
	PES	−0.261	−0.296	0.98	—	—	—	—	—	—	—	
	CY	0.057	−0.296	−0.273	0.951	—	—	—	—	—	—	
Customer features	RO	0.066	−0.065	−0.187	−0.127	0.969	—	—	—	—	—	
	IR	−0.163	−0.063	−0.043	−0.151	−0.097	0.964	—	—	—	—	
	SO	−0.022	−0.045	0.085	−0.131	−0.172	−0.268	0.936	—	—	—	
	PBO	−0.117	0.199	−0.168	−0.27	−0.071	−0.188	0.072	0.964	—	—	
	OFE	−0.041	−0.059	0.054	−0.024	−0.235	−0.098	−0.032	−0.065	0.956	—	
Purpose to employ	ONLINE	−0.012	−0.17	−0.139	−0.097	−0.087	−0.149	0.043	−0.179	−0.316	0.963	—
	TV	−0.089	0.098	−0.043	0.075	−0.079	−0.13	−0.193	−0.127	−0.088	−0.046	0.943

Source: author

4.2.1. *Purpose to employTV*

Regarding the Purpose to employ TV, the SEO discovered that perceived customer traits ($c = 0.567^{**}$, $p < .01$) had a positive correlation with the Purpose to employ TV.

Additional examination of the elements comprising the perceived customer characteristics examined that there is a significant positive connection between SO ($c = 0.304^{**}$, $p < .01$) and PBO ($c = 0.271^{*}$, $p < .05$) with the use of TV. This statement challenges the premise that there is a negative relationship between functional watching orientation and the Purpose to employ television. There was no discernible correlation between any of the VPs' observable traits and their inclination to watch television.

Employing Pearson's correlation analysis, it was determined there is a positive and essential correlation among the perceived features of VPs and the Purpose to employ TV, with a CC of.334**. Additionally, there is also a positive and essential correlation among the perceived customer features and the Purpose to employ TV, with a CC of.450**. Above this are the CC found for the Purpose to employ VPs.

Age and gender do not quantitatively influence the correlation between the VPs' observable traits, the customers features noticed, and the Purpose to employ the VPs or TV, according to an analysis of their regulatory effect.

Table 5
The purpose to employ vps ().

Statement	Elements	Correlation (c)	Significance (p-value)
Regarding the Purpose to employ virtual private networks (VPNs)	Perceived features of VPs	0.3499**	p < .01
	Perceived features of customers	0.507**	p < .01
Additional examination of the elements comprising the Observed features of VPs	PES	0.252**	p < .01
In contrast, the examination of the elements of perceived customer features indicated that three elements	IR	0.243**	p < .01
	PBO	0.263**	p < .01
	OFE	0.375**	p < .01

Source: author

4.2.2. *Employ and connection with material characteristics*

Ultimately, the frequent analysis yielded more understanding of customer behaviour in relation to the Serve and Connection with material features. Approximately 62 % of the participants said that they spend less than 2 h per day watching television, but 50 % of them reported spending more than 5 h per day browsing the internet. The development of internet browsing has had a profound impact on the viewing habits of individuals. A notable 31.6 % of respondents have completely ceased watching television, while a considerable 62 % now allocate less time to TV consumption. Ultimately, 41 % of participants engage in the act of consuming television programming on the internet at least once a day, and 34 % do so at least once a week. Table 6 shows the Employ and Connection with material characteristics.

Music (54.1 %) and comedy (45.7 % of all views) are the most popular genres among those who watch at least one video online every day. Also, among those who watch at least one video online every day, the most popular genres are music (22.6 %) and comedy (39.8 %).

Table 6
Employand Connection with material characteristics ().

Category	Statement	Elements	Correlation (c)	Significance (p-value)
Watching	Regarding the Purpose to employ virtual private networks (VPNs)	Perceived features of VPs	0.3499**	p < .01
		Perceived features of consumers	0.507**	p < .01
Collaborating	Additional examination of the elements comprising the Observed features of VPs	PES	0.252**	p < .01
Producing	In contrast, the examination of the elements of perceived customer features indicated that three elements	IR	0.243**	p < .01
Employ		PBO	0.263**	p < .01
		OFE	0.375**	p < .01

Source: author

A half of internet users do it at least once a week, and a half do it at least once a month. At least 32.1 % of internet users share videos online at least once daily, and 32.6 % do so at least once weekly. Social networking applications like Facebook and Twitter account for 51.7 % of material collaborating, while instant communication apps like WhatsApp account for 33.8 %.

In terms of engaging with information, 31.8 % of people said they would use the like/dislike buttons at least once a day, while 26.5 % said they never do. Of those that see material, only 10.7 % would remark on it at least once a day, and 50.2 % would never comment at all.

While watching television, many people utilise several screens at once. For example, 69.3 % of respondents employ their computers, and 28.5 % utilise their cellphones. They engage in non-audiovisual pursuits unrelated to the TV show they are seeing (36.6 % of the time) and watch other videos at the same time as the show they are watching (21.9 % of the time). Lastly, half of the people who took the research had never recorded a video to share online, and even more have never mixed a film using professional graphics or audio.

5. Discussion

The findings confirm the hypothesis that there is a substantial negative association between TV watching duration and purpose to employ VPs because they indicate that individuals are watching less TV. Although there is no significant association between the purpose to employ VPs and videos blends or alteration, there is a substantial positive correlation between the purpose to employ VPs and collaborating views, collaborating, and video material production for entertainment purposes. It has been discovered that those who employ VPNs and watch less television also spend more time browsing and viewing videos online.

The findings indicate that although conventional television in Yemen is not going away, it is certainly experiencing many difficulties, particularly in light of the fact that TV programming networks were unable to establish a presence on the new platforms due to their inability to adjust to the recent developments. If not, conventional TV would eventually disappear and become outdated. With the evolution of technology and customer consumption, conventional television began to fade into the background. Due to Yemen's low accessible income and the fact that traditional TV is still popular among older generations, it may take some time before it is replaced. As a result, the country's online video consumption is increasing, but at a slower pace than that of other developed nations. It is imperative for traditional transmitting networks to devise strategies and elements of entertainment to appeal to younger generations and accomplish them on the websites they utilise, as the various packages created by telecommuting and video services draw more viewers to online platforms. This is in line with the platform evolution concept and technology change, which contends that emerging technologies do not always indicate the creation of new ones but rather pose a danger to the market's required participants.

6. Conclusion

This study uses predictors to assess usage and interaction as it anticipates the development of TV and internet video services in Yemen's dynamic market. The investigation demonstrates that the PES is the only variable that shows a positive correlation with the purpose to employ online video platforms, outperforming earlier results. Remarkably, IR, PBO and OFE also demonstrate substantial positive correlations with the desire to use these services. The investigation, which included 400 academic graduates, provided insights into changing consumer behaviors, including a decrease in conventional television watching. Nonetheless, the research highlights a realistic obstacle to the expansion of video services, namely the difficulty presented by limited disposable funds in the dynamic Yemen media environment. The findings confirm the hypothesis that there is a substantial negative association among TV viewing time and purpose to employ VPs because they indicate that individuals are watching less TV. This study presents insightful information on how customer behaviour is evolving inside Yemen's research-weak transitioning media structure.Constraints include the necessity for a strong infrastructure, changing media consuming choices, and rapid technology improvements. Future developments in personalized media distribution, VR, AR and flawless cross-platform interaction along with engaging entertainment content. Sustained innovation will lead to improved user experiences and provide new opportunities for industry growth.

CRediT authorship contribution statement

Yashwanth Nanjappa: Writing – original draft. **M. Guru Vimal Kumar:** Writing – review & editing, Formal analysis. **K. Vanisree:** Writing – review & editing, Data curation. **D.V. Divakara Rao:** Writing – review & editing, Validation, Supervision. **Saiyed Faiayaz Waris:** Writing – original draft, Validation, Software. **Narender Chinthamu:** Supervision, Methodology, Formal analysis.

Declaration of competing interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

Data availability

Data will be made available on request.

References

[1] F.R.D. Carpentier, T. Correa, M. Reyes, L.S. Taillie, Evaluating the impact of Chile's marketing regulation of unhealthy foods and beverages: pre-school and adolescent children's changes in exposure to food advertising on television, Public Health Nutr. 23 (4) (2020) 747–755.
[2] I.A. Guitart, G. Hervet, S. Gelper, Competitive advertising strategies for programmatic television, J. Acad. Mark. Sci. 48 (2020) 753–775, https://doi.org/10.1007/s11747-019-00691-5.
[3] D. Rowe, R. Tiffen, B. Hutchins, Keeping it free: Sport television and public policy in Australia, J. Digital Media Policy 14 (1) (2023) 103–123, https://doi.org/10.1386/jdmp_00098_1.
[4] A.E. Tuchman, H.S. Nair, P.M. Gardete, Television ad-skipping, consumption complementarities and the consumer demand for advertising, Quant. Mark. Econ. 16 (2) (2018) 111–174, https://doi.org/10.1007/s11129-017-9192-y.
[5] M. Kamei, Trends and technology in the era of post TV-the rise of OTT platforms, Think India Journal 22 (33) (2019) 184–192.
[6] S. Kim, D. Kim, Rethinking OTT regulation based on the global OTT market trends and regulation cases, J. Internet Comput. Serv. 20 (6) (2019) 143–156.
[7] E.A. Park, Business strategies of Korean TV players in the age of over-the-top (OTT) video service, Int. J. Commun. 12 (2018) 22.
[8] T. Kumari, A study on growth of over the top (OTT) video services in India, Int. J. Latest Res. Human. Social Sci. (IJLRHSS) 3 (9) (2020) 68–73.
[9] R.K. Tengeh, N. Udoakpan, Over-the-top television services and changes in consumer viewing patterns in South Africa, Manage. Dyn. Knowledge Econ. 9 (2) (2021) 257–277.
[10] G.S. Crawford, O. Shcherbakov, M. Shum, Quality overprovision in cable television markets, Am. Econ. Rev. 109 (3) (2019) 956–995, https://doi.org/10.1257/aer.20151182.
[11] F. Galetić, M. Dabić, Quo Vadis public television? Market position of selected Western European countries, Technol. Soc. 66 (2021) 101634, https://doi.org/10.1016/j.techsoc.2021.101634.
[12] G.S. Crawford, O. Shcherbakov, M. Shum, Quality overprovision in cable television markets 109(3), (2019)956-995.
[13] S. Park, Y. Kwon, Research on the Relationship between the Growth of OTT Service Market and the Change in the Structure of the Pay-TVMarket. (2019).
[14] N.M. Dawi, A. Jusoh, J. Streimikis, A. Mardani, The influence of service quality on customer satisfaction and customer behavioral intentions by moderating role of switching barriers in satellite pay TV market, Econ. Sociol. 11 (4) (2018) 198.
[15] J. Allgaier, Science and environmental communication on YouTube: strategically distorted communications in online videos on climate change and climate engineering, Front. Commun. 36 (2019), https://doi.org/10.3389/fcomm.2019.00036.
[16] L.C. Tong, M.Y. Acikalin, A. Genevsky, B. Shiv, B. Knutson, Brain activity forecasts video engagement in an internet attention market, Proc. Natl. Acad. Sci. 117 (12) (2020) 6936–6941, https://doi.org/10.1073/pnas.1905178117v.
[17] D. Castro, C. Cascajosa, From Netflix to Movistar+: How subscription video-on-demand services have transformed Spanish TV production, JCMS: J. Cinema Media Stud. 59 (3) (2020) 154–160, https://doi.org/10.1353/cj.2020.0019.
[18] P. Gupta, The factors effecting shift of Indian customers from TV series to web series-the future of OTT services in India, EPRA Int. J. Multidisciplinary Res. (IJMR) (2021).

ARTIFICIAL INTELLIGENCE AND ARGUMENTED REALITY DRIVEN HOME AUTOMATION

Dr.K.Vanisree[1], Pallepati Varalaxmi[2], Gangaraju Bindhu Madhavi[3], Palsam Uday[4], Neerudi Bhavani[5]
Associate Professor & Head Of The Department[1], Students[2,3,4,5], Dept.ECE
Samskruthi College Of Engineering And Technology, Ghatkesar, Hyderabad, Telangana, India.

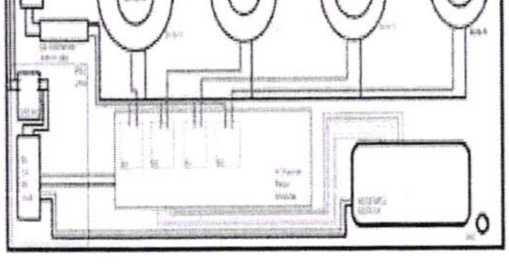
Abstract: *This paper presents a low-cost flexible and reliable home automation system with additional security using Arduino microcontroller, with IP connectivity through local Wi-Fi for accessing and controlling devices by authorized user remotely using Smart phone application. The proposed system is server independent and uses Internet of things to control human desired appliances starting from industrial machine to consumer goods. The user can also use different devices for controlling by the help of web-browser, smart phone or IR remote module. To demonstrate the effectiveness and feasibility of this system, in this paper we present a home automation system using Arduino UNO microcontroller and esp8266-01 as a connectivity module. It helps the user to control various appliances such as light, fan, TV and can take decision based on the feedback of sensors remotely. We have tested our system through conducted experiment on various environmental conditions. To control lights, fans and other home appliances which are connected to the relay system, the system offers switching functionalities. It is also used for environmental monitoring by sensing and analysing data about temperature and humidity. Another notifying feature in this system designed is the intrusion detection which is offered by this system using motion sensor. All these activities are controlled by using Android mobile app-Blynk.*

Keywords: Arduino Uno Controller; Internet of things (Iot); Esp8266-01; Wi-Fi network; Node MCU, IoT, Blink app

I. Introduction

As rapid change in technology always aims to serve the mankind, the expectation for living a simple yet advance life keeps on increasing Internet has become an important part of human's social life and educational life without which they are just helpless. The Internet of things (Iot) devices not only controls but also monitors the electronic, electrical and various mechanical systems which are used in various types of infrastructures. These devices which are connected to the cloud server are controlled by a single user (also known as admin) which are again transmitted or notified to all the authorized user connected to that network [2-5]. Various electronics and electrical devices are connected and controlled remotely through different network infrastructures. Web browser present in laptop or smart phone or any other smart technique through which we can operate switches, simply removes the hassle of manually operating a switch. Now a day's although smart switches are available, they prove to be very costly, also for their working we required additional devices such as hub or switch [3,6]. As there is rapid change in wireless technology several connectivity devices are available in the market which solves the purpose of communicating medium with the device and the micro-controller. Starting from Bluetooth to Wi-Fi, from ZigBee to Z-wave and NFC all solve the purpose of communicating medium.

1.1 Block Diagram



Following diagram explains how each of the equipment works according their functions in given circuit diagram. schematic diagram, algorithm, flowchart which help to know the design and methodology.

1.2 Main Switch

We have main switch at the top left side of our circuit from where 240V will pass from them in short, the main switch is our power supply from where voltage will pass throughout the circuit that there is an input indication switch that switch will indicate where the 5v voltage is reaching at our whole circuit or not.

1.3 DC Hub

DC HUB is used to convert DC to AC voltage because our circuit works on alternate voltage. provide 6 DC power sources for the connected devices. DC power cord application eliminates the use of the extension cord keeping your server room neat. Fool Proof plugs, avoid short-circuitry.

1.4 Bulb Sockets and Bulbs

There work here is to see whether the passing voltage is circulating in proper manner they will glow when the 5v reach at them. They are output unit we can find out our circuit is working properly or not at output section.

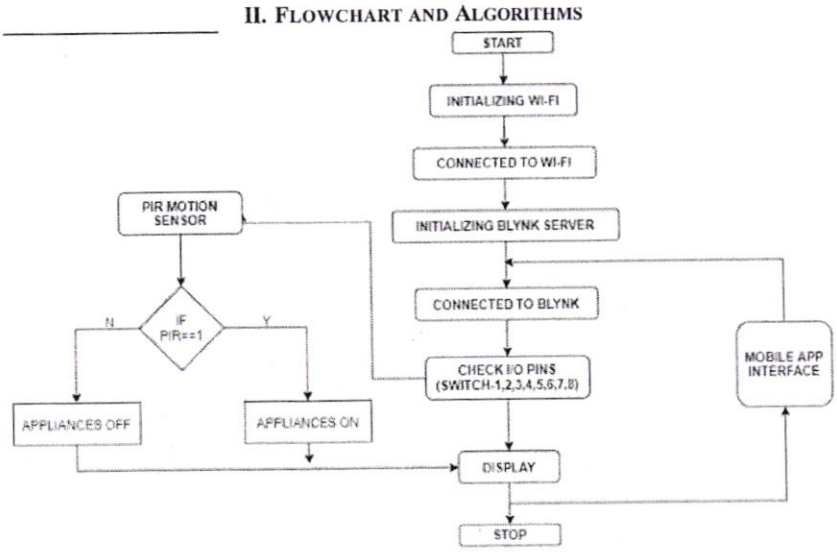
1.5 Relay Module

This section is heart of our circuit after programming done in Arduino section is done the we can see weather bulbs are blinking or not but the neutral & phase section is connected to relay module whenever we use the blink app & give command to circuit which are active high value & active low value according to our necessary needs, we can observe the output.

1.6 Node MCU

In this section program execution takes place our main program is stored in aurdiuo after execution of program the output generated by the Arduino is 3v so we have added a level shifter to amplify the 3v into 5v because our circuits minimum requirement of voltage is 5v. Open the Serial Monitor window from the Arduino IDE and change the following settings at the bottom of the Serial Monitor window: Both NL & CR – send both a newline and carriage return character at the end of a command. 115200 baud.

II. Flowchart and Algorithms



2.1 Algorithm

1. Analysis of the problem. Analyse the problems to be studied regarding smart home.
2. Analysis of needs. In this case all needs in researching both from journals, literature books, tools, and materials.
3. System design. Designing tools to be built using the NodeMCU ESP8266 module, and the sensors used.
4. System programming. Make a program using the Arduino IDE and the Blynk android application.
5. Testing tools. Testing tools with program codes created and internet connections.
6. Making reports and summarizing the results of the experiment.

III. Result

The main purpose of this smart home design is to control the electronic appliances in home like fans, lights, AC and forth remotely using smart phone. By using Blynk android app one can control the electronic appliances in home from any distance All the persons in that family can share Blynk app so that, when one person switches a device either fan or light etc., remaining persons will get this information and are aware of usage of the respective equipment Once all the connections are given to all the components start working. This proposed system when we give input the person by the operation It gives notifications and alerts the user in different instances like when the person enters into the room and automatically switches on and off home appliances like fans, for instance, if there is absence of light then immediately the bulb will glow as shown in below.

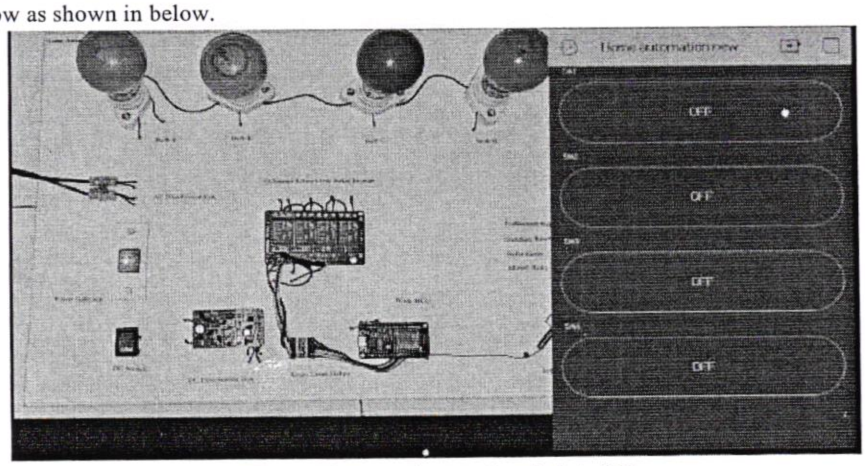


Figure: Output when each switch is ON

IV. Applications Of Home Automation

1. Controlled electrical fixtures such as lights and air conditioners
2. Simplified garden or lawn management
3. HVAC
4. Controlled smart home appliances
5. Enhanced safety and security at home
6. Water and air quality control and monitoring
7. Voice based home assistant supporting natural language
8. Smart locks and switches

V. Advantages Home Automation

1. Safety. The ability to control small appliances and lighting with your fingertips anywhere you are will add safety in your home. You can make sure appliances are off when it's needed to be off and on when it's needed to be on.

2. Security. The ability to lock the door through your phone is one of the greatest benefits of home automation. This will give you peace of mind knowing that the door is close and not guessing. The fact that you can be alerted each time someone enters your home also allows you to monitor who is entering your home at all times, especially when you are not there.
3. Convenience. The ability to control everything with your fingertips is very convenient. You never leave the house without your wallet, keys and your smart phone. With our smart phone always with us, we can easily monitor our home and control everything with just touch of a finger.
4. Saves Time. Since we are living in a very fast-paced environment, we don't even have time to worry about our home. With home automation, we can save time going back to our home and make sure everything is order, like if the kids close the door from school or turn on the lights when you get home
5. Save Money. This is the biggest advantage of home automation. With the ability to control the light, whether dimming or turning on/off on specific time will saves homeowner a great ton of money. You can save money through household temperature, with proper automation in window shades and automated thermostat. In addition, you can save gas, by not driving back home if you forgot to turn off appliances or lock the door.

VI. Conclusion

This project presented is a low cost and flexible home control and monitoring system using Node MCU Board with internet and various sensors remotely controlled by Android OS smart phone. In this, Node MCU micro controller is used as an interface between user and hardware components. It is programmed and connected to several components according to the requirements. A micro web server is used as an application layer for communication between remote users and home devices, security systems. This entire system communication is enabled through internet. Notifications are sent to user through the app BLYNK installed in smart phone. User can operate wirelessly or home appliances can be automated by using several sensors like temperature sensor, LDR etc. All these together forms a complete capable, flexible smart home control and monitoring system, based on IOT technology Smart Home with Internet of Things (IoT) based NodeMCU ESP8266 Module can be designed with various components hardware and software support so that it can be arranged into a smart home system that is controlled with the Blynk android application according to what is intended The Smart Home with this Internet of Things (IoT) based NodeMCU ESP8266 Module can be implemented to control some of the home electronics performance including lighting controls, fan control, temperature monitoring, early warning systems and etc.

VII. Future Scope

Automation is not just a word but a requirement of everyone in the future. Technology made it possible to control your home appliances with the help of mobile application or voice assistant. People in India are quickly adopting this technology but still, this technology is new for most people. Future scope for the home automation systems involves making homes even smarter. Homes can be interfaced with sensors including motion sensors, light sensors and temperature sensors and provide automated toggling of devices based on conditions. Smart Homes In the coming years, fully automated smart homes will surely become a reality as the home automation is developing rapidly. Due to good user convenience, smart homes are appealing a wide range of people all over the globe. The User can check for the electricity usage, the condition of his devices and get notification accordingly Smart Cities With increasing automation and IoT, devices can communicate with each other. This will help in building new and smarter cities. Cities that would be free form pollution, traffic accidents, etc. problems. Agriculture The proposed system can be used in Agriculture as well. The various devices used in fields can be operated from any remote location.

References

[1] International journal for research in applied science &engineering technology (ijraset) volume 6 issue iv, April 2018
[2] 7th international conference on recent trends in engineering science & management iot based office.

Automation system using android, prof. S. A. Shaikh, genba sopanrao moze college of engineering, balewadi, pune, (2017)

[3] International Journal of Advanced Research in Electrical, Electronics and Instrumentation Engineering International Office Area Monitoring and Control Using IOT ,Vol.6,Issue 6, June 2017, Prof. S.A. Shaikh, Pravara Rural Engg. College ,Loni, Maharashtra, Pune. (2017)

[4] Ahmed ElShafee; Karim Alaa Hamed; "Design and Implementation of a Wi-Fi Based Home Automation System". International Journal of Computer, Electrical, Automation, Control and Information Engineering Vol: 6 , No: 8, 2012.

[5] Monika M Patel; Mehul A Jajal; Dixita B vataliya, Home Automation using Raspberry Pi. International Journal of Innovative and Emerging Research in Engineering Volume 2, Issue 3, 2015.

[6] Praveen Kumar; Umesh Chandra Pati, "IoT based Monitoring and Control of Appliances for Smart Home". IEEE International Conference on Recent Trends in Electronics Information Communication Technology, May 20-21, 2016, India. .

[7] International journal for innovative research in science & technology (ijirst)-volume 1-may 2015' the real Time office automation using raspberry.

INTERNATIONAL JOURNAL OF APPLIED SCIENCE ENGINEERING AND MANAGEMENT
ISSN2454-9940
www.ijasem.org
Vol 18, Issue 2, 2024

IOT BASED REMOTE ACCESS HUMAN CONTROL ROBOT USING MEMS SENSOR

Dr.V.SANDEEP KUMAR[1], YELDHANDA ARUNDATHI[2], KONDAM SHIRISHA[3], KASSA BALA MANIKANTA[4], UDARI NIVAS CHANDU[5]
Associate Professor [1], Students [2,3,4,5], Dept.ECE
Samskruthi College Of Engineering And Technology, Ghatkesar, Hyderabad, Telangana, India.

Abstract: The paper describes a robustness of MEMS based Gesture Controlled Robot is a kind of robot that can be by our hand gestures rather than an ordinary old switches or keypad. In Future there is a chance of making robots that can interact with humans in an natural manner. Hence our target interest is with hand motion based gesture interfaces. An innovative Formula for gesture recognition is developed for identifying the distinct action signs made through hand movement. A MEMS Sensor was used to carry out this and also an Ultrasonic sensor for convinced operation. In order to full-fill our requirement a program has been written and executed using a microcontroller system. Upon noticing the results of experimentation proves that our gesture formula is very competent and it's also enhance the natural way of intelligence and also assembled in a simple hardware circuit.

I. INTRODUCTION

Technology is the word coined for the practical application of scientific knowledge in the industry. The advancement in technology cannot be justified unless it is used for leveraging the user's purpose. Technology, is today, imbibed for accomplishment of several tasks of varied complexity, in almost all walks of life. The society as a whole is exquisitely dependent on science and technology. Technology has played a very significant role in improving the quality of life. One way through which this is done is by automating several tasks using complex logic to simplify the work.Gesture recognition has been a research area which received much attention from many research communities such as human computer interaction and image processing. The increase in human-machine interactions in our daily lives has made user interface technology progressively more important. Physical gestures as intuitive expressions will greatly ease the interaction process and enable humans to more naturally command computers or machines. Now a day's robots are controlled by remote or cell phone or by direct wired connection. If we thinking about cost and required hardware's all this things increases the complexity, especially for low level application. For example, in tele-robotics, slave robots have been demonstrated to follow the master's hand motions remotely [1].

Gestures control robots are extensively employed in human non-verbal communication. They allow to express orders (e.g. "stop"), mood state (e.g. "victory" gesture), or to transmit some basic cardinal information (e.g. "two"). In addition, in some special situations they can be the only way of communicating, as in the cases of deaf people (sign language) and police's traffic coordination in the absence of traffic lights, a real-time continuous gesture recognition system for sign language Face and Gesture recognition.

Robots are becoming increasingly useful on the battlefield because they can be armed and sent into dangerous areas to perform critical missions. Controlling robots using traditional methods may not be possible during covert or hazardous missions. A wireless data glove was developed for communications in these extreme environments where typing on a keyboard is either impractical or impossible. This paper reports an adaptation of this communications glove for transmitting gestures to a military robot to control its functions. Novel remote control of robots has been an active area of research and technology, especially over the past decade. For example, a wearable, wireless tele-operation system was developed for controlling robot with a multi-modal display. Remotely controlled robots have been used in environments where conditions are hazardous to humans.

Gestures were used to control a flying manta-ray model. A glove apparatus was used to control a wheelchair using robotic technology. Other proposed applications of recognizing hand gestures include character-recognition in 3-D space using inertial sensors [2], [3], gesture recognition to control a television set remotely [4], enabling a hand as a 3-D mouse [5], and using hand gestures as a control mechanism in virtual reality [6]. It can also be used for the improvement of interaction between two humans. In our work, a miniature MEMS accelerometer based recognition system which can recognize eight hand gestures in 3-D space is built. The system has potential uses such it act as a vocal tract for speech impaired people. To overcome the limitations such as unexpected ambient optical noise, slower dynamic

ISSN2454-9940

www.ijasem.org

Vol 18, Issue 2, 2024

response, and relatively large data collections/processing of vision-based method [9], and to strike a balance between accuracy of collected data and cost of devices, a Micro Inertial Measurement Unit is utilized in this project to detect the accelerations of hand motions in three dimensions. The proposed recognition system is implemented based on MEMS acceleration sensors. Since heavy computation burden will be brought if gyroscopes are used for inertial measurement [10], our current system is based on MEMS accelerometers only and gyroscopes are not implemented for motion sensing. Fig.1 shows the system architecture of the proposed gesture recognition system based on MEMS accelerometer. The details of the individual steps are described below.

II. SYSTEM DESIGN MODEL

A. Software design module

For the operation purpose, the user application instructions are written programming code by using **embedded c**. The application program is compiled by using **KEIL-C** compiler and converts the source file into **.hex file**. For the dumping purpose, we use micro flash programmer. Here the program is dumped in the microcontroller **ROM memory** location. The µVision3 screen provides us with a menu bar for command entry, a tool bar where we can rapidly select command buttons, and windows for source files, dialog boxes, and information displays. µVision3 lets us simultaneously open and view multiple source files.

A project contains enough information to take a set of source files and generate exactly the binary code required for the application. Because of the high degree of flexibility required from the tools, there are many options that can be set to configure the tools to operate in a specific manner. It would be tedious to have to set these options up every time the application is being built; therefore they are stored in a project file. Loading the project file into KEIL informs KEIL which source files are required, where they are, and how to configure the tools in the correct way. The user of KEIL centers on "projects". A project is a list of all the source files required to build a single application, all the tool options which specify exactly how to build the application, and – if required – how the application should be simulated. The project can then be saved to preserve the settings. The project is reloaded and the simulator or debugger started, all the desired windows are opened. KEIL project files have the extension.

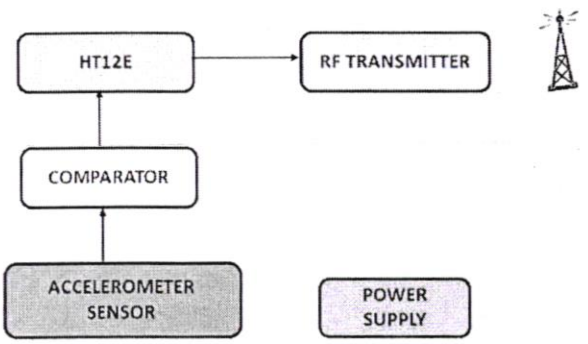
B. Hardware design module

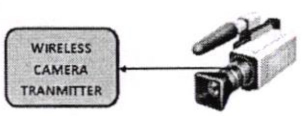
In cases there is a requirement of a mechanism where in the chair should be controlled without any physical contact. Therefore gesture is our choice in order to achieve this primary goal. Gesture is a nonverbal and easier physical action. A sensor that takes gesture as its input can do this job. The Power supply is a reference to a source of electrical power. A device or system that supplies electrical or other types of energy to an output load or group of loads is called a power supply unit or PSU. The term is most commonly applied to electrical energy supplies, less often to mechanical ones, and rarely to others. The MMA7361L is a low power, low profile capacitive micro machined accelerometer featuring signal conditioning, a 1-pole low pass filter, temperature compensation, self test, 0g-Detect which detects linear freefall, and g-Select which allows for the selection between 2 sensitivities. Zero-g offset and sensitivity are factory set and require no external devices. The MMA7361L includes a Sleep Mode that makes it ideal for handheld battery powered electronics.

The RF module, as the name suggests, operates at Radio Frequency. The corresponding frequency range varies between 30 kHz & 300 GHz. In this RF system, the digital data is represented as variations in the amplitude of carrier wave. This kind of modulation is known as Amplitude Shift Keying (ASK).Transmission through RF is better than IR (infrared) because of many reasons. Firstly, signals through RF can travel through larger distances making it suitable for long range applications. Also, while IR mostly operates in line-of-sight mode, RF signals can travel even when there is an obstruction between transmitter & receiver. Next, RF transmission is more strong and reliable than IR transmission. RF communication uses a specific frequency unlike IR signals which are affected by other IR emitting sources. The HT 12E Encoder ICs are series of CMOS LSIs for Remote Control system applications. They are capable of Encoding 12 bit of information which consists of N address bits and 12-N data bits. Each address/data input is externally programmable if bonded out. The HT 12D ICs are series of CMOS LSIs for remote control system applications. These ICs are paired with each other. For proper operation a pair of encoder/decoder with the same number of address and data format should be selected. The Decoder receive the serial address and data from its corresponding decoder, transmitted by a carrier using an RF transmission medium and gives output to the output pins after processing the data. The L293 and L293D are quadruple high-current half-H drivers. The L293 is designed to provide bidirectional drive currents of up to 1 A at voltages from 4.5 V to 36 V. The L293D is designed to provide bidirectional drive currents of up to 600-mA at voltages from 4.5 V to 36 V. Both devices are designed to drive inductive loads such as relays, solenoids, dc and bipolar stepping motors, as well as other high- current/high-voltage loads in positive-supply applications.

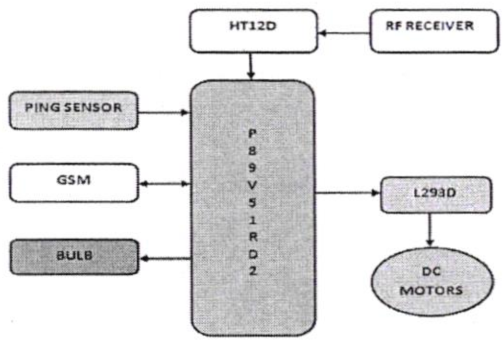
A GSM modem is a wireless modem that works with a GSM wireless network. A wireless modem behaves like a dial-up modem. The main difference between them is that a dial-up modem sends and receives data through a fixed telephone line while a wireless modem sends and receives data through radio waves.

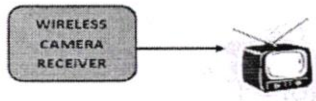
Transmitting section: The above transmitting diagram indicates the transmitting section which includes an accelerometer whose output is in continuous form as the encoder can only understands the digital data we are using the comparator for converting the analogy data to digital data and this data is to be transmitted so we are using radio transmitter which transmits the serial data converted by the encoder from parallel data.





Receiving Section: The above receiving block diagram indicates the receiver section the transmitted data by the transmitter is received by the RF receiver and the serial data is given as input to the decoder which converts the serial data to parallel data and is given as input to the microcontroller which consists of a predefined program to fulfil our task, depending upon the data received the controller generates some signals to the motor driver LED's buzzer's etc., here the purpose of the motor driver is to drive the motors and here LED's and buzzer are used for some specific indications Various types of modules like ping module, GSM module are used.The ultrasonic sensor output signal is fed to the microcontroller in which a suitable embedded 'c' program is written the algorithm here,to indicate the presence of an obstacle. Here the GSM module includes a SIM used for Tran's receiver for the controller to do a task which includes a glowing of bulb that represents a bomb.

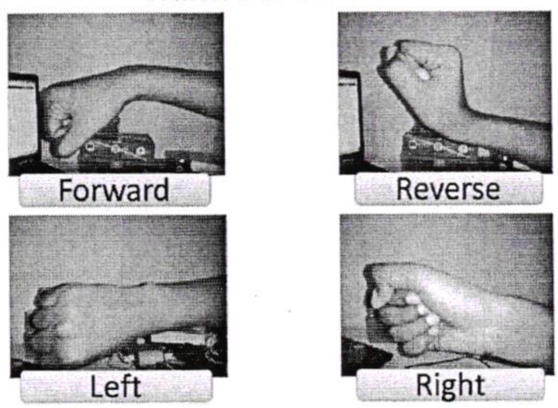




III. EXPERIMENTAL RESULTS

In the area of safety, for example, many machines require operators to place each hand on a control switch before the controller starts any action. Instead of having operators move their hands to special switches, why not simply let them hold up their hands with a gesture sensor? This type of control could improve productivity, reduce the effects of repetitive motions, and improve safety. Advanced robotic arms that are designed like the human hand itself can easily controlled using hand gestures only. The arm controller wears the sensor gloves and the robotic arm will mimic the movement of the controller. Advanced robotic arms like these can perform complex and hazardous tasks with ease. Proposed utility in fields of construction, hazardous waste disposal, medical sciences.

Hand Movement's

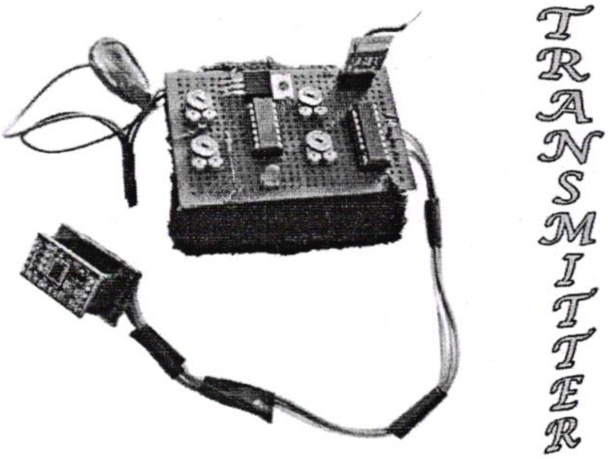


INTERNATIONAL JOURNAL OF APPLIED SCIENCE ENGINEERING AND MANAGEMENT

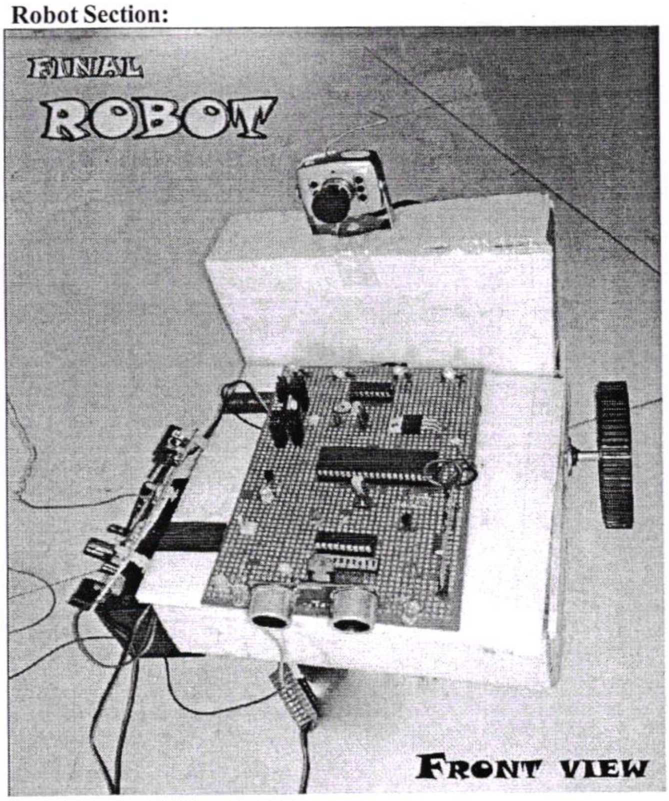
ISSN2454-9940

www.ijasem.org

Vol 18, Issue 2, 2024



Robot Section:



IV. CONCLUSION

We proposed a fast and simple algorithm for hand gesture recognition for controlling robot. We have demonstrated the effectiveness of this computationally efficient algorithm on real images we have acquired. In our system of gesture controlled robots, we have only considered a limited number of gestures. Our algorithm can be extended in a number of ways to recognize a broader set of gestures. The gesture recognition portion of our algorithm is too simple, and would need to be improved if

this technique would need to be used in challenging operating conditions. Reliable performance of hand gesture recognition techniques in a general setting require dealing with occlusions, temporal tracking for recognizing dynamic gestures, as well as 3D modelling of the hand, which are still mostly beyond the current state of the art.

REFERENCES

[1] T. H. Speeter (1992), "Transformation human hand motion for tele manipulation," *Presence*, **1**, 1, pp. 63–79.

[2] S. Zhou, Z. Dong, W. J. Li, and C. P. Kwong (2008), "Hand-written character recognition using MEMS motion sensing technology," in *Proc. IEEE/ASME Int. Conf. Advanced Intelligent Mechatronics*, pp.1418–1423.

[3] J. K. Oh, S. J. Cho, and W. C. Bang *et al.* (2004), "Inertial sensor based recognition of 3-D character gestures with an ensemble of classifiers," presentedat the 9th Int. Workshop on Frontiers in Handwriting Recognition.

[4] W. T. Freeman and C. D. Weissman (1995) , "TV control by hand gestures, "presented at the IEEE Int. Workshop on Automatic Face and Gesture Recognition, Zurich, Switzerland.

[5] L. Bretzner and T. Lindeberg(1998), "Relative orientation from extended sequences of sparse point and line correspondences using the affine trifocal tensor," in *Proc. 5th Eur. Conf. Computer Vision*, Berlin, Germany,**1406**, Lecture Notes in Computer Science, pp.141–157, Springer Verlag.

ISSN2454-9940

www.ijasem.org

Vol 18, Issue 2, 2024

[6] D. Xu (2006), "A neural network approach for hand gesture recognition in virtual reality driving training system of SPG," presented at the *18th Int. Conf. Pattern Recognition*.

[7] H. Je, J. Kim, and D. Kim (2007), "Hand gesture recognition to understand musical conducting action," presented at the *IEEE Int. Conf. Robot &Human Interactive Communication.* [8] T. Yang, Y. Xu, and A. (1994) , Hidden Markov Model for Gesture Recognition,CMU-RI-TR- 94 10, Robotics Institute, Carnegie Mellon Univ.,Pittsburgh, PA.

[9] S. Zhou, Q. Shan, F. Fei, W. J. Li, C. P. Kwong, and C. K. Wu *et al* (2009)., "Gesture recognition for interactive controllers using MEMS motion sensors," in *Proc. IEEE Int. Conf. Nano /Micro Engineered and Molecular Systems*, pp. 935–940.

[10] S. Zhang, C. Yuan, and V. Zhang (2008), "Handwritten character recognition using orientation quantization based on 3-D accelerometer," presented at the *5th Annu. Int. Conf. Ubiquitous Systems.*

[11] J. S. Lipscomb (1991), "A trainable gesture recognizer," *Pattern. Recognit.*,**24**, 9, pp. 895–907.

[12] W. M. Newman and R. F. Sproull (1979), *Principles of Interactive Computer Graphics*. New York: McGraw-Hill.

[13] D. H. Rubine (1991), "The Automatic Recognition of Gesture," Ph.D dissertation, Computer Science Dept., Carnegie Mellon Univ., Pittsburgh, PA.

[14] K. S. Fu, *"Syntactic Recognition in Character Recognition"*. New York: Academic, 1974, **112**, Mathematics in Science and Engineering.

[15] S. S. Fels and G. E. Hinton(1993), "Glove-talk: A neural network interface between a data glove and a speech synthesizer," *IEEE Trans. Neural Netw.*, **4**, l, pp. 2–8.

[16] C. M. Bishop(2006), *Pattern Recognition and Machine Learning*, 1st ed. New York: Springer.

[17] T. Schlomer, B. Poppinga, N. Henze, and S. Boll (2008), "Gesture recognition with a Wii controller," in *Proc. 2nd Int. Conf. Tangible and Embedded Interaction (TEI'08)*, Bonn, Germany, pp. 11–14.

DETECTION OF HELMET VIOLATIONS AND VEHICLE NUMBER PLATE RECOGNITION FOR SAFETY AND SURVEILLANCE SYSTEMS

Mrs.Rekha [1], Neha Tabassum [2], Rakala Manideep [3], Gottamukkala Shirisha[4] ,Matta Vamshi Krishna [5]

Asst.Professor[1], Students, [2,3,4,5], Dept.ECE

Samskruthi College of Engineering and Technology, Ghatkesar, Hyderabad, Telangana, India.

ABSTRACT

Nowadays, riding motorcycles without wearing a helmet is a traffic violation that leads to an increase in the number of accidents and deaths in India. For public safety reasons, the government made it a law that every motorcyclist wears a helmet while riding a motorcycle. But most of the people still contradict this by riding their vehicles without helmets. To address this issue, in this paper, we propose an approach for automatic detection of helmetless motorcyclists and recognition of license number plates using surveillance videos in real-time. For detection the system will use the YOLO deep learning framework. For classification SVM algorithm will be used to recognize the number plates of motorcyclists using images or videos taken by a camera, which involves different steps like vehicle classification, pre-processing, recognition of number plate. To avoid accidents and for public safety, there is need for a system that automatically detects the people who are not wearing a helmet and extracts the vehicle number which would help find the motorcyclist to be penalized. This will help the traffic police department in catching the violators and using this, data fines can be imposed on the riders who repeatedly commits the mistake of not wearing the helmet.

Keyword: YOLO, Convolutional Neural Network, SVM, OCR.

I. INTRODUCTION

In practically every country, two-wheelers are a popular mode of transportation. However, there is a substantial danger associated due to the lack of protection. It is highly recommended that bike riders use helmets to lessen the risk associated. Two-Wheelers account for the topmost number of road accidents. Though reckless and reckless driving is the primary cause of these incidents, brain injuries are the leading cause of mortality in road accidents. Study shows that further than one- third who failed in road accidents could have survived if they would have worn a helmet, the operation of helmet can save accident deaths by 30 to 40. The number of traffic accidents caused by motorcycle riders who do not wear helmets has been alarming. According to Police Department annual report (published in 2017), 35-40% of fatal accidents in the city in 2016 were caused by motorcyclists "not wearing helmets" or "low quality helmets." Section 129 of the Motor Vehicles Act of 1988 requires two-wheeler users to wear safety helmets. The law also states that a helmet should have a thickness of 20-25mm and be made of high-quality foam. It should also include the ISI mark and follow to the Bureau of Indian Standards.

But unfortunately, no one seems to follow these rules, at least not for pillion riders. These days videotape Surveillance grounded systems have turned into significant gear to remain a track on any veritably crook or foe to law movement in current moral advancement. There are being styles which use technical detectors in the ergonomics of the motorbike to check the presence of a helmet. But it's insolvable to move every stoner to install detectors on the formerly being bikes. Also, the delicacy and integrity of these detectors is questionable. Apart from this, systems that use videotape processing have veritably high computational costs. The technologies that were used to make the system were veritably precious hence making it an economically nonviable choice.

In light of this, there is an increasing demand for the development of a solid and simple adept technique for detecting helmet use of motorcycle riders that does not accept an individual's viewpoint. AI is a potential method for automating the recognition of motorcycle helmet wear. AI has been used in a variety of street healthrelated discovery projects and has achieved great precision for general recognition. Several researchers have attempted to address the problem of detecting motorcyclists without helmets using various methods, but have been unable to accurately identify motorcyclists without helmets under difficult conditions such as occlusion, illumination, poor video quality, varying weather conditions, and so on. One key cause for previous systems' low performance is the use of less discriminative representation for object classification, as well as the inclusion of irrelevant items against the goal of detecting motorcyclists without helmets. Furthermore, present techniques only make advantage of handmade features. Deep networks have acquired popularity for producing cuttingedge results in complex tasks like as picture classification, object identification, motion detection, and segmentation due to its capacity to learn features straight from raw data without the need for operator tuning.

In modern society, video surveillance-based systems have become a vital piece of technology for keeping track of any type of illegal or anti-law activity. Over the last few decades, various artificial intelligence techniques, such as computer vision and machine learning, have been widely used in intelligent monitoring at power substations. It can not only save time by avoiding labour-intensive operations, but it can also detect power equipment faults and worker unlawful operation in real time, protecting against accidents.

However, contemporary video surveillance-based solutions are passive and require extensive human intervention. In general, such systems are impractical owing to the participation of people, whose efficiency degrades with time. Automation of this procedure is very desirable for accurate and rigorous monitoring of these infractions, as well as for drastically reducing the quantity of human resources required. In addition, numerous nations are implementing systems using surveillance cameras in public spaces. As a result, the option for identifying violators utilizing current infrastructure is also cost-effective.

II. RELATED WORK

The first step in the helmet detection of motorcyclists is normally motorcycle detection. From the existing literature, it can be seen that utmost of the current styles are traditional styles, and there are relatively many styles grounded on deep learning. The object detection domain has been more frequent due to the evolving object detection algorithms that give improved accuracy in the newer performances. It's important to understand how these algorithms work and the advantages and disadvantages of choosing the one that suits this operation. This review of the former literature will concentrate on the aspects of each algorithm, and the reason for choosing a specific algorithm for this design will be justified.

2.1 Detection of helmets using traditional methods

Traditional methods generally employ similar concepts, as illustrated. It is proposed in paper by B. Yogameena et.al [1] in first step is to detect moving objects. First, moving objects are extracted from surveillance videos using the motion segmentation method. Optical flow, frame difference, and background subtraction are examples of common motion segmentation methods used by Lucas BD et.al [3]. Finally, binary classifiers (such as support vector machine (SVM) and K-nearest neighbour (KNN)) are used to categories motorcycles. The methodology followed by Messelodi S. et.al [5] used the YOLOv3 algorithm to detect whether a motorcyclist is wearing a helmet, although motorbike detection is not reported. Devadiga et al [6] described and tested a system for automatic classification of motorcycles with and without helmets. It has used (SVM) Support Vector Machine which is derived from the head region of the static images and individual image frame from video data. By this method the accuracy rate was high but the number of testing images taken were very less.

The algorithm (YOLO) is used to extract the foreground objects in the video which is then extracted as frames. The location where the helmet can be found is found by the bounding boxes. This area is extracted and the helmet is detected using a machine learning classifier. Tuytelaars T. et al [8]. used a background removal technique to identify moving cars and principal component analysis to analyse the resulting features. Waranusast et al. [9] Employ the background removal approach and the SMO (Sequential Minimal Optimization) classifier to recognize motorcycles in footage. The moving item on the video frame is obtained via adaptive background subtraction in paper proposed by Wen C-Y et.al. [10]

2.2 Deep learning-based helmet detection

Deep learning-based solutions have been proposed by scholars in recent years. W. Hu et.al [11] utilized the YOLOv3 method to recognize the motorbike and person in the image and then estimated the overlapping area of the bounding box between the motorcycle and the person to determine who was riding the motorcycle. Some authors like K. Dahiya et.al [16] used YOLOv3 technique to detect the motorbike, then extract the upper part of the image and use the classification algorithm to distinguish the helmet and non-helmet. Similarly, when there is more than one person on the motorcycle, the classification algorithm is rendered ineffective. Finally, the YOLOv3 algorithm was utilized to determine whether the motorcyclist was wearing a helmet. However, in terms of traffic surveillance, motorcyclists and motorcycles are heavily overlapping, thus detecting motorcyclists individually is superfluous. Then, hand-crafted features and CNN are employed to differentiate between helmet and non-helmet. Finally, it is demonstrated that CNN outperforms manual features in terms of accuracy. CNN is then utilized to classify motorcycle riders in moving objects. Finally, they continue to employ CNN to classify the top quarter area of motorcycles in order to confirm that riders are not wearing helmets. Algorithm then use a faster region-based CNN (faster R-CNN) to detect motorcycles in the indicated foreground items, ensuring that motorcyclists exist. Later, the quicker R-CNN was utilized to detect motorcyclists wearing or not wearing helmets. Although the helmet detection approach is employed in paper by R.V. Silva et.al [18] standard background subtraction is still used to retrieve the foreground target in the motorbike identification step, which will be very poor in a busy setting. In the paper proposed by Redmon J et.al [20] background subtraction and object segmentation are used to recognize bike riders in surveillance video first. Then, using binary classifier, it identifies whether or not the bike rider is wearing a helmet. Adam et al [21] divided the problem of detecting motorcycle helmet use into two steps. The first step is to segment and categories the vehicle images. This stage attempts to detect all moving objects in the scene. The second phase is helmet detection, a support vector machine classifier to classify an image as helmet or non-helmet.

Some authors used certain vehicle detection algorithms in which they cropped the upper part of the image and use classification algorithms to distinguish helmet and non-helmet riders which consumed more time and decreased the efficiency of the project. Some authors suggested circle arc detection algorithm to detect the presence of a helmet but they found that the drawback of this algorithm is that it uses only geometric features of the helmet. Geometric features are not enough to detect the helmet because many times the head can be mistaken with the helmet. To increase accuracy some authors used algorithms such as histogram of oriented gradient but the time interval required for image processing and object detection is high i.e., rate of 11.58 ms per frame. In order to improve the system's accuracy and overcome these issues, we will use the YOLO algorithm and the SVM as a classifier in our project.

III. METHODOLOGY

The methodology is given in the following steps: -

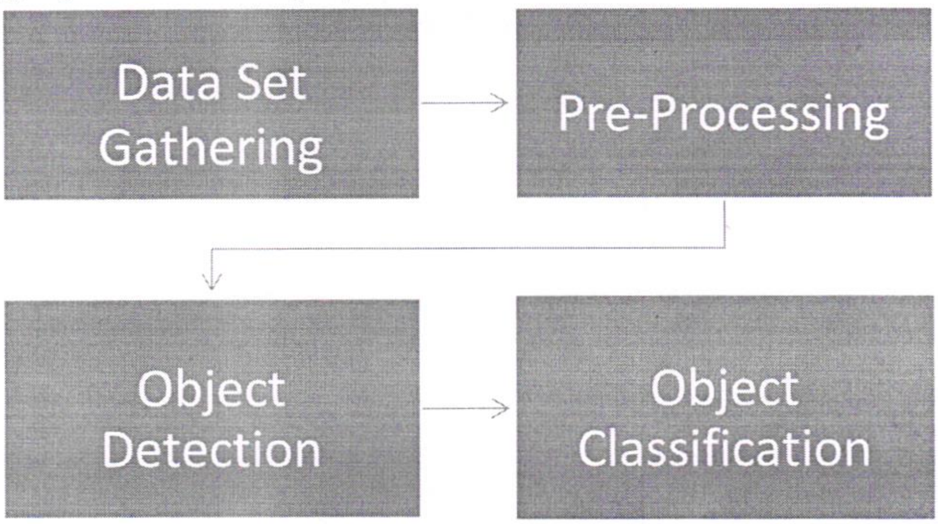


Figure 1: General Control Flow of System

3.1 Dataset Gathering and pre-processing.

The live feed captured from the Traffic Cameras will be provided as the dataset. Now inside the model first we need to pre-process the video frames by techniques such as.

• **Noise reduction:** - Image noise is random variation of brightness or colour information in images, and is usually an aspect of electronic noise.

• **Gradient calculation:** - Gradient magnitude represents the strength of the change in the intensity level of the image.

• **Image Sharpening:** - Image sharpening is an effect applied to digital images to give them a sharper appearance.

3.2 Object detection

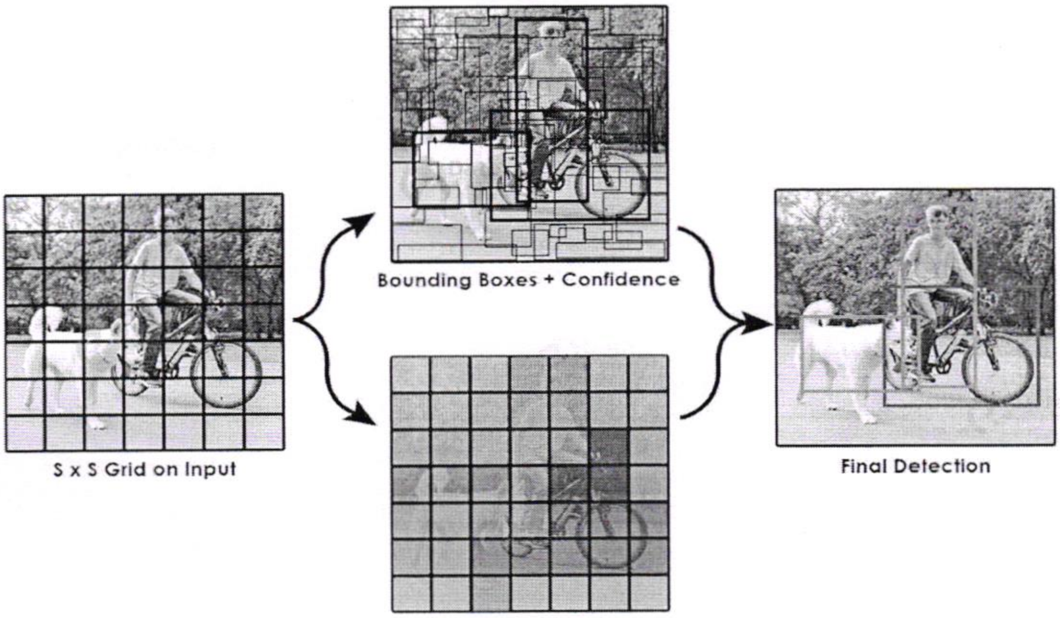


Figure 2: Working Of YOLO

The first step is to detect the objects by using Localization. Object localization is a fundamental practical task in Computer Vision, which aims to locate the target within the image or video. It has been used in many applications, including human face recognition, retail checkout recognition, automated driving, and automatic monitoring systems.

Then the algorithm we are using to detect objects is **YOLO. YOLO** algorithm employs convolutional neural networks (CNN) to detect objects in real-time. As the name suggests, the algorithm requires only a single forward propagation through a neural network to detect objects.

First, as shown in fig.2 the image is divided into grid cells. Each grid has a dimension of S X S. Each grid cell forecasts B bounding boxes and provides their confidence scores. By use of these algorithms, we will detect a rider, helmet and number plate. All the predictions are made simultaneously using a convolutional neural network. Intersection over union ensures that the predicted bounding boxes are equal to the real boxes of the objects. This phenomenon eliminates unnecessary bounding boxes that do not meet the characteristics of the objects (like height and width).

The final detection will consist of unique bounding boxes that fit the objects perfectly. Hence the two-wheelers, helmets and number plates will be detected and passed to the next step.

3.3 Object Classification

After helmet and motorbike detection, in this stage we will apply the classification methods to distinguish between the two-wheeler and the other moving objects and also classify the biker is wearing the helmet or not. The Number plate is then accessed only if the rider is not wearing the helmet.

For classification purpose we will use support vector machine algorithm. SVM (support vector machine) chooses the extreme points/vectors that help in creating the hyperplane and finds the closest point of the lines from both the classes and then make categorization. After this if the helmetless rider is detected then the number plate is extracted of that bike. Finally, as shown in fig. 3 the motorcycle and helmet are detected.

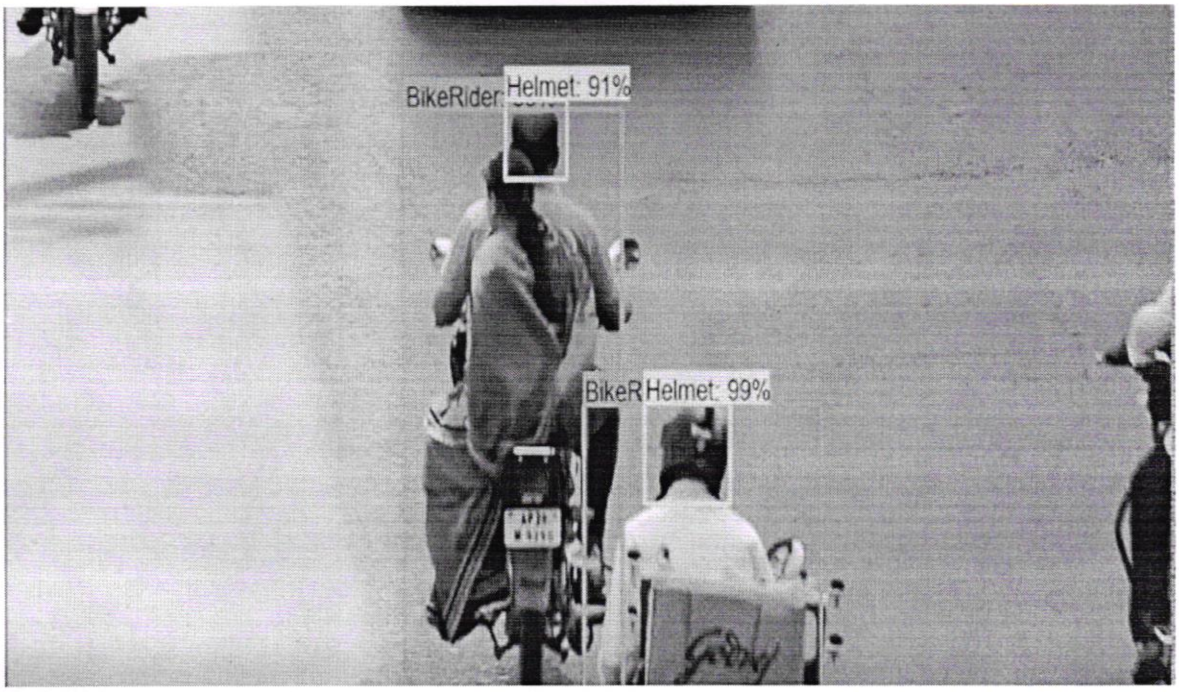


Figure 3: Detection of frame with helmet and bike

IV. DISCUSSION

We are proposing a system for the automatic detection of motorcycle riders without helmets from CCTV video and the automatic retrieval of vehicle license number plates for such motorcyclists. The existing system needs human assistance, which is a difficult task. This system will mainly use object detection principles with the YOLO architecture for helmet and license plate detection from the input given in the form of a video or an image, and the system recognizes motorcyclists who drive without wearing a helmet. Using optical character recognition (OCR), the license plate details will be read and stored in the database. The method will ensure that it will reduce both complexity and time and will save the lives of many by forcing riders to wear helmets while travelling on two wheelers and this system will help the traffic police in catching the helmetless riders without being physically present on the field.

V. CONCLUSION

This model focuses on catching motorcyclists without helmets. The existing video surveillance system is effective, but it requires significant human assistance, whose efficiency decreases with time, so we want to make it automated. First, the system classifies moving objects as either motorcycling or non-motorcycling. Furthermore, if the system detects a motorcyclist without a helmet, it will finally extract the license plate of the vehicle. This will help the Transport Office to identify every offender accurately and arrest the suspect's vehicle, thereby imposing violation fines. Thus, our model increases the speed of operations in real time with the use of the YOLO and OCR methods.

ACKNOWLEDGEMENT

First and foremost, we would like to express our heartfelt sincere gratitude to Dr.V.P. Balpande of Priyadarshini JL College of Engineering for their excellent guidance and valuable suggestions that helped us throughout this project. The team members would like to thank the Department of Computer Science and Engineering of Priyadarshini JL College of Engineering for providing the necessary support and resources.

VI. REFERENCES

[1] B. Yogameena, K. Menaka and S. Saravana Perumaal, "Deep learning-based helmet wear analysis of a motorcycle rider for intelligent surveillance system," in IET Intelligent Transport Systems, vol. 13, no. 7, 2019, pp.1190-1198

[2] J. Chiverton, "Helmet presence classification with motorcycle detection and tracking," Intelligent Transport Systems (IET), vol. 6, no. 3, September 2012, pp.259–269.

[3] Lucas BD, Kanade T (1981), "An iterative image registration technique with an application to stereo vision", Morgan Kaufmann Publishers Inc, San Francisco, pp 674–679.

[4] J. Mistry, A. K. Mishra, M. Agarwal, A. Vyas, V. M. Chudasama and K. P. Upla, "An automatic detection of helmeted and non-helmeted motorcyclists with license plate extraction using convolutional neural network",2017 Seventh International Conference on Image Processing Theory, Tools and Applications (IPTA), Montreal, QC, 2017, pp.1-6.

[5] Messelodi S, Modena C, Zanin M (2005), "A computer vision system for the detection and classification of vehicles at urban road intersections", Pattern Anal Palp 8:17–31.

[6] Kavyashree Devadiga, Yash Gujarathi, Pratik Khanapurkar, Shreya Joshi and Shubhankar Deshpande,"Real Time Automatic Helmet Detection of Bike Riders", International Journal for Innovative Research in Science & Technology Volume 4 Issue 11, 2018, pp.146-148.

[7] Sonoda S, Tan JK, Kim H, Ishikawa S, Morie T (2011), "Moving objects detection at an intersection by sequential background extraction", International conference on control automation and systems (ICCAS), pp 1752 –1755.

[8] Tuytelaars T, Gool LV, Bay H, Less A (2008), "Speeded-up robust features (surf)", Computer vision image understand, pp 346–359.

[9] Waranusast R, Bundon N, Timtong V, Tangnoi C, Pattanathaburt P (2013), "Machine vision techniques for motorcycle safety helmet detection", 28th International conference of image and vision computing New Zealand (IVCNZ), pp. 35–40.

[10] Wen C-Y, Chiu S-H, Liaw J-J, Chuan-Pin L (2003), "The safety helmet detection for ATM's surveillance system via the modified though transform", IEEE 37th Annual international Carnahan conference on security technology, pp.364–369.

[11] W. Hu, T. Tan, L. Wang, and S. Maybank, "A survey on visual surveillance of object motion and behaviors", IEEE Transactions on Systems, Man, and Cybernetics, Part C: Applications and Reviews, vol. 34, no. 3, 2004, pp.33

[12] Manoharan, S. (2019),"An Improved Safety Algorithm for Artificial Intelligence Enabled Processors in Self Driving Cars", Journal of Artificial Intelligence, 1(02), pp.95-104.

[13] Pattasu Doughmala, Katanyoo Klubsuwan, "Half and Full Helmet Detection in Thailand using Haar Like Feature and Circle Hough Transform on Image Processing" in Proceeding of IEEE International Conference on Computer and Information Technology, Thailand, Bangkok, 2016, pp.611-614.

[14] N. Boonsiri Sumpun, W. Puarungroj and P. Wairocana Phuttha, "Automatic Detector for Bikers with no Helmet using Deep Learning", 22nd International Computer Science and Engineering Conference (ICSEC), Chiang Mai, Thailand, 2018, pp.1-4.

[15] M. Dasgupta, O. Bandyopadhyay and S. Chatterji, "Automated Helmet Detection for Multiple Motorcycle Riders using CNN", IEEE Conference on Information and Communication Technology, Allahabad, India, 2019, pp.1-4.

[16] K. Dahiya, D. Singh and C.K.Mohan, "Automatic detection of bike riders without helmets using surveillance videos in real-time", in Proceeding of International Joint Conference Neural Networks (IJCNN), Vancouver, Canada, 24-2, 2016, pp.3046-3051.

[17] B. Yogameena, K. Menaka and S. Saravana Perumaal, "Deep learning-based helmet wear analysis of a motorcycle rider for intelligent surveillance system", IET Intelligent Transport Systems, vol. 13, no. 7, 2019, pp.1190-1198.

[18] R. V. Silva, T. Aires, and V. Rodrigo, " Helmet Detection on Motorcyclists using image descriptors and classifiers", in Proceeding of Graphics, Patterns and Images (SIBGRAPI), Rio de Janeiro, Brazil, 27-30 August 2014, pp.141-148R.

[19] Redmon, Joseph, and Ali Farhadi. 'YOLO9000: better, faster, stronger.' IEEE conference on computer vision and pattern recognition, 2017, pp.7263- 7271.

[20] Redmon J, Divvala S, Girshick R, et al. You only look once: unified, real time object detection Computer Vision and Pattern Recognition, 2016, pp.779-786.

[21] A.Adam, E. Rivlin, I. Shimshoni, and D. Reinitz, "Robust real-time unusual event detection using multiple fixed location monitors," IEEE Transactions on Pattern Analysis and Machine Intelligence, vol. 30, no. 3, march 2008, pp.555–560.

IOT BASED COLD STORAGE MONITORING SYSTEM

Mrs.Y.Jalajakshi (Asst.Professor)[1]

Ms.sriram Rani[2]
Ms.Jivilikapally Ramya Sri[3]
Mr.Regunta Raja ravindra[4]
Mr.Pandula Sai Kiran[5]

Samskruti College of Engineering & Technology
Kondapur (V), Ghatkesar (M) Medchal Dist (Old R.R. Dist), Hyderabad-501301 Telangana, India
Department of Electronics and communication Engineering

Abstact: Ensuring food safety and hygiene is paramount to reducing food wastage and maintaining quality. Atmospheric conditions such as temperature, humidity, ethanol levels, and light exposure significantly impact the freshness and longevity of food products. To mitigate the risks of spoilage and decay, deploying atmosphere monitoring devices in food stores is essential. These devices leverage IoT technology to continuously monitor environmental factors, providing real-time insights into conditions within the store. By closely monitoring these factors, appropriate measures can be taken to control the environment, such as implementing refrigeration or vacuum storage. This proactive approach not only helps in preserving the quality of food but also minimizes the risk of contamination and extends the shelf life of products. Ultimately, integrating atmosphere monitoring devices into food storage facilities enhances food safety practices, reduces food waste, and ensures consumers receive high-quality, fresh products.

Keywords: IoT, cold storage monitoring system, food safety, food quality, contamination, food waste reduction.

I. INTRODUCTION

In food industry, cold storage is a must. The main objective of this kind of storage is to preserving the raw foods within for a certain period of time. But, for lack of technology and ignorance about atmospheric factors like temperature, humidity, ethanol and dark effect on raw foods; many times, food safety is not maintained well enough. In this project, the basic objective is to monitoring food store atmosphere by internet based real time monitoring using the IoT based monitoring system of food storages. For Food or Argo industries monitoring of the foods or materials which are rotten able are subject to constant monitoring; if just a simple thing goes wrong then it can become a result of a big loss. So, real time monitoring of foods/materials for those industries are very necessary. In this project, a research has been carried out to monitor real-time condition of food storages through internet; in which physical presence is not needed. So, that can save man work and also a very effective way of monitoring. This research has been conducted using very simple methodology and appliances which are available and requires minimal technical knowledge to operate.

II. REVIEW OF LITERATURE

[1] Pasha (2016) discusses the use of ThingSpeak and Matlab for sensing and monitoring systems. Sensors are crucial for detecting temperature, humidity, and other critical parameters within cold storage environments. [3] Sinha et al. (2015) highlight the role of Xively in IoT-based sensing systems, emphasizing the importance of accurate and reliable sensors in monitoring conditions. [2] Mhatre & Rai (2017) explore the integration between wireless sensors and cloud systems, detailing how gateways facilitate the transfer of data from sensors to cloud platforms for analysis and storage. [4]

ThingSpeak (2024) and [5] MathWorks (2024) describe how cloud-based platforms like ThingSpeak support real-time data visualization and analysis using Matlab. [15] Reddy & Reddy (2016) discuss smart agriculture systems that utilize actuators to adjust environmental conditions based on sensor data, a concept applicable to cold storage systems as well. Real-time data collection and monitoring ensure immediate detection and correction of deviations from optimal conditions. [1] Pasha (2016) emphasizes the benefits of real-time monitoring using ThingSpeak and Matlab. [10] Abdel-Basset et al. (2018) discuss how data analytics in IoT systems can optimize supply chain operations by predicting failures and optimizing storage conditions. Automated control of storage conditions reduces energy consumption and minimizes spoilage, leading to significant cost savings. [8] Sethi & Sarangi (2017) highlight the cost efficiencies brought by IoT architectures in various applications. IoT systems reduce the need for manual intervention. [11] Gubbi et al. (2013) and [14] Atzori et al. (2010) provide overviews of IoT architectures that enable automated control and monitoring. [16] Elkhodr et al. (2016) address the security concerns in IoT implementations, suggesting robust encryption and security protocols to protect data integrity.Reliable internet connectivity is essential. [17] Al-Fuqaha et al. (2015) suggest using redundant communication paths and local storage options to mitigate connectivity problems. Integrating IoT with existing infrastructure can be challenging. [9] Dorsemaine et al. (2015) and [18] Xu et al. (2014) discuss the importance of interoperability in IoT systems to facilitate integration. Initial setup costs can be high, but the long-term benefits justify the investment. [20] Bandyopadhyay & Sen (2011) discuss the economic considerations and long-term advantages of IoT deployment. Ensuring optimal storage conditions for perishable goods like fruits, vegetables, and dairy products is critical. [6] Vij & Aggarwal (2017) demonstrate the application of IoT in smart irrigation, which shares similarities with cold storage monitoring. IoT systems ensure compliance with regulatory requirements and prevent spoilage of sensitive pharmaceuticals. [7] Alam & Ahmed (2017) highlight the use of IoT in healthcare systems, which parallels its use in pharmaceutical storage. Monitoring conditions during transportation is essential. [10] Abdel-Basset et al. (2018) discuss the impact of IoT on supply chains, emphasizing real-time monitoring throughout the logistics process. Integrating machine learning can enhance predictive maintenance and optimize storage conditions. [13] Perera et al. (2014) suggest using AI to analyze IoT data for improved decision-making.

[19] Vermesan & Friess (2013) propose using blockchain for improved transparency and traceability in the cold chain, ensuring product authenticity and integrity. Advances in sensor technology will further improve the accuracy and reliability of IoT-based monitoring systems. [4] ThingSpeak (2024) and [5] MathWorks (2024) discuss ongoing improvements in sensor technology and their integration with

III. Methodology & Implementation

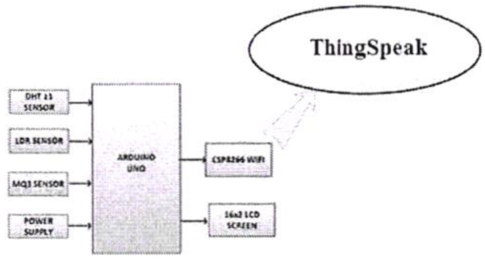


Fig-1: Block Diagram

Block Diagram Description: The block diagram outlines the architecture of an IoT-based cold storage monitoring system designed to maintain optimal conditions for temperature-sensitive products. It consists of five main blocks, each fulfilling a specific role in ensuring the efficiency and safety of the storage environment. The system begins with the Power Supply block, which provides stable power to all components from a 230V AC source, ensuring uninterrupted operation. A regulated 5V DC supply is generated using a 9V 1A DC Power Supply SMPS and a 7805 voltage regulator IC, powering the entire system. The central processing unit of the system is the Microcontroller block, utilizing an Arduino UNO to orchestrate the operation of all interfacing devices. Through programmed instructions, the microcontroller controls the Wi-Fi Modem, Ethanol Sensor, LDR Sensor, DHT11 Temperature and Humidity Sensor, and LCD display, facilitating data acquisition and transmission. The Wi-Fi Modem (ESP8266) block enables wireless internet communication between the Food Store and a remote server, facilitating real-time monitoring and data exchange. This connectivity ensures seamless integration with cloud-based platforms for remote access and management. The Sensors blocks consist of the MQ3 Ethanol Sensor, LDR Sensor, and DHT11 Temperature and Humidity Sensor. These sensors play vital roles in monitoring environmental parameters within the Food Store, including ethanol levels, ambient light intensity, temperature, and humidity. By continuously monitoring these parameters, the system can detect anomalies and take corrective actions to maintain optimal storage conditions. Finally, the LCD block serves as the user interface, providing real-time display of monitored parameters such as temperature, humidity, light intensity, and ethanol levels. This visual feedback enhances user interaction and facilitates quick assessment of the storage environment's status. Together, these blocks form a comprehensive IoT-based cold storage monitoring system, ensuring the safety, quality, and integrity of temperature-sensitive products throughout the storage process.

Circuit Description: The circuit is based on the Arduino UNO prototyping board, a versatile platform for building electronic projects. It integrates various sensors to monitor environmental parameters crucial for maintaining optimal conditions in food storage facilities. The circuit's IoT capabilities enable remote monitoring and data transmission to an online platform for real-time access. **Arduino UNO:** The Arduino UNO serves as the central control unit, interfacing with the sensors and managing data transmission.

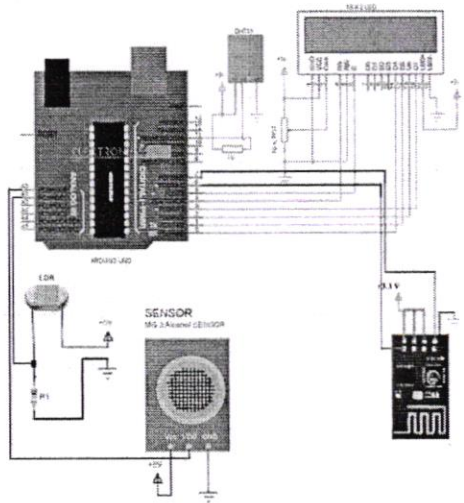


Fig-2: Circuit Diagram

It is programmed to read sensor inputs, process data, and communicate with the ESP8266 Wi-Fi Modem for internet connectivity. **Sensors:** DHT-11 Temperature and Humidity Sensor: Monitors temperature and humidity levels within the food storage environment. This sensor provides essential data for assessing the storage conditions of perishable goods. **MQ3 Alcohol Sensor:** Detects alcohol content in the air, ensuring compliance with safety regulations and preventing potential hazards in the storage facility. **LDR (Light Dependent Resistor):** Measures exposure to light, offering insights into ambient lighting conditions within the storage area. This data aids in energy management and assessing light-sensitive products' storage requirements. **ESP8266 Wi-Fi Modem:** The ESP8266 Wi-Fi Modem facilitates internet connectivity, enabling the Arduino UNO to send sensor data to an IoT platform for remote monitoring. It establishes a connection to a Wi-Fi router, allowing access to the internet from anywhere. **LCD Display:** A character LCD is interfaced with the Arduino UNO to provide local display of sensor data. This allows for convenient onsite monitoring of environmental factors such as temperature, humidity, alcohol content, and light exposure. **IoT Connectivity:** The integration of IoT technology enables users to remotely monitor the food storage environment in real-time. Sensor data is transmitted to an online platform, accessible from any internet-enabled device. This capability offers flexibility and convenience, allowing users to monitor storage conditions from anywhere and at any time.

IV. RESULTS

The implementation of IoT-based cold storage systems has demonstrated substantial enhancements in operational efficiency and product quality.

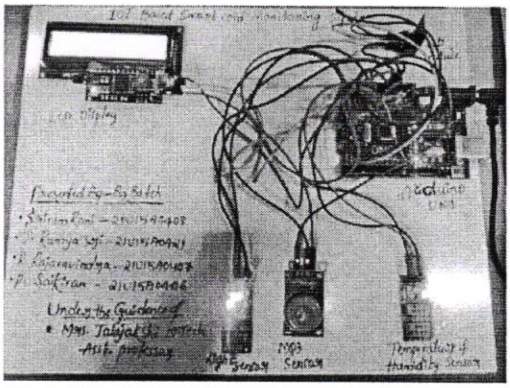


Fig-3: Working Kit

An IoT-based smart cold storage monitoring system utilizes the Internet of Things (IoT) for the real-time monitoring and management of cold storage environments. The system comprises sensors for monitoring temperature, humidity, and lighting conditions within the cold storage room. A LCD display provides readings from these sensors, enabling operators to take necessary precautions and continuously monitor food items. This proactive approach increases the longevity and freshness of food products.

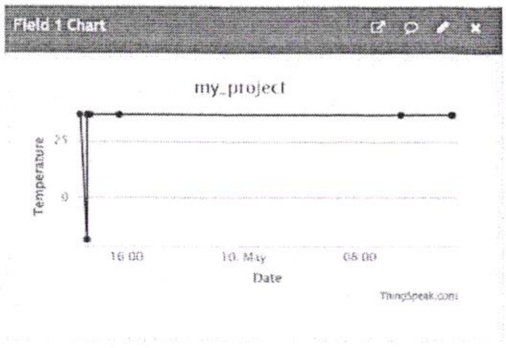


Fig-4: Temperature

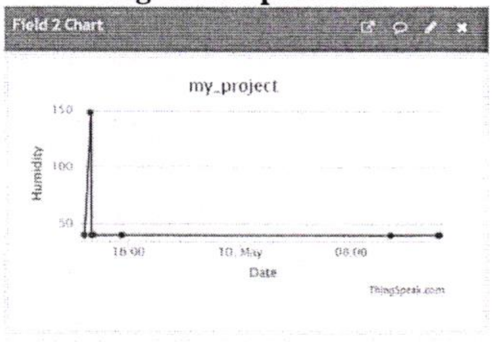


Fig-5: Humidity

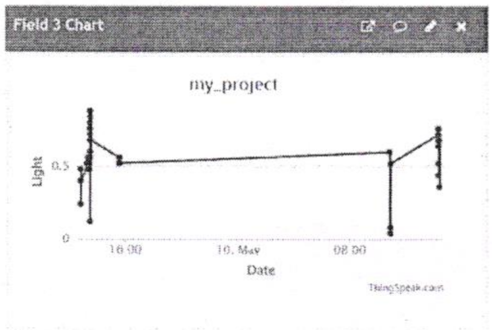


Fig-6: Light

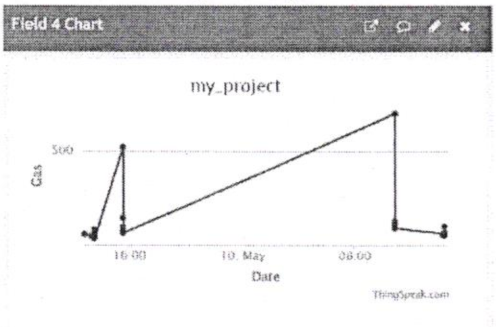


Fig-7: Gas

V.CONCLUSION

In this project the effective measurement of temperature, humidity, light, and ethanol data using the automated system in food storage facilities. This system enables the evaluation and monitoring of various environmental factors conveniently through mobile phones or PCs. By implementing this automated monitoring system, food storage facilities can ensure optimal conditions for food preservation, thereby reducing spoilage and maintaining quality. The ability to access real-time data remotely enhances efficiency and allows for timely interventions to prevent potential issues. Overall, the experimentation highlights the potential of automated monitoring solutions in enhancing food safety practices and improving operational processes in the food industry.

REFERENCE

1. Pasha, S. (2016). ThingSpeak based sensing and monitoring system for IoT with Matlab Analysis. International Journal of New Technology and Research (IJNTR), 2(6), 19-23.
2. Mhatre, L., & Rai, N. (2017). Integration between wireless sensor and cloud. In I-SMAC (IoT in Social, Mobile, Analytics and Cloud) (I-SMAC) (pp. 779-782). IEEE.
3. Sinha, N., Pujitha, K. E., & Alex, J. S. R. (2015). Xively based sensing and monitoring system for IoT. Computer Communication and Informatics (ICCCI), 1-6.
4. ThingSpeak. (2024). What is ThingSpeak? Retrieved from https://thingspeak.com/pages/what_is_thingspeak
5. MathWorks. (2024). Analyze IoT sensor data with ThingSpeak and MATLAB. Retrieved from https://www.mathworks.com/solutions/internet-of-things/thingspeak.html
6. Vij, A., & Aggarwal, P. (2017). Smart irrigation using IoT and cloud computing. International Journal of Engineering Science and Computing (IJESC), 7(5), 11244-11247.
7. Alam, T., & Ahmed, I. (2017). IoT-Cloud based framework for patient's data collection in smart healthcare system using Raspberry-Pi. International Journal of Online and Biomedical Engineering (iJOE), 13(12), 20-26.
8. Sethi, P., & Sarangi, S. R. (2017). Internet of Things: Architectures, protocols, and applications. Journal of Electrical and Computer Engineering, 2017, Article ID 9324035.
9. Dorsemaine, B., Gaulier, J. P., Wary, J. P., Kheir, N., & Urien, P. (2015). Internet of Things: A definition and taxonomy. In 2015 9th International Conference on Next Generation Mobile Applications, Services and Technologies (pp. 72-77). IEEE.
10. Abdel-Basset, M., Manogaran, G., & Mohamed, M. (2018). Internet of Things (IoT) and its impact on supply chain: A framework for building smart, secure, and efficient systems. Future Generation Computer Systems, 86, 614-628.
11. Gubbi, J., Buyya, R., Marusic, S., & Palaniswami, M. (2013). Internet of Things (IoT): A vision, architectural elements, and future directions. Future Generation Computer Systems, 29(7), 1645-1660.

International Journal of
Information Technology & Computer Engineering

ISSN 2347–3657

Volume 12, Issue 2, 2024

FARM ERA ADVANCED GIS FIELD MAPPING PRECISION CROP PLANNING INPUT TRACKING AI-POWERED PEST MANAGEMENT REAL-TIME WEATHER UPDATES SMART IRRIGATION AND POWERFUL DATA ANALYTICS FOR OPTIMIZED FARMING

Mr. V. Shankar[1], Assistant Professor T. RaghuChandar[2] , G.Swathi[3] , G.Soma shekar[4] , B.Ankitha[5]

Shankarvuyyala88@gmail.com[1],raghu.sunnuy20@gmail.com[2],swathigurram035@gmail.com[3],somashekargajula@gmail.com[4],bathulaankitha24@gmail.com[5] SAMSKRUTI COLLEGE OF ENGINEERING AND TECHNOLOGY[1,2,3,4,5]

2

Abstract - The Farm Era Advanced GIS Field Mapping system revolutionizes agriculture by integrating precision technology with various tools to enhance farming practices. This innovative platform allows farmers to create detailed field maps, plan crops precisely, track inputs effectively, and implement AI-powered pest management strategies. Real-time weather updates enable farmers to make informed decisions, while smart irrigation systems optimize water usage. The system also offers powerful data analytics providing insights for optimized farming practices. By harnessing these technologies, farmers can achieve higher yields, reduce resource wastage, and improve sustainability. Keywords: precision crop planning, AI-powered pest management, real-time weather updates, smart irrigation, powerful data analytics.

I. INTRODUCTION

Farm Era is a cutting-edge platform that revolutionizes agriculture by integrating advanced GIS field mapping technology, precision crop planning, input tracking, AI-powered pest management, real-time weather updates, smart irrigation, and powerful data analytics for optimized farming practices. By seamlessly combining these innovative features, Farm Era empowers farmers to make informed decisions that increase productivity, efficiency, and sustainability on their farms. The use of GIS field mapping enables farmers to accurately monitor and manage their fields, leading to precise crop planning and optimal resource utilization. Through input tracking, farmers can monitor the usage of seeds, fertilizers, and other inputs, ensuring efficient allocation and minimizing waste. The AI-powered pest management feature utilizes advanced algorithms to detect, predict, and mitigate pest threats, thereby enhancing crop health and yield. Real-time weather updates provide farmers with crucial information to anticipate and respond to changing weather conditions, enabling proactive decision-making. Smart irrigation technology optimizes water usage by delivering the right amount of water at the right time, conserving resources, and promoting crop health. Furthermore, Farm Era's powerful data analytics capability processes vast amounts of farm data to provide valuable insights and actionable recommendations that drive farm performance and profitability. By harnessing the potential of technology and data-driven solutions, Farm Era is transforming traditional farming practices into a more sustainable, efficient, and productive model for the future of agriculture.

II. RELATED WORKS

[1] "Applications of geospatial and big data technologies in smart farming" - This title suggests that the reference explores how geospatial technologies and big data are being utilized in the context of smart farming practices. The focus is likely on how these technologies are applied to improve efficiency, productivity, and sustainability in agricultural operations.

[2] "Geoinformatics, artificial intelligence, sensor technology, big data: emerging modern tools for sustainable agriculture" - This title indicates that the reference discusses the emergence of modern tools such as geoinformatics, artificial intelligence, sensor technology, and big data in the realm of sustainable agriculture. It is likely to delve into how these advanced technologies are paving the way for more sustainable agricultural practices.

[3] "From smart farming towards agriculture 5.0: A review on crop data management" - This title suggests that the reference provides a review of the evolution from smart farming to what is termed as "agriculture 5.0," with a specific focus on crop data management. It could encompass discussions on the evolution of agricultural technologies and strategies for effective crop data management.

[4] "GIS applications in agriculture" - This title implies that the reference explores the applications of Geographic Information Systems (GIS) in agriculture. It is likely to discuss how GIS technologies are being leveraged to improve decision-making, planning, and management in agricultural settings.

International Journal of
Information Technology & Computer Engineering

ISSN 2347–3657

Volume 12, Issue 2, 2024

[5] "Next-Generation Precision Farming Integrating AI and IoT in Crop Management Systems" - This title indicates that the reference discusses the integration of Artificial Intelligence (AI) and Internet of Things (IoT) technologies in next-generation precision farming. The focus is likely on how these technologies are reshaping crop management systems for enhanced efficiency and productivity.

[6] "Precision agriculture: Weather forecasting for future farming" - This title suggests that the reference focuses on weather forecasting within the context of precision agriculture. It may explore how accurate weather predictions and forecasts contribute to improving farming practices and decision-making for future agricultural sustainability.

[7] "Unmanned aerial vehicle and geospatial analysis in smart irrigation and crop monitoring on IoT platform" - This title implies that the reference explores the utilization of unmanned aerial vehicles and geospatial analysis in the context of smart irrigation and crop monitoring on an Internet of Things (IoT) platform. It likely delves into how these technologies are revolutionizing irrigation practices and crop monitoring.

[8] "Role of artificial intelligence, sensor technology, big data in agriculture: next-generation farming" - This title suggests that the reference discusses the pivotal role played by artificial intelligence, sensor technology, and big data in driving next-generation farming practices. It could elaborate on how these technologies are transforming agriculture towards greater efficiency and sustainability.

[9] "Implementation of Artificial Intelligence, Machine Learning, and Internet of Things (IoT) in revolutionizing Agriculture: A review on recent trends and challenges" - This title indicates that the reference explores the implementation of Artificial Intelligence, Machine Learning, and IoT technologies in revolutionizing agriculture. It may provide a comprehensive review of current trends, challenges, and opportunities in leveraging these technologies for agricultural advancements.

[10] "Smart Sensor-Based Smart Agriculture for Better Crop Production in This Smart Era" - This title suggests that the reference discusses the use of smart sensor-based technologies in smart agriculture to enhance crop production in the current era. It likely delves into how sensor technologies are being harnessed to optimize crop yields and improve farming practices.

III. EXISTING SYSTEM

The existing system for Farm Era Advanced GIS Field Mapping, Precision Crop Planning, Input Tracking, AI-Powered Pest Management, Real-Time Weather Updates, Smart Irrigation, and Powerful Data Analytics for Optimized Farming does have several disadvantages. Firstly, one of the major drawbacks is the complexity and high cost associated with integrating all these different components into a seamless system. This can make it difficult for small or resource-constrained farmers to adopt and implement the technology effectively. Secondly, reliance on advanced technologies such as AI and GIS can also lead to issues with data accuracy and reliability, especially in areas with poor internet connectivity or inconsistent data sources.

Additionally, the existing system may lack user-friendly interfaces and training resources, making it challenging for farmers who are not well-versed in technology to fully utilize its capabilities. The high level of technical expertise required to operate and troubleshoot the system can further act as a barrier to widespread adoption. Moreover, the system may also face compatibility issues with existing farm equipment and machinery, requiring farmers to make additional investments in upgrading their tools.

Furthermore, the dependency on real-time weather updates for decision-making can be a significant limitation, as weather predictions are never completely accurate and can lead to suboptimal farming practices. The reliance on smart irrigation systems may also pose challenges in terms of maintenance and sustainability, as any malfunctions or breakdowns can have detrimental effects on crop productivity. Lastly, the power consumption of these systems can be a concern, especially in regions with unreliable or costly access to electricity, adding to the operational costs for farmers. Overall, while the system offers numerous benefits, addressing these disadvantages will be crucial for ensuring its widespread adoption and long-term success in enhancing farming practices.

IV. PROPOSED SYSTEM

The proposed work for the FARM ERA project entails deploying advanced GIS technology for precise field mapping and planning of crops, integrating AI algorithms for enhanced input tracking and management. The system will incorporate AI-powered pest management techniques to identify and address pest issues more effectively, thereby improving crop yields and reducing losses. Real-time weather updates will be central to the system, providing farmers with accurate meteorological data to make informed decisions and adjust farming practices accordingly. Smart irrigation systems will be implemented to optimize water usage and ensure crops receive the appropriate amount of water, thus contributing to sustainable farming practices. The project will also employ powerful data analytics tools to

International Journal of
Information Technology & Computer Engineering

ISSN 2347–3657
Volume 12, Issue 2, 2024

process and analyze vast amounts of data collected from various sources on the farm, enabling farmers to gain valuable insights and make data-driven decisions for improved farming operations. Overall, FARM ERA aims to revolutionize farming practices by integrating cutting-edge technologies to enhance productivity, sustainability, and profitability in agriculture.

V. SYSTEM ARCHITECTURE

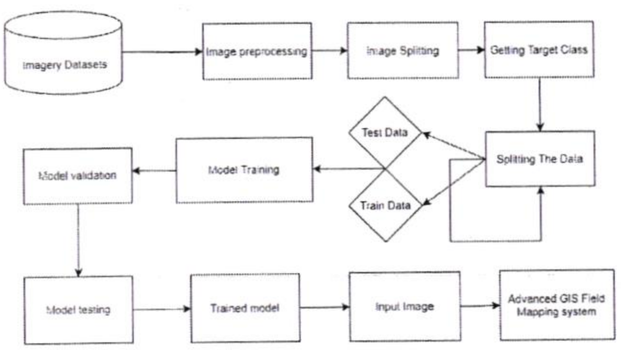


Fig. 1. System Architecture

VI. METHODOLOGY

1. Field Mapping and Precision Crop Planning Module: The Field Mapping and Precision Crop Planning module in the FARM ERA ADVANCED GIS system is designed to provide farmers with comprehensive tools for accurately mapping their fields and planning crop activities with precision. By utilizing advanced GIS technology, farmers can create detailed maps of their fields, including soil composition, topography, drainage patterns, and other key geographic features. This module allows farmers to strategically plan the placement of crops, irrigation systems, and other inputs based on real-time data and analytics. By harnessing the power of AI algorithms, farmers can optimize crop planning to maximize yields and minimize input costs. Additionally, the module offers tools for tracking input usage, monitoring soil health, and evaluating crop performance throughout the growing season. Overall, the Field Mapping and Precision Crop Planning module empowers farmers to make data-driven decisions that enhance productivity and sustainability on their farms.

2. AI-Powered Pest Management Module: The AI-powered pest Management module in the FARM ERA ADVANCED GIS system revolutionizes the way farmers detect, monitor, and control pests in their fields. By incorporating artificial intelligence algorithms, this module provides real-time pest identification, monitoring, and early warning alerts to farmers. With the ability to analyze vast amounts of data from various sources, including field sensors, satellite imagery, and weather data, the AI-powered system can accurately predict pest outbreaks and prescribe targeted interventions. Farmers can access personalized recommendations for pest control strategies, such as precision spraying or biological controls, to manage infestations effectively while minimizing environmental impact. This advanced module equips farmers with the tools to prevent crop losses, reduce pesticide usage, and promote healthier ecosystems on their farms.

3. Real-Time Weather Updates and Smart Irrigation Module: The Real-Time Weather Updates and Smart Irrigation module in the FARM ERA ADVANCED GIS system provides farmers with critical information and tools to optimize water usage and irrigation management. By integrating real-time weather data and forecasts, farmers can make informed decisions about irrigation scheduling, drought response, and water conservation practices. With smart irrigation technology, farmers can remotely monitor and control irrigation systems based on weather conditions, soil moisture levels, and crop water requirements. This module enables precise and efficient water delivery to crops, minimizing water wastage and maximizing crop productivity. The system also offers data analytics capabilities to track water usage, assess irrigation efficiency, and generate insights for continuous improvement. Overall, the Real-Time Weather Updates and Smart Irrigation module empowers farmers to conserve water resources, increase crop resilience to climate variability, and achieve sustainable farming practices.

VII. RESULT AND DISCUSSION

The FARM ERA system is an advanced agricultural technology platform designed to revolutionize farming practices by integrating GIS field mapping, precision crop planning, input tracking, AI-powered pest management, real-time weather updates, smart irrigation, and powerful data analytics for optimized farming outcomes.

ISSN 2347-3657
Volume 12, Issue 2, 2024

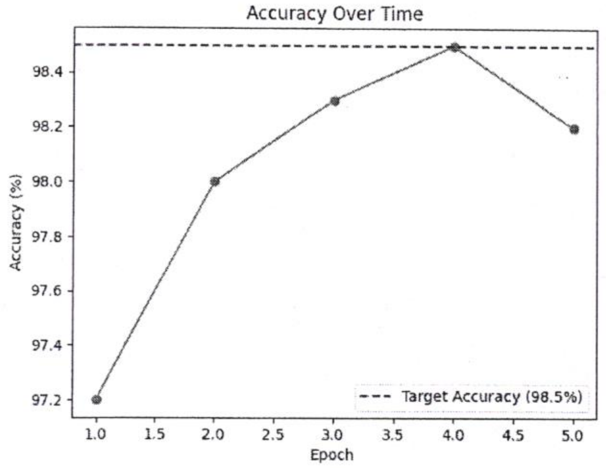


Fig.2. Accuracy graph

By combining these innovative features, FARM ERA empowers farmers to make data-driven decisions that enhance productivity, efficiency, and sustainability on their farms. Through GIS field mapping, farmers can accurately assess their land, optimize crop placement, and manage resources effectively. Precision crop planning ensures that crops are planted and nurtured according to specific requirements, leading to higher yields and quality.

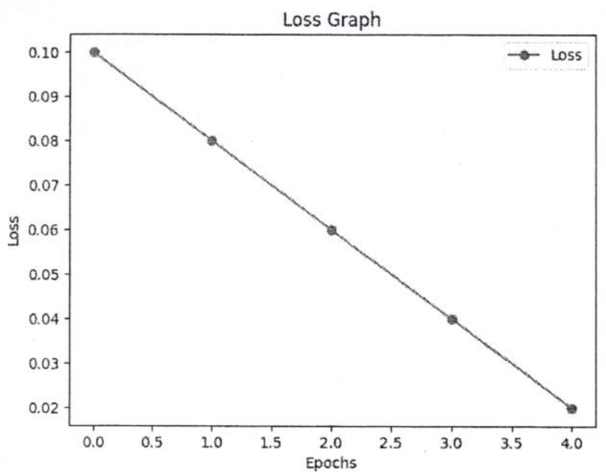


Fig.3. Loss graph

The system's AI-powered pest management capabilities help farmers proactively identify and address pest issues, reducing crop damage and minimizing the need for chemical interventions. Real-time weather updates enable farmers to make timely decisions regarding irrigation, crop protection, and harvesting activities.

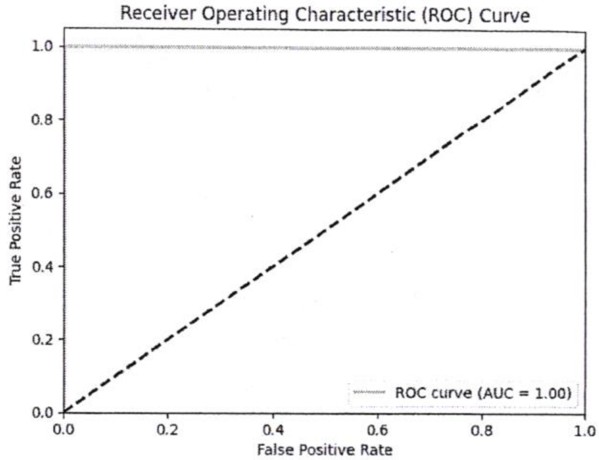


Fig 4. ROC Curve

Smart irrigation features support water conservation efforts by delivering the right amount of water to crops based on their specific needs.

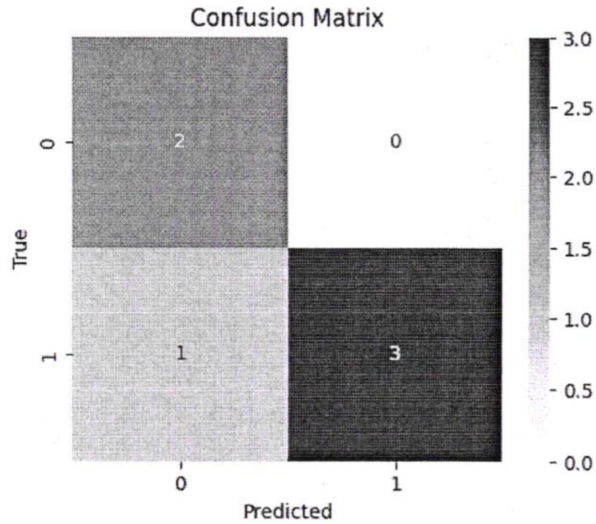


Fig 5. Confusion matrix

Finally, powerful data analytics tools provide valuable insights into farm operations, enabling farmers to continuously improve their practices and achieve optimal results in their agricultural endeavors.

VIII. CONCLUSION

In summary, the FARM ERA system offers an advanced and comprehensive solution for modern agriculture, integrating GIS field mapping, precision crop planning, input tracking,

ISSN 2347–3657
Volume 12, Issue 2, 2024

AI-powered pest management, real-time weather updates, smart irrigation, and powerful data analytics. By harnessing these technologies, farmers can optimize their farming practices, enhance crop yields, minimize input wastage, and improve overall productivity. The system's ability to provide intelligent insights through data analytics helps farmers make informed decisions, while real-time weather updates enable timely adjustments. Overall, the FARM ERA system represents a cutting-edge approach to farming, enabling sustainable and efficient agricultural practices.

IX. FUTURE WORK

Future work for the FARM ERA advanced GIS field mapping system involves integrating more artificial intelligence capabilities to enhance precision crop planning, input tracking, and pest management. By leveraging AI algorithms, the system can analyze data more efficiently and provide proactive solutions to optimize farming practices. Incorporating real-time weather updates into the platform will enable farmers to make timely decisions based on current conditions, enhancing crop yield and resource management. Smart irrigation technology can be further developed to automate watering schedules based on crop needs and weather patterns, contributing to water conservation efforts. Additionally, enhancing data analytics capabilities to provide powerful insights for farmers will result in more informed decision-making and improved operational efficiency. By focusing on these areas, the FARM ERA system aims to revolutionize farming practices and increase sustainability in agriculture.

REFERENCES

[1] Obi Reddy, G. P., Dwivedi, B. S., & Ravindra Chary, G. (2023). Applications of geospatial and big data technologies in smart farming. In Smart Agriculture for Developing Nations: Status, Perspectives, and Challenges (pp. 15-31). Singapore: Springer Nature Singapore.

[2] Singh, A., Mehrotra, R., Rajput, V. D., Dmitriev, P., Singh, A. K., Kumar, P., ... & Singh, A. K. (2022). Geoinformatics, artificial intelligence, sensor technology, big data: emerging modern tools for sustainable agriculture. Sustainable agriculture systems and technologies, 295-313.

[3] Saiz-Rubio, V., & Rovira-Más, F. (2020). From smart farming towards agriculture 5.0: A review on crop data management. Agronomy, 10(2), 207.

[4] Ghosh, P., & Kumpatla, S. P. (2022). GIS applications in agriculture. In Geographic Information Systems and Applications in Coastal Studies. IntechOpen.

[5] Rhoads, J. (2023). Next-Generation Precision Farming Integrating AI and IoT in Crop Management Systems. AI, IoT and the Fourth Industrial Revolution Review, 13(7), 1-9.

[6] Ukhurebor, K. E., Adetunji, C. O., Olugbemi, O. T., Nwankwo, W., Olayinka, A. S., Umezuruike, C., & Hefft, D. I. (2022). Precision agriculture: Weather forecasting for future farming. In Ai, edge and iot-based smart agriculture (pp. 101-121). Academic Press.

[7] Zhao, W., Wang, M., & Pham, V. T. (2023). Unmanned aerial vehicle and geospatial analysis in smart irrigation and crop monitoring on IoT platform. Mobile Information Systems, 2023.

[8] Kumar, P., Singh, A., Rajput, V. D., Yadav, A. K. S., Kumar, P., Singh, A. K., & Minkina, T. (2022). Role of artificial intelligence, sensor technology, big data in agriculture: next-generation farming. In Bioinformatics in Agriculture (pp. 625-639). Academic Press.

[9] Dawn, N., Ghosh, T., Ghosh, S., Saha, A., Mukherjee, P., Sarkar, S., ... & Sanyal, T. (2023). Implementation of Artificial Intelligence, Machine Learning, and Internet of Things (IoT) is revolutionizing Agriculture: A review on recent trends and challenges. Int. J. Exp. Res. Rev, 30, 190-218.

[10] Pradeep, M., & Tyagi, A. K. (2024). Smart Sensor-Based Smart Agriculture for Better Crop Production in This Smart Era. In AI Applications for Business, Medical, and Agricultural Sustainability (pp. 236-266). IGI Global.

WHEEL CHAIR CONTROL THROUGH EYE BLINKING USING ARUDINO

Mr.Anuptiwari [1], Thimmapuram Divya [2], Mehendikar Srujan [3], Arigela Divya [4], Panjala Shashank Goud [5]
Assistant Professor, Students[2,3,4,5], Dept.ECE
Samskruthi College of Engineering and Technology, Ghatkesar, Hyderabad, Telangana, India

***

Abstract: *The important part of our project is to implement the wheelchair with the control of eye movement. This wheelchair is used for the elderly and different abled people. In this project eye blinking and tracking technology is used. This method consists of hardware which eliminate work using IR sensor. The proposed model uses eye blink movement tracking system to control wheelchair. When movement is captured it is given to the Arduino. Then this output given to the motor driver circuit, IR sensor controlled to the proper operation system of wheelchair. All wheels connected to motor driver circuit to move wheel chair based on eye blink movement.*

Keywords : Arduino Kit ,Motor Driver IC,IR sensor ,Wheels ,Buzzer.

INTRODUCTION: We are introducing the design and implementation of wheelchair controlled using eye movement. This wheelchair is easy for differently abled and paralyzed people to make their life more easier. The first IR sensor is mounted in front of the wheelchair for detection of obstacle. If obstacle is very close to the wheels then it is detected by IR sensor. This output is given to the Arduino. Then buzzer is activated which I s connected to the Arduino. The second IR sensor is mounted on goggle for capturing the eye blink movement. This sensor captured his eye blink movement and this signal sends to motor driver circuit to move and stop the wheelchair. As per the counting of number of eye blink movement the circuit will perform different operations like left, right, forward, backward and stop.

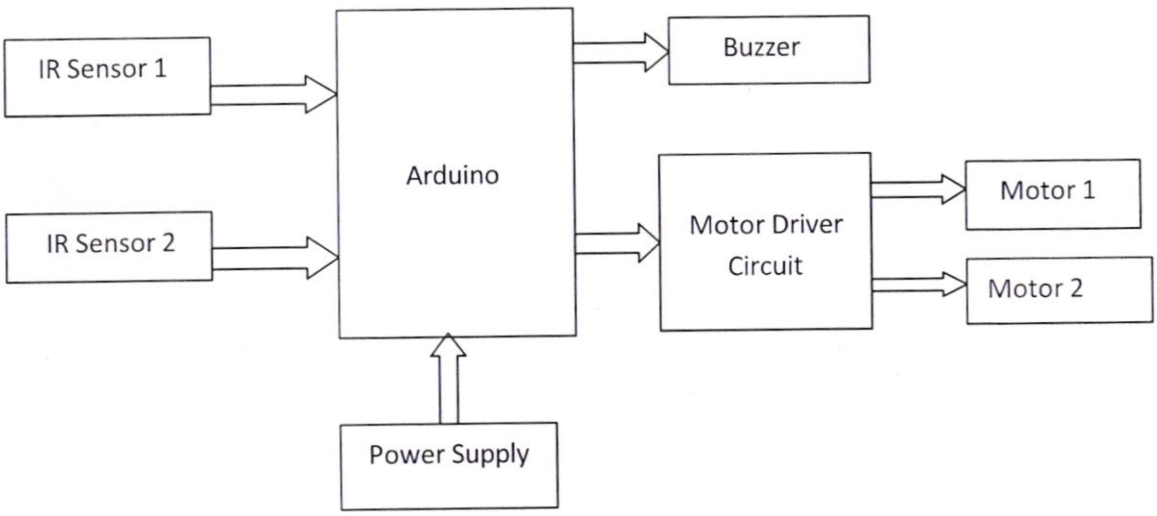


Fig. Proposed Model

Problem statement : The Main objetive of our system is to differntly abled and paralyzed people becomes independent.They do their motion with the help of eye blink movement.

1.1 Proposed Work :

In this proposed system Arduino is used to control the IR sensor and Motor driver circuit.IR sensor is usd to find the difference between obstacle and user.The wheelchair consist of two IR sensors,one motor driver circuit,buzzer.Out of the two IR sensors, one IR sensor is used for obstacle detection and another is used for eye blink movement.IR sensor work by using specific light sensor to detect light wavelenght infra-red spectrum.When object is not present no IR light detected by sensor.Whwn object is present refelcted IR light detected by sensor. When power supply is given to Aruduino kit then process is start for obstacle detection and eye blink movement signal given to the Arduino.

Hardware and software components:

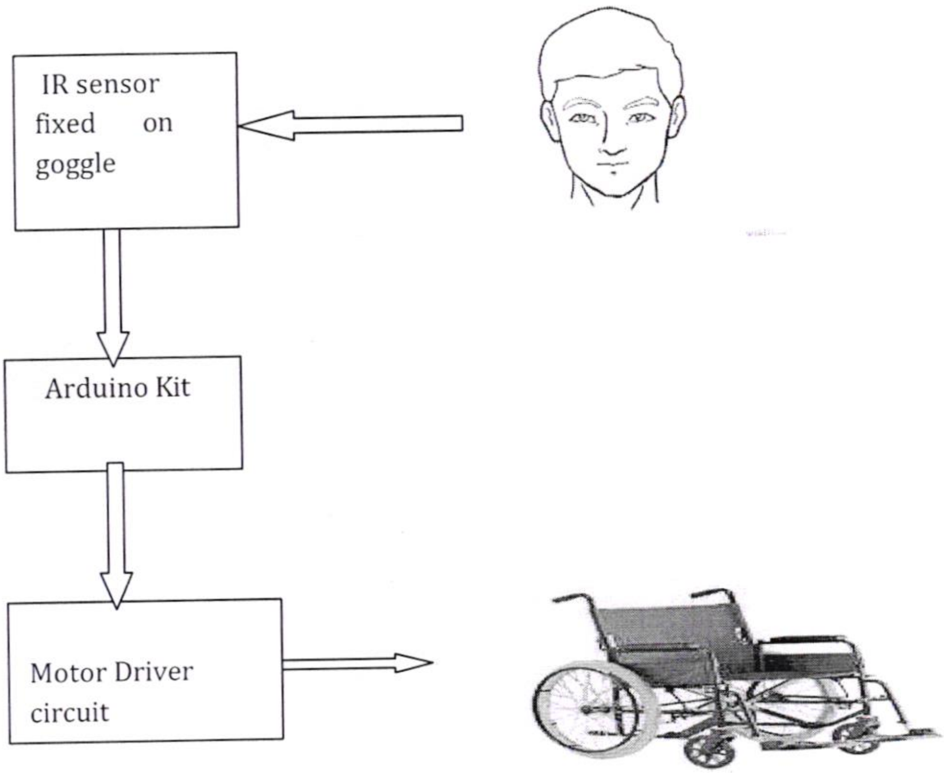
Hardware:

- Arduino Kit
- Motor Driver IC
- IR Sensor
- Buzzer
- LED
- wheelchair

Software:

- Arduino software

1.2 System Architecture :



CONCLUSIONS: According to the real time condition the evolution of life for differently abled and paralyzed people can be saved from accsident. To detect the obstacle with the help of IR sensor it is useful for recognize obstacle and implement low cost. Inside the house paralyzed people reaching a desired destination is little bit difficult. So this system is easy for these people.

REFERENCES:

[1] K. Sudheer, „Voice and Gesture Based Electric-Automaticed Wheelchair Using ARM" ,International Journal of Research in Computer and Communication technology, IJRCCT, ISSN 2278-5841, Vol 1, Issue 6,November 2012.

[2] Luis A. Rivera, Guilherme N. DeSouza, et al, and Senior member, „A Automatic Wheelchair Controlled using Hand Gestures, IEEE, University of Missouri on April 2010.

[3] Ituratte, J. Antelis, J. Minguez, „Synchronous EEG brain-actuated wheelchair with automated navigation,"Kobe, Japan, May 2009.

[4] Bong-Gun Shin, Taesoo Kim, Sungho Jo, et al, „Noninvasive brain signal interface for a wheelchair navigation", International Conference on Control, Automation and Systems, Gyeonggi-do, Korea, October 2010.

[5] Eyeball and Blink Controlled Robot with Fuzzy Logic Based Obstacle Avoidance System for Disabled K.S.Sabarish, A.M. Suman, (ICEEE'2012) June 16-17, 2012, Bangkok.

[6] Wei-Chung Cheng 'An Electro-Oculography Circuit for Detecting Eye Movements for Low-Powerv Displays'.

IRACST – International Journal of Computer Networks and Wireless Communications (IJCNWC), ISSN: 2250-3501
Vol.14, Issue No 2, May 2024

IOT BASED GREENHOUSE MONITORING AND CONTROLLING SYSTEM

Mrs.ANANDITA GOSWAMI [1], VANKE ANVESH [2], KOTWAL BHAVANA [3], KAMPALLY ANKITHA[4]
Asst.Professor[1], Students[2,3,4], Dept.ECE
Samskruthi College of Engineering and Technology, Ghatkesar, Hyderabad, Telangana, India.

Abstract- **Technological advances play a vital role in all fields that include the realm of Agricultural Engineering. The greenhouse explicates as a constructed building that functions to manipulate the desired environmental conditions so that plants will be more controlled. Also, these plants provide more optimal results compared to plants that are cultivated outside the greenhouse. However, the use of internet technology in greenhouse monitoring systems is still limited. Based on this, to utilize the internet by creating a greenhouse system that can be monitored remotely with an internet network using the Blynk application on Android. The user of these prototype systems must have a mobile device with Internet access and a web browser connected to a Blynk account.**

Keywords- **Green House Effect, LDR sensor, Node MCU ESP8266, Temperature & Humidity sensor (DHT11).**

I. INTRODUCTION

The utilization of technology in agriculture can optimize the performance of farmers. Hence, technology in the realm of agriculture is increasingly being developed. One approach is by utilizing the internet network to conduct a monitoring system in a greenhouse.(Shah & Batt , 2017) developed a prototype of a cost-effective system using Internet of Things (IoT) technology that enables people to monitor and manage growing conditions inside the greenhouse. (Anthony, 2017)developed a prototype system that was perceived by the end-users to be helpful in terms of water conservation, energy conservation, plants growth, and load conservation. The user of these prototype systems must have a mobile device with Internet access and a web browser connected to a Blynk account. In (Liang, He, Chen, & Du, 2018) developed a system that performed software and hardware design of greenhouse environmental information collection based on the Wi-Fi module to replace 485 bus or CAN bus that is complicated and the lines are easy to age. These three monitoring systems use sensors that continuously work and send information to the microcontroller. These sensors were placed in the greenhouse as a replacement for manual monitoring. One used to detect the moisture content of the growth media is a soil moisture sensor, which is necessary to control sufficient irrigation water for the plant. Temperature and humidity sensors are used to sense any particular change in the atmosphere inside the greenhouse. The information given by these sensors will be used as a reference to maintain an optimum environmental condition for plant growth. Previous studies by (Marliyanti, 2018) monitored temperature, relative humidity (RH), light intensity, and soil moisture inside a greenhouse with red spinach (Amaranthus tricolor, is a pretty annual that grows quickly and provides brilliant color) planted in polybags. In this study, the author aimed to design a similar monitoring system, by using an internet network, therefore, the monitoring system can be conducted remotely.

The monitoring system technology monitors the temperature humidity, soil moisture, and light intensity inside the greenhouse via the internet using the Blynk application on Android smartphones based on Microcontroller Node MCU ESP8266.

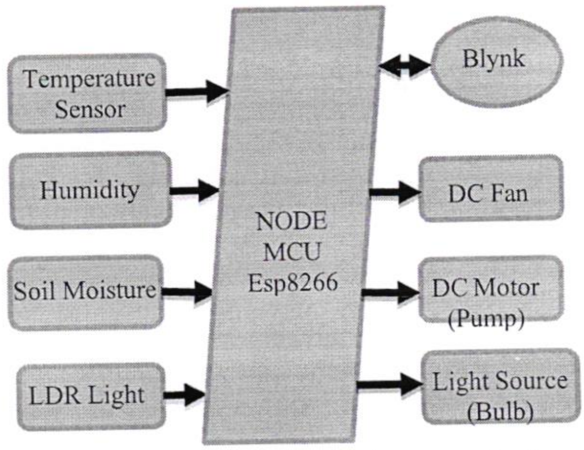


Figure. 1: Block Diagram of Greenhouse Monitoring and Controlling System

II. METHODOLOGY

To make a successful greenhouse system, all parameters such as temperature, humidity, light concentration, and moisture of the soil must be familiar so that diverse plants can be cultivated flawlessly. Thus, continuous monitoring of temperature, light, and moisture is significant. We have used a humidity and temperature sensor (DHT11), light sensor (LDR), soil moisture sensor to monitor all the greenhouse parameters continuously. The primary device that we have used for the framework is NodeMCU to save the data collected by the sensors mentioned above and to practice the data. We installed a BLYNK APP on our mobile phones to monitor and control the greenhouse information easily.

In the proposed framework, at first, the DHT11 sensor will happen and quantify the constant upsides of temperature and moistness which is sent to Node MCU. Now, Node MCU will compare these real-time values with preset threshold values. On the off chance that the continuous parameters are under edge esteem, there will be no change except for assuming the qualities are over the limit, Node MCU will provide the order to turn on the fan and the same process will continue for the soil moisture and LDR sensor.

Threshold value = Temperature + (Humidity*0.1)

On the off chance that the Threshold esteem surpasses, the electronic gadgets are naturally turned ON, so we can keep up the necessary air inside the greenhouse by gazing at these electronic gadgets. Furthermore, through that, we are keeping up dampness and temperature in the shut greenhouse. The data gathered from this sensor is given to the customer through the BLYNK App. In this framework, Node MCU is the core of the entire framework that assumes responsibility for the cycle. When sensors sense any adjustment in climate or soil, Node MCU comes in real life and cycle the necessary activity. When the soil moisture sensor doesn't detect any dampness in soil then Node MCU turns ON the water siphon and makes an impression on the LED status that the engine is turned on. Furthermore, if LDR faculties low light, Node MCU takes control and turns on the light bulb. In this framework a 16×2 LCD is utilized for showing status for all activities like Motor turned on or off, temperature, moistness, and light status. Blynk application is likewise associated for message alarm of the status to be shipped off the proprietor.

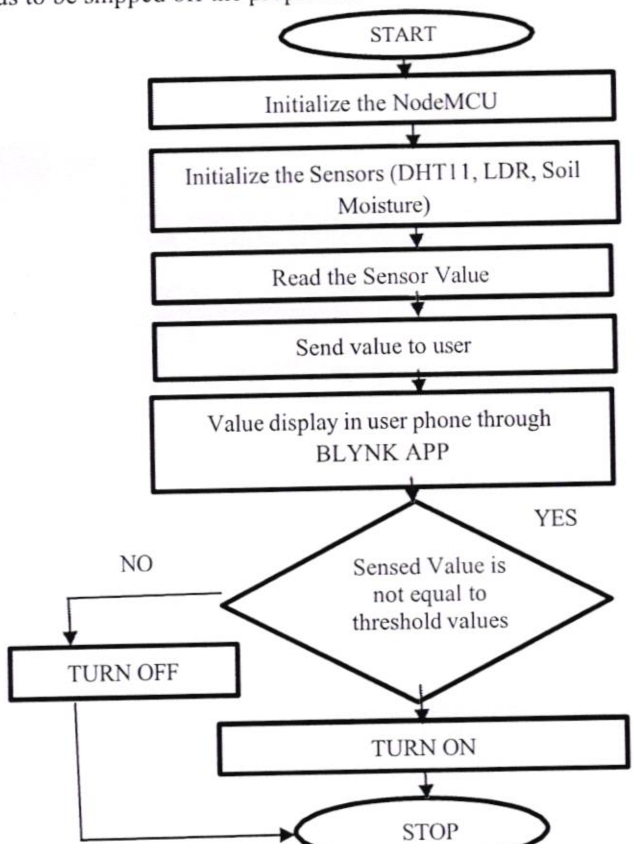


Figure. 2: Flowchart of the proposed system

The flow chart of this system is shown in Figure. 2, which explain: all the operations in the sequence by using the blocks. Helps in ε better understanding of the working of this system. This flow char describes the project flow, from initializing the NodeMCU, the sensors (DHT11 sensor, LDR Sensor, Soil Moisture Sensor) anc reads the data from the environment, the read value sent to the consumer's smartphone through BLYNK APP. All the value get: display in the user phone through this BLYNK APP. Througl BLYNK APP user can control the functions.

III. SYSTEM ARCHITECTURE

A. HARDWARE USED

NODEMCU

Node MCU is a microcontroller with an ESP8266 Wi-Fi modul that allows it to link to the internet. It is a software and hardwar development board with open-source firmware. Node MCU ha: 4MB of flash memory and 128KB RAM to store data and programs It has a 3.3V operating voltage. It can be programmed usin Arduino IDE. It has a high baud rate of 115,200. The Node MCL has 17 GPIO (General Purpose Input/Output) Pins in which 10 pin: are digital and only 1 pin is analog. Here Node MCU is used to reac Inputs from the Sensors used (Soil Moisture, LDR, and DHT11 fo Temperature & Humidity) and provide the appropriate output.

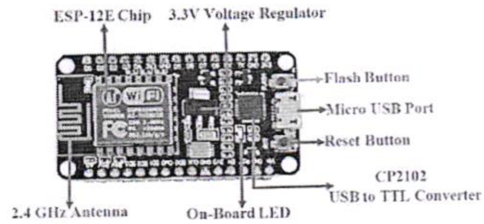


Figure. 3. Node MCU

TEMPERATURE & HUMIDITY SENSOR (DHT11):

The primary function of this sensor is to determine temperature and dampness and to change mechanized sign yield. It provides superio grade and excellent overall course of action efficiency by using the pushed sign five-star affirming technique, temperature, and tenacit seeing movement. The sensor joins a resistive-type drenched qualit assessment part and an NTC temperature assessment piece, anc connects with a ruling 8-digit microcontroller, offerin inconceivable quality, speedy response, adversarial beyond wha many woul asonableness.

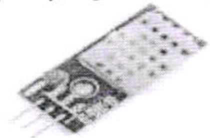


Figure 4. DHT11 Temperature & Humidity Sensor

SOIL & MOISTURE SENSOR:

The soil moisture sensor is used to check the amount of moisture ir the soil in which it is placed. This sensor is composed of two tests t go current through the dirt, and afterward, it peruses that protectior from acquiring the moisture level. Whenever more water i: available, it makes the dirt lead power effectively which implies, for example, less opposition while dry soil leads to less power for example more obstruction.

Figure. 4. Soil Moisture Sensor

LDR LIGHT SENSOR (LDR):

LDRs (light-dependent resistors), also known as photo-resistors, have resistance values that vary by many orders of magnitude depending on how much light falls on their surface. This resistor works on photoconductivity principle. When light falls on the LDR, the resistance decreases, allowing it to switch OFF a light, and when the LDR is in darkness, the resistance increases, allowing it to switch ON a light.

Figure 5: LDR Light

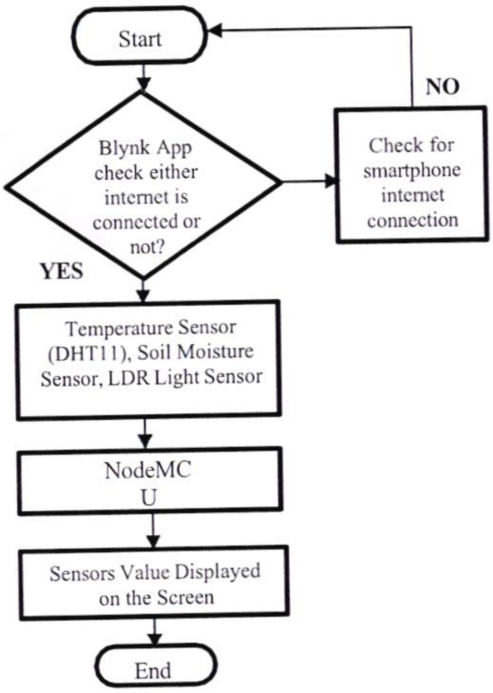
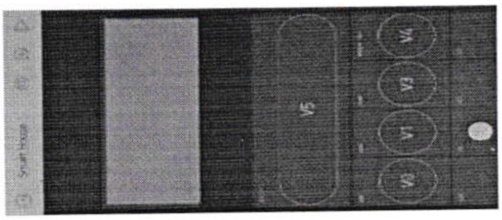


Figure.7. Flow Chart of Blynk App

B. SOFTWARE USED

BLYNK APP:

Blynk is a Platform with iOS and Android applications to control Arduino, Raspberry Pi over the Internet. It was intended for the Internet of Things. It can control hardware remotely, show sensor information, store information, visualize and numerous different things. In this project, we are controlling LEDs using Blynk App and Esp8266. In **Error! Reference source not found.**8., the functioning of the Blynk app is explained, initially, it checks for the internet connection, if not connected to the internet it goes again to the start and if the internet is connected it goes to the Sensors (DHT11 Temperature & Humidity Sensor, Soil Moisture Sensor and LDR Light Sensor). Then after the sensors, Node MCU is initialized to check the value of the sensor and it displays the values on the LCD screen in the Blynk App



Error! Reference source not found.**8. Blynk app.**

IV. RESULTS AND ANALYSIS

TABLE 1: Comparison of the Proposed System with some Recent Works

Reference No.	Temperature Sensor	Humidity Sensor	Soil Moisture Sensor	LDR Light Sensor	Node MCU Esp8266 Wi-Fi Module	Operati – Continu s
[6]	✓	✓	✓	✓	×	Not Possib
[9]	✓	✓	×	✓	✓	Not Possib
[13]	✓	✓	✓	✓	×	Not Possib
[14]	✓	✓	×	×	×	Not Possib
Proposed Work	✓	✓	✓	✓	✓	Possib

The TABLE 1. above delineates how the proposed framework offe controlling and monitoring alongside all potential parameters ir examination with ongoing works identified with the nursery framework by other researchers. All these factors together were not proposed before. The framework has been tried under a recreated climate effectively. It portrayed the capacity of monitoring and controlling the light, moistness of the air, and inside temperature and dampness level of the soil altogether.

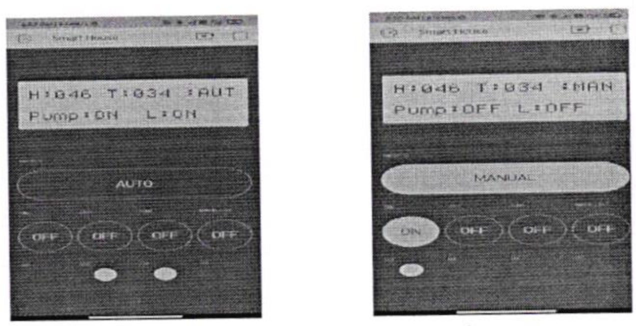


Figure. 6: Sample Screen containing data of the working

The upsides of different boundaries like temperature, moistness, soil dampness, and light force are estimated effectively, and the deliberate qualities are shown on LCD that is appended with the framework. It is observed that the communication between Node MCU Esp8266 Wi-Fi Module and various sensors is done accurately without any interference. Figure. *6*. shows a sample screen of the Blynk application on the user's device. The values from the greenhouse are perfectly shown over the Blynk App on the user's device. The situation with the actuators is displayed for the Pump and the Light. The screen shows if the gadget is in auto or manual mode and appropriately the situation with every one of the LEDs.

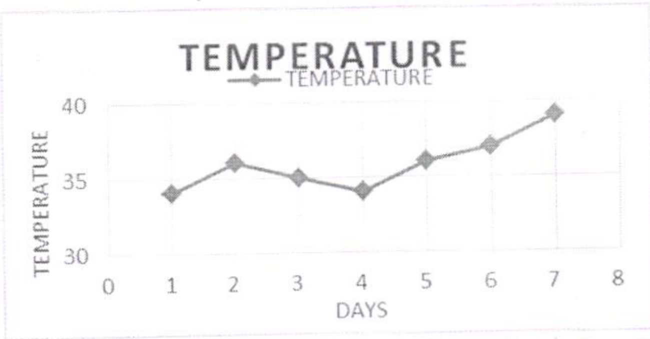


Figure. 7: Temperature data of greenhouse for various days at same time

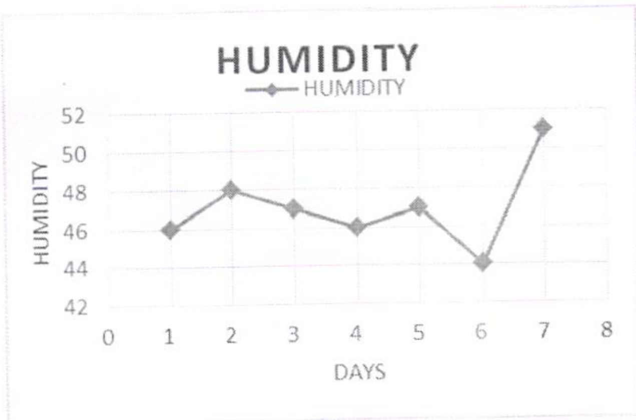


Figure. 8: Humidity data of greenhouse for various days at same time

Figure. 9: Light status of greenhouse at different times of the

Figure. *7*., Figure. 8, depicts the graphical representation o temperature and humidity respectively on seven different days of a week at a particular time (10:30am) for temperature and humidity The framework was tested at different times of the day to check i the light intensity of the greenhouse is reflected on the led status Figure. 9, represents the light status i.e. ON(1) or OFF(0). The graphs are created using the data from the database. The improvement of programmed greenhouse monitoring and controlling framework utilizing sensors and sunlight-based force is completed successfully.

V. CONCLUSION

After successfully studying all the objectives, we have built a fully functioning Greenhouse Automatic Monitoring and Controlling System. The proposed system uses three Sensors that determine the required parameters (Temperature, Humidity, Soil Moisture, and Lightning Conditions) for better crop/plant production inside the greenhouse. We developed a cost-effective system based on Interne of Things (IoT) databases to analyze the data. It allows changing the Threshold values according to the need for crop fertilization. In the future, this system can be a multi-controller system that will enable a master controller along with its slave controllers to automate multiple greenhouses simultaneously. Farmers can use Smar Greenhouse to create an environment for their crops that is both climate-smart and nutrition-sensitive, resulting in higher crop quality. The information gathered is used to calculate energy consumption, which assists growers in making the best use of their resources. Monitor, Control, Automate and Detect Plant Growth. I Monitors parameters for an anomaly, Controls the environment for better yield, Save power, water consumption and electricity.

REFERENCES

[1] Remya Koshy, M D Yaseen, K Fayis, Shaji Nisil, N J Harish and M Ajay, "Greenhouse Monitoring and Control Based on IOT Using WSN", ITSI Transactions on Electrical and Electronics Engineering, Vol. 4, No. 3, 2016.

[2] S.K.M. Mashhadi, H. Yadollahi, & A.M. Mashhad, Turk J Elec Eng & Comp Sci., vol. 24, pp. 2589 – 2608 (2016).

[3] Bhujbal, N., Sase, V. P., & Ratnaparkhi, M. R. (2015) Automated Green House Controller. International Journal on Advanced Electrical and Electronics Engineering (IJAEEE) 77-79.

[4] Bhujbal, N., Sase, V. P., & Ratnaparkhi, M. R. (2015) Automated Green House Controller. International Journal on Advanced Electrical and Electronics Engineering (IJAEEE) 77-79.

[5] D. Misra & S. Ghosh, International Journal of Environment Agriculture and Biotechnology, 997- 1002 (2017)

[6] John Edgar S. Anthony, An Automated Greenhouse Monitoring System of Abiotic Factors for Leafy Vegetables Production in IRCHE 2017.

[7] MD Jiabul Hoque, Md. Razu Ahmed and Saif Hannan, EJERS European Journal of Engineering Research and Science "An Automated Greenhouse Monitoring and Controlling System using Sensors and Solar Power" Vol. 5, No. 4, April 2020.

WIRELESS COMMUNICATION BASED WATER SURFACE CLEANING BOAT

Mr.G.VEERANNA[1], THIRMANI MANISHA GOUD[2], PUTTA KOUSHIK[3], KUSUMA PRASANNA[4]
Assistant Professor[1], Students[2,3,4], Dept.Ece
Samskruthi College of Engineering and Technology, Ghatkesar, Hyderabad, Telangana, India.

ABSTRACT: Clean water is a basic need for all living beings. Without water survival in the Earth is not possible. Water covers about 70% of the Earth's surface among that only 3% of that is pure water. Water gets polluted due to any reasons like industry waste, sewage waste, garbage waste. Hence it is important to maintain cleanliness and hygiene of water. We considered this water pollution as a serious issue and start to work on the project. We decided to incorporate technology to get the work done effectively and efficiently. Our project design is in such a way that it collects the waste which floats on water bodies. In present time almost all the people are familiar with robots. We are going to design a very interesting robot that is RF controlled Robot. It is important to monitor the pH of a water body. An alteration in normal pH in a water body can be an indication of increased pollution or other environmental factors. Hence the solubility and biological availability of the chemical constituents of water are determined by pH sensor.

KEYWORDS: Sewage, garbage, Remote Controlled Robot, Radio Frequency, potential hydrogen.

I. INTRODUCTION

Traditional method for collecting water surface floating waste are manual basis, by means of boat trash skimmer. The above methods are costly risky and large time consuming. To eliminate the drawbacks of the above-mentioned methods the remote controlled water cleaning machine was designed which helps in cleaning the water surface efficiently and eco/friendly. The water waste cleaning Robot consists of RF transmitter and receiver DC motor battery pH sensor, bucket collector are attached to it for collecting the waste and monitoring the water. The authors of reference paper are Jacop Anderson, Erik Hall, Josephsan doval, Ryan N.Smith. The main objective of this paper is to develop a surface vehicle equipped with water quality monitoring sensors. The main drawback of this system is that it is very costly and manufacturing become complex.

In addition to that, it can only monitor the water quality .The above drawback can be rectified by our proposed system because it can not only monitor the water quality but also collect the garbge waste that floating on the water surface. The authors of our base paper are Zhai Yuji, Zhou Yu, Luo Huanxin, Liu Yunjia, Liu Liang from china used camera for monitoring the surface of the water bodies. But in our project we used pH sensor to monitor the water bodies. Because in our country the water bodies are mostly polluted by industrial liquid waste.

II. PROPOSED FRAME WORK

A. REMOTE CONTROL DESIGN

RF controlled robot is controlled by using four push buttons placed at the transmitter side. A transmitter device is used in our hand which consists of a RF Transmitter and a RF Encoder. This transmitter part will transmit the command to the robot so that it can do the required task like moving forward, reverse, turning left, turning right and stop. All these tasks will perform by using four push buttons that are placed on RF transmitter.

This is a ASK hybrid transmitter and receiver operate at 433Mhz and has a crystal stabilized oscillator to maintain the accurate frequency control. This module is very efficient where long range RF communications is required. It does not send data using UART or microcontroller directly because lots of noise present at this frequency. It can be used with the help of encoder and decoder ICs which extract data from the noise.

At the receiver end it consists of RF receiver to receive the signal or data. It consists of a decoder IC converts the received serial data into parallel data. The motor driver IC has two channels for two motors. According to the received data the robot will move by using the two motor. The motor used here are DC motor with gear box.

The RF modules are very small in dimension and have a wide operating voltage range 3 Volt to 12 Volt. The transmitter draws no power when transmitting logic zero while fully suppressing the carrier frequency thus consume significantly low power in battery operation. When logic one is sent carrier is fully on to about 4.5mA with 3 Volt power supply. The data is sent serially from the transmitter which is received by the tuned receiver.

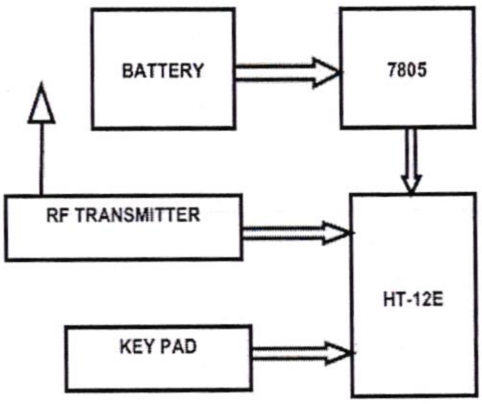


Figure 1.1 Block diagram of RF transmitter

HT-12E is an encoder IC. The encoder can convert parallel data into the serial data and transmit it. HT-12D is a decoder IC which can convert the serial data again back to the parallel data.

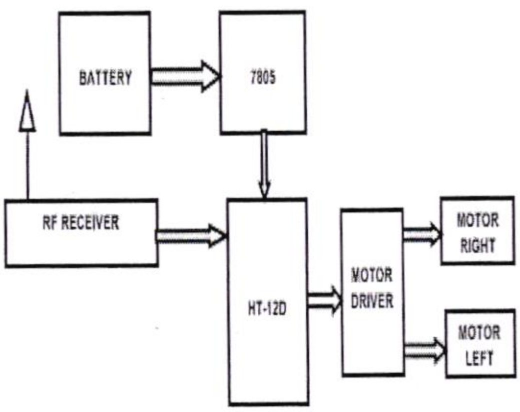


Figure 1.2 Block diagram of RF receiver

The above shown diagram is for the RF receiver circuit. Based on the signal received by the receiver , the motor will rotate and the robot will move.

Button Pressed at Transmitter	Moving Direction of Robot
First(1)	Left
Second(2)	Right
First and Second(1&2)	Forward
Third and Fourth(3&4)	Backward
No Button pressed	Stop

Table 1.3 Keypad number with robot motion.

When we press the first button robot start moving in left side and moving continues until the button is released. When we press the second button in the transmitter, it will moving in right side until the button is released. When we press first and second button at the same time, robot start moving in the forward direction until the push button is released. When we press third and fourth button at the same time the robot keep going in backward direction until the button is released.

B. COMPONENTS DESCRIPTION

Battery source:

Lithium-ion batteries are common rechargeable batteries that are mainly used for portable electronics, with a high energy density, no memory effect. The 12V 7AH Lithium-ion battery features with built in battery production system that keeps the battery running at peak performance and protects the cells for thousands of cycles.

L293D Motor driver:

This is a motor drier IC which has two channels for driving two motors. It has two in built transistor Darlington pair for current amplification and has a separate power supply pin for giving external supply for motors. Two 9 volt batteries are used to power motor driver and remaining Rx circuit. And another 9 volt battery is used to power the transmitter.

DC Motor:

A 10RPM 12 volt DC motor with gearbox is used in our module. No-load current is 60mA(maximum) and load current is 300mA(maximum).This geared motors are widely used in robotics application. Nut and threads on shaft to easily connect . Internal threaded shafts for connecting it to the wheel.

Voltage Regulator :

7805 is a three terminal linear voltage regulator IC. A positive unregulated voltage is given at the input. Ground pin is common to both input and the output. The output regulated 5 Volt is taken at the pin of the IC.

C. pH MONITORING DESIGN

It is important to monitor the pH of a water body because it affects aquatic organisms. An alteration in normal pH in a water body can be an indication of increased pollution. The PH value of the different water bodies at current situation are shown below

WATER SOURCES	Ph VALUE
Waters of volcanic exhalation	>2
Mine Waters	3-4
Swamps	4-6
Ground Waters	5-7
Rivers	6.8-7.8
Fresh Lakes	7.3-9.2
Ocean	7.8-8.3

Table 1.4 Water sources and their pH values.

This tabulation is one among the evident for the pollution that has been exist in water bodies. The pH value of the fresh water should be equal to 7. The value goes above 7 are basic. The value goes below 7 are acidic. Now a days, due to the industrialization many of the industrial waste especially liquid waste without any recycling directly dumped into the rivers and lakes. Hence , it is important to monitor the pH value of all the fresh water resources . To ensure the safety of the fresh water and by using the pH monitoring system.

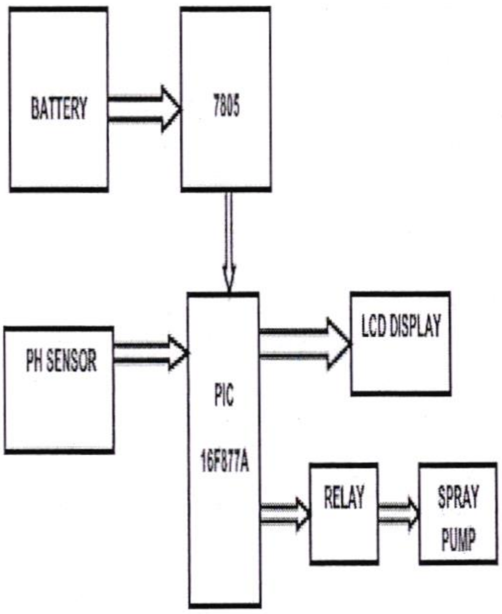


Figure 1.5 Block diagram of pH monitoring system

D. COMPONENETS DESCRIPTION

pH sensor:

The most common method for measuring pH is to use an electrochemical pH sensor. Combination pH sensor are a type of electrochemical pH sensor that feature both a measuring electrode and a reference electrode the measuring electrode detects changes in the pH value while the reference provides a stable signal for comparison.

Micro controller:

The PIC microcontroller 16F877A is used in our module. It consists of Flash memory. The program memory is programmed using MPLAB devices. SRAM (data memory), EEPROM memory programmed during run time.

LCD:

The LCD module are very commonly used in most of the projects. The reason being its cheap price, availability and programmer friendly. 16*2 LCD is named so because , it has 16 columns and 2 rows.

SPRAY PUMP :

The spray displacement pump makes a fluid move by trapping a fixed amount and forcing that trapped volume into the discharge nozzle. The nozzle of the spray pump concentrates the liquid into steam by forcing it through a small hole. Spray pump also consists of one - way valve to keep air from flowing back into the pump and allows suction within the pump so that liquid can be pulled up.

E. BUCKET COLLECTOR DESIGN

The bucket collector is used to collect the waste that present in the surface of the water bodies. This method is most efficient in collecting the waste.

Electromagnetic relays are used in this system. This relay operates on the principle of electromagnetic attraction. It is a type of magnet switch which uses magnet for creating the magnetic field. The magnetic field then uses for opening and closing the switch and for performing the operation. A relay is an electromagnetic switch operated by relatively small electric current that can turn on or off a much large current. The heart of the relay is electromagnetic which is a coil of wire that becomes a temporary magnet when the electricity flows through it.

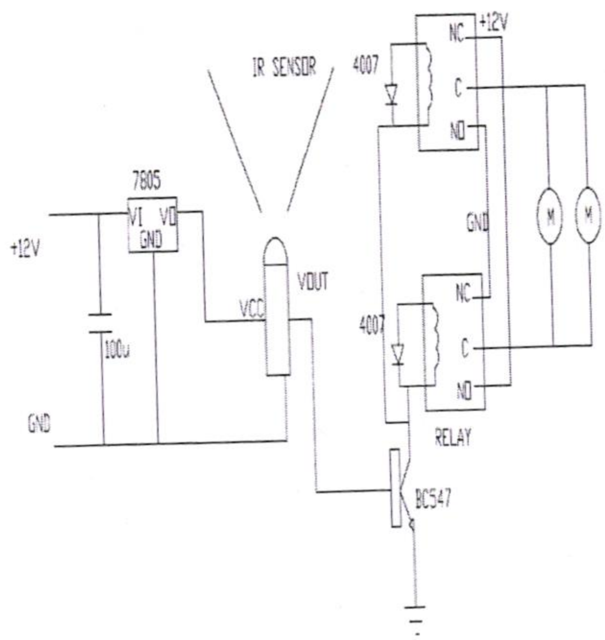


Figure 1.6 Block diagram of bucket collector.

Based on the above shown mechanism the bucket collector will collect the waste. The IR sensor is used to detect the object that present in the surface of the water bodies. The collected wastes are kept in a container.

Infrared motion sensors detect the motion in day time and night time reliably. The sensor does not require any contact with the product to be sensed. They are physically smaller in size and are more affordable.

III. WORKING PRINCIPLE

The machine consists of bucket collector coupled with motor, relay and IR sensor which are used for collecting the surface waste present in the water bodies. The collected waste is thrown on the container. The machine will run the water bodies with the help of the DC motor. The total electrical devices are controlled by RF transmitter and receiver which used to control the machine remotely.

IV. DESIGN ANALYSIS

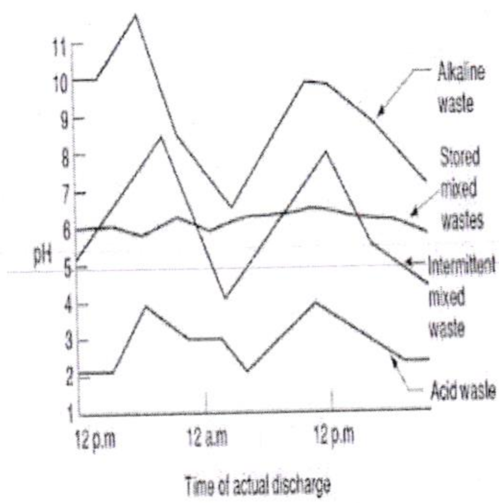


Figure 1.7 pH neutralization curve

Acid and alkaline waste may be produced and proper mixing of this waste at appropriate times can accomplish neutralization. Although, this requires the storage of waste to avoid slugs of acid or alkali. This waste can be stored in fluid form and sprayed by using the spray pump to achieve neutralization.

V. ADVANTAGES AND DISADVANTAGES

Advantages:

Initial and maintenance cost is low. This project is very useful for small as well as big lakes, rivers where garbage is present in large amount. Skill worker are not required to drive the system. Environment friendly system. Design of the system is made simple.

Limitations:

This machine is able to collect the waste which is only floating on water level.

VI. FUTURE SCOPE

The machine can be designed for deep cleaning. Capacity of the machine can be increased for cleaning big rivers and lakes.

VII. CONCLUSIONS

This project " WATER SURFACE CLEANING ROBOT " has designed which is very much economical, easy to operate and helpful for water cleaning and it can be modified with more cleaning capacity and efficiency.

REFERENCES

[1] Prof. Kean V. Dhande, "Design and fabrication of river cleaning system", "International Journal of Modern trends in Engineering and Research" Volume 4, Issue 2 [February-2017], ISSN (PRINT): 2393-8161.
[2] Prof. Ajay Dhumal, "study of river harvesting and trash cleaning machine" "International Journal of Innovation Research in Science andEngineering ", Volume 2, Issue 3[March-2016] ISSN:2454-9665.
[3] Prof. N.G.Jogi. "Efficient lake garbage collector by using pedal operated boat", "International Journal of Modern trends in Engineering and Research", Volume 02, Issue 04[April-2016] ISSN:2455-1457.
[4] B.D. Shiwalkar, "Design data for machine elements",2013 Edition,Denett& Co.pp.203.
[5]S. K. Hajra Choudhury, A. K. Hajra Choudhury, NirjharRoy, "Manufacturing processes", Volume –I, 14th Edition, Media Promoters and Publisher Pvt. Ltd, pp 373.
[6] Jianhua Wang, Wei Gu, Jianxin Zhu, Jubiao Zhang. "An Unmanned Surface Vehicle for Multi - Mission Applications". Proc . 2009 International Conference on Electronic Computer Technology, 20-22 Feb, Shanghai, P.R. China, Page(S):358-361.
[7] Caccia, M., Bibuli M., Bono R., Bruzzone G. "Aluminum hull USV for coastal water and seafloor monitoring". Proc. OCEANS 2009-EUROPE, 11-14 May, Bremen Germany, Page(s): 1-5.
[8] Manley, J. "Unmanned Surface Vehicles, 15 Years of Development", Proc. Oceans 2008 MTS/IEEE Quebec Conference and Exhibition (Ocean '08), Sept. 2008.
[9]Basant Rai, Pollution and Conservation of Ganga River in modern India, International Journal of Scientific and Research Publication Volume-3, April 2013,ISSN2250-3153,PP 1-4.
[10] Rajendra Patil, Rahul Itnare, Sagar Ahirrao, Amol Jadhav and Ajay Dhumal, Study of river harvesting and trash cleaning machine, International Journal of Innovation Research in Science and Engineering , Vol.No.2, March 2016, pp.422-431.
[11] Priyam Das, Kenneth R. Tamminga, The gangas and the GAP, An Assessment of effect to clean a sacred river, sustainability 2012, 1647-1668, pp. 1647-1668.

A NEW IOT FOR ARTIFICIAL INTELLIGENCE IN AGRICULTURE

Mr. N. Ravindar [1], Yelagandula Divya Sree [2], Thota Mahendar [3], Survi Sushmitha [4], Sandhemoni Maneeshwar[5]

Asst.Professor[1], Students[2,3,4,5], Dept.ECE

Samskruthi College of Engineering and Technology, Ghatkesar, Hyderabad, Telangana, India.

Abstract :

In every country agriculture is done from lifetime which are examine to be science and also skill of growing plants. In day today life, technology is updating and it is also necessary to trend up agriculture too. IoT plays a lead part in smart agriculture. Internets of Things (IoT) sensors are used to provide necessary information about agriculture fields. The main head of IoT is to monitor the agriculture by using the wireless sensor networks and collect the data from different sensors which are deployed at various no des and send by wireless protocol. By utilizing IoT system the smart agriculture is charged by Node MCU. It comprises the humidity sensor, temperature sensor, moisture sensor and DC motor. This structure begins to inspect the humidity and moisture level. The sensors are used to sense the level of water and if the level is below the range then the system automatically stars watering. According to the exchange in temperature degree the sensor does its job. IoT too shows the details of humidity, moisture level by including date and time. The temperature measure based on type of crops cultured can also be modify.

Introduction

One of the biggest livelihood companies in India is Agriculture.Agriculture performs an indispensable position in aiding human life. The upward shove in populace is proportional to the extend in agriculture production. Basically, Agriculture manufacturing relies upon the seasonal conditions which do now not have adequate water sources. To get advisable consequences in agriculture and to overcome the problems, IoT primarily based clever agriculture device is employed. Global and regional scale agricultural monitoring structures aim,to grant up-to-date records regarding meals production. In IoT-based smart farming, a device is built for monitoring the crop discipline with the help of sensors like light, humidity, temperature, soil moisture, etc. The farmers can display the field prerequisites from anywhere. IoT-based smart farming is rather efficient when in contrast with the conventional approach. Due to the current advances in sensors for the irrigation structures for agriculture and the evolution of WSN and IoT technologies, these can be utilized in the improvement of computerized irrigation systems. The device will decide the parameters that are monitored in irrigation structures concerning water volume and quality, soil characteristics, climate conditions, and fertilizer utilization and supply an overview of the most utilized nodes and wi-fi applied sciences employed to put in force WSN and IoT based totally clever irrigation systems.

Literature Survey

An IOT Based Crop-field monitoring an irrigation automation machine describes how to display a crop field. A device is developed by means of the use of sensors and in accordance to the choice from a server primarily based on sensed data, the irrigation device is automated. Through wi-fi transmission the sensed records is forwarded to net server database. If the irrigation is computerized then the moisture and temperature fields are lowered under the achievable range. The consumer can reveal and manipulate the device remotely with the assist of software which gives a net interface to person [1].By smart Agriculture monitoring system and one of the oldest ways in agriculture is the manual method of checking the parameters. In this method farmers by themselves verify all the parameter and calculate the reading [2] The device focuses on creating gadgets and device to manage, show and alert the customers the usage of the benefits of a wi-fi sensor community system. It objectives at making agriculture clever the use of automation and IoT applied sciences [3].

The cloud computing units are used at the give up of the machine that can create a entire computing machine from sensors to equipment that look at statistics from agriculture field. It proposes a novel methodology for clever farming by way of which include a clever sensing gadget and clever irrigator machine thru wi-fi conversation science [4]. This machine is less costly at price for installation. Here one can get admission to and additionally manipulate the agriculture machine in laptop, mobile smartphone or a pc [5].

Block diagram

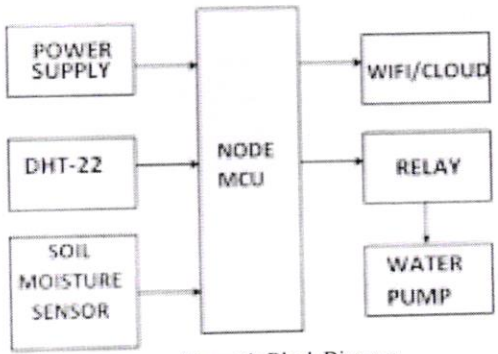


Figure 1: Block Diagram

The Block diagram of the proposed system which gives information of the required modules is shown in Figure 1.

Required Modules

Hardware requirements

- Soil moisture sensor
- Temperature sensor (DHT-11)
- Relay
- Pump
- IoT (WI-FI module ESP8266)
- Power supply: 5V, 700mA Regulated power supply **Software tools required**
- Arduino IDE
- Thingspeak website

Soil Moisture sensor

A system which is used to experience the moisture stage in the sand is referred to as soil moisture sensor and is proven in Figure two When the sensor senses the water scarcity in the field, the module output is at excessive degree else the output is at low level. This sensor reminds the consumer to water their flora and additionally video display units the moisture content material of soil. It has been extensively used in agriculture, land irrigation and botanical gardening.

Figure 2: Soil Moisture Sensor

Temperature Sensor (DHT-11)

Temperature Sensor (DHT-11) is used to reveal temperature and humidity of the atmosphere. The DHT-11 proven in Figure three is a primary extremely low value digital temperature and humidity sensor. It makes use of a capacitive humidity sensor and a thermistor to measure the surrounding air and cut up out a digital sign on the information pin. The DHT-11calculate relative humidity by measuring the electrical resistance between two electrodes.

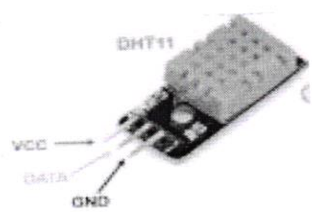


Figure 3: Temperature sensor

Relay

A relay is used as electrically operated alternate which is validated in Figure 4 It has a set of enter terminals for a single or a couple of manipulate indications and a set of going for walks contact terminals. The swap may additionally comprise vary of contacts in extra than one contact sorts which make contacts or injury contacts. Relay is used to flip on the water pump in order to maintain the moisture stage of the crop.

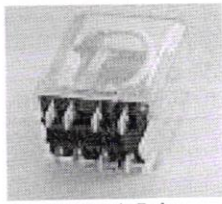


Figure 4: Relay

Water pump
The DC 3-6V Mini Micro Submersible Water Pump proven in Figure 5 is a low cost, small measurement Submersible Pump Motor. It operates with a 2.5 to 6V strength supply. It can pump up to a hundred and twenty litres per hour with a very low contemporary consumption of 220mA. Just join the tube pipe to the motor outlet, submerge it in water, and strength it.

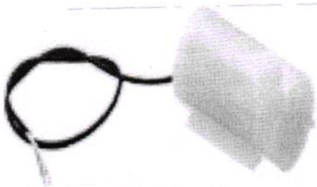


Figure 5: Water Pump

IoT (WI-FI module ESP8266)
The NodeMCU (ESP8266) proven in Figure 6 is a microcontroller with an built in Wi-Fi module. The complete pins on this system are 30 out of which 17 are GPIO (General Purpose Input/Output) pins which are linked to a range of sensors to get hold of information from the sensors and ship output information to the linked devices. The NodeMCU has 128KB of RAM and 4MB flash reminiscence storage to save applications and data. The code is dumped into the NodeMCU thru USB and is saved in it. Whenever the NodeMCU receives enter information from the sensors, it crosschecks the information acquired and shops the acquired data. Depending on the records acquired it sends a pulse to the Relay Module which in-turn acts as a change to on or off the pump. The running frequency of the NodeMCU stages from eighty to one hundred sixty MHZ and the working voltage of this system vary from three to 3.6V. The Wi-Fi module presents in the NodeMCU range from 46 (indoors) to 92 (Outdoors) Meters.

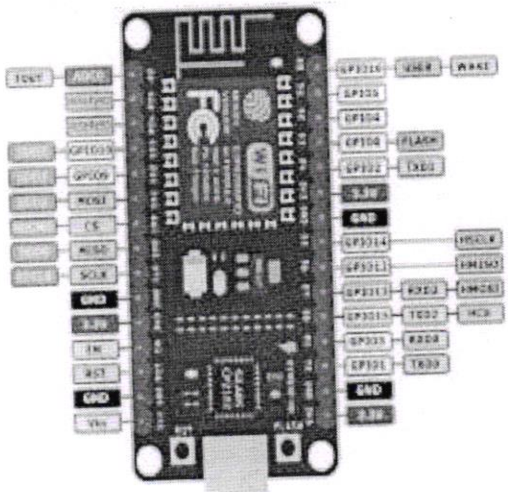


Figure 6: ESP8266 module

Power Supply
Power grant tested in Figure 7 is an electrical device which assets electric powered powered strength to an electrical load. The first characteristic of a electrical energy provide is to convert electric powered powered current day from a provide to the proper voltage, present day and frequency to strength up the load. As a result, energy assets are moreover referred to as electric powered powered power converters. Some electrical energy substances are separate standalone parts of tools while others are built into the load domestic tools that they power

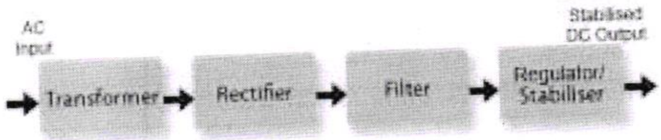


Figure 7: Block diagram of a fixed regulated power supply

Arduino IDE
The Arduino Integrated Development Environment (IDE) is a cross-platform utility in which the features are written in C and C++ languages. It is used to write and dump the written applications to Arduino like minded boards with the assist of 1/3 birthday party cores and different supplier improvement boards.
Thingspeak website
ThingSpeak is an IoT analytics platform which is used to aggregate, visualize, and analyse stay facts streams in the cloud. When the information is despatched to Thingspeak from the devices, it creates on the spot visualization of stay statistics and sends an alert.
Internal Work of ThingSpeak is proven in Figure eight

Working

The clever agriculture monitoring device is examined beneath a number conditions. The soil moisture sensor is used to check the soil for all climatic stipulations and outcomes are interpreted successfully. The moisture output readings at exceptional climate prerequisites is taken and updated. Wi-Fi is used to gain the wi-fi transmission.
The values of soil moisture sensor purely depend on the resistivity of the soil. The value of the sensor at beginning of wet condition is 0. The sensed value is sent to microcontroller through NodeMCU and motor pump gets

OFF in this condition. The most threshold fee upon dry soil is1023. When the sensed price with the aid of sensor reaches the threshold value, the microcontroller set off the relay and motor receives ON. When enough quantity of water is furnished to plants, the motor pump is became ON and is became OFF automatically.

Advantages

It is easy to maintain and cost is reasonable to purchase. The components which are used are easily available.

- It has advantage to observe the status on smartphone or laptop using internet. The information is up to date even in absence of farmer.
- The collected data is updated and the farmer is conscious about the status of the crop.
- To achieve more effective and accurate details of crop several additional sensors can also be included.

Results and Analysis

The foremost intention of this challenge is to put in force the current science in required fields like agriculture. Using IoT technological know-how in agriculture, this machine makes agriculture monitoring easy. The benefits as cited like water saving and labour saving are required the most in modern agricultural kingdom of affairs. Consequently, the use of the sensor community in fields of agriculture makes wise irrigation. The data from IoT is despatched to the customer the use of cloud. Consequently, any adjustments interior the crop may additionally be recognized without difficulty and early evaluation is carried out as such.
The measured and monitored parameters like temperature, humidity and moisture in soil are shown in figures Figure 10, Figure 11 and Figure 12 respectively.

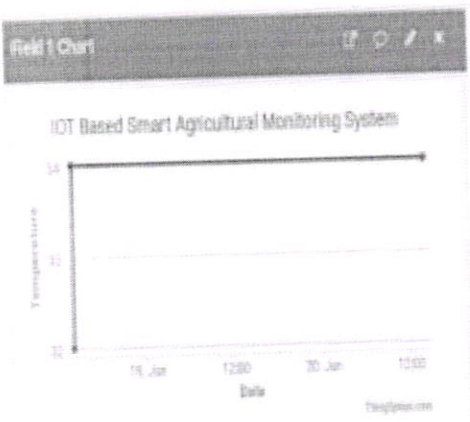


Figure 10: Temperature Measurement

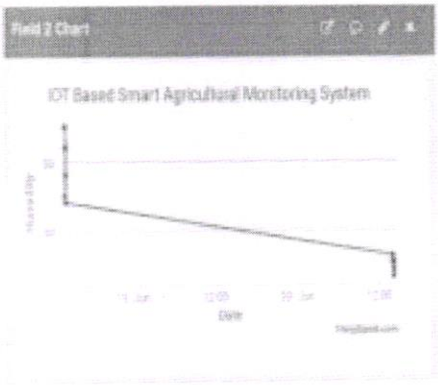


Figure 11: Humidity Measurement

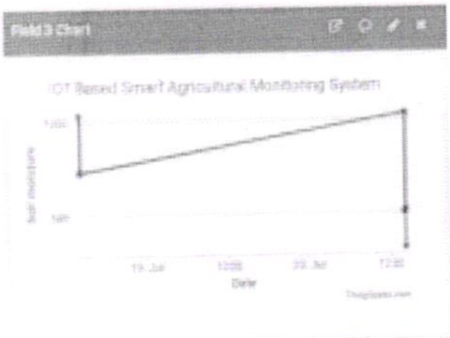


Figure 12: Soil Moisture Measurement

Conclusion and Future Scope

7.1 Conclusion

IoT will assist to decorate clever farming. Using IoT the gadget can predict the soil moisture stage and humidity so that the irrigation machine can be monitored and controlled. IoT works in distinct domains of farming to enhance time efficiency, water management, crop monitoring, soil administration and manipulate of insecticides and pesticides. This machine additionally minimizes human efforts, simplifies methods of farming and helps to attain clever farming. Besides the benefits furnished by using this system, clever farming can additionally assist to develop the market for farmer with single contact and minimal effort.

7.2 Future Scope

- The venture has widespread scope in creating the device and making it greater consumer pleasant and the extra aspects of the machine like:
- By putting in a webcam in the system, images of the vegetation can be captured and the facts can be despatched to database.
- Speech based totally choice can be applied in the machine for the human beings who are much less literate.
- GPS (Global Positioning System) can be built-in to grant unique region of the farmer and greater correct climate reviews of agriculture subject and garden.Regional language feature can be implemented to make it easy for the farmers who are aware of only their regional language.

References

1. Rajalakshmi.P and S. Devi Mahalakshmi, "IOT Based Crop Field Monitoring and Irrigation Automation", 10th International conference on Intelligent systems and control (ISCO), 2016.
2. Joaquin Gutierrez, Juan Francisco Villa-Medina et.al, "Automated Irrigation System Using a Wireless Sensor Network and GPRS Module", IEEE Transactions on Instrumentation and Measurement, 2013.
3. Dr. V. Vidya Devi and G. Meena Kumari, "Real Time Automation and Monitoring System for Modernized Agriculture", International Journal of Review and Research in Applied Sciences and Engineering, Vol3 no.1. pp 7-12, 2013.
4. Basha, Elizabeth, and Daniela Rus, "Design of early warning flood detection systems for developing countries", International Conference on Information and Communication Technologies and Development, 2007.
5. K. Jyostsna Vanaja, Aala Suresh et.al, "IOT based Agriculture System Using NodeMCU", International Research Journal of Engineering and Technology, Vol.05.
6. T. Rajesh, Y. Thrinayana and D. Srinivasulu "IoT based smart agriculture monitoring system", International Research Journal of Engineering and Technology,

INDIAN JOURNAL OF TECHNICAL EDUCATION

ISSN 0971-3034

Volume,12 Issue,1 May,2024

IOT BASED WOMEN SAFETY BAND AND TRACKING ALERTS BY USING GPS WITH LIVE LOCATION

Gudati Naveen, Komirelly Tejaswini, GORIGE POOJA, V.Vinod,
Mrs.CH. Ramya Sree, Assitant professor,
U.G.Students,
Electronics and communication engineering,
Samskruti college of engineering and technology, Hyderabad.

Abstract:

Sexual harassment is one of the many issues that women confront nowadays. A gadget that integrates with other devices is part of the suggested system. An integral part of the hardware system is a "smart band" that users may wear and which maintains continual communication with an internet-connected mobile device. By the end of this project, women will have the assurance that they will never be powerless in critical situations. We may take the right steps by constructing a modern system that reveals the women's position and health state. Engineers can track women's participation in social problems in real-time using data collected from a variety of sensors. But among God's finest creations, the woman endures the worst anguish. It breaks me heart to report that American women do not have it good. According to the National Crimes Records Bureau (NCRB) report, 88 rape crimes were registered daily in India in 2019. According to NCRB, the risk of a girl or woman becoming a victim of rape has increased by 44% in only 10 years.

Introduction

The necessity for creative ways to guarantee women's safety has grown in recent years due to the prevalence of safety issues in modern society. One innovative piece of technology that aims to empower women is the Women Safety Bangle. It has GPS tracking, GSM call, and SMS notification capabilities, so women can defend themselves efficiently. This revolutionary gadget offers a one-stop solution for safety by integrating state-of-the-art GPS technology with functionalities for real-time communication. Rather from looking like a typical safety gear, the Women Safety Bangle is intended to be understated but strong, like a trendy ornament. With its understated elegance and modern style, this accessory is perfect for ladies who want to be seen without attracting too much attention to themselves. In the event of an emergency, the user is able to broadcast their live position because to the bangle's sophisticated GPS tracking capabilities, which belie its seemingly innocuous look. The Women Safety Bangle offers real-time location sharing with trusted friends or emergency agencies thanks to its GPS tracking technology. The SOS alert function on the bangle may be quickly used in case of an emergency, notifying pre-configured contacts of your exact position. This function comes in handy especially when a lady is in danger and needs help right away. Women may stay in touch even when GPS reception is spotty because to the Women Safety Bangle's built-in GSM call and SMS notification features. Not only can users share their GPS coordinates with others, but they can also send an SMS alert or make a GSM call to a specific contact with the tap of a button. Because of this two-way communication, women who are in danger have more ways than one to get assistance. A complete safety solution that meets the different demands of contemporary women, the Women Safety Bangle integrates GPS tracking, GSM call, and SMS notification features. This gadget gives you peace of mind by giving you fast access to help when you need it, whether you're wandering alone at night, commuting in new locations, or doing outdoor activities.

In addition, the Women Safety Bangle has an easy-to-understand interface that can be used with confidence even while under pressure. The gadget is a dependable friend for ladies who are always on the go, thanks to its long-lasting battery that allows for longer usage without regular recharging. To sum up, the Women Safety Bangle is an innovative

INDIAN JOURNAL OF TECHNICAL EDUCATION

ISSN 0971-3034

Volume,12 Issue,1 May,2024

tool that gives women agency over their own safety, thanks to its GPS tracking, GSM calling, and SMS alert features. In a world where everything can change in an instant, this groundbreaking solution provides safety and security by integrating cutting-edge technology with an intuitive design. A woman may confidently go out into the world with the Women Safety Bangle on her finger, knowing that assistance is at the touch of a button.

Literature Survey

[1].Design and Development of "Suraksha"-

This article discusses the main principle underpinning suraksha, a women's safety device, which is to flash a warning revealing the exact position of the distressed victim to the police in order to avert the occurrence and then catch the criminal.

[2]. One touch alarm system for women's safety using GSM

A GSM-based one-touch alert system for the protection of women is detailed in this article. People are coming up with creative methods to protect themselves in the wake of the recent uproar in Delhi, which shocked the country and brought attention to the safety challenges facing women. We provide a gadget here that safeguards ladies. This helps in locating safe havens and contacting the appropriate authorities to rescue the individual. You only needed to keep your finger on the device's button whenever you felt threatened. A PIC microcontroller, a GSM module, and a GPS module make up the gadget. Activating the gadget, which looks like a regular watch, allows it to monitor the whereabouts of the ladies via GPS and communicate urgent messages to SOS contacts and the police control room using GSM.

[3]. SHE (Society Harnessing Equipment)

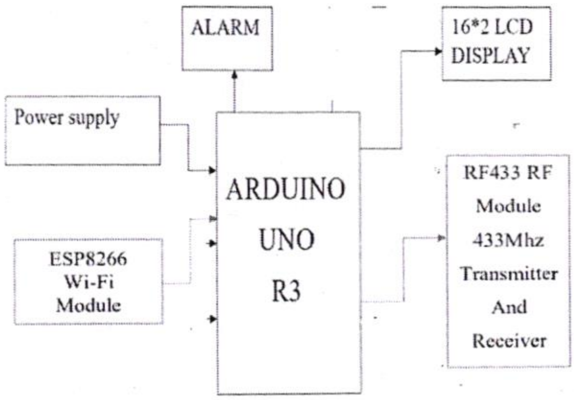
What we have here is an electrical gadget implanted in a clothing. The sufferer may use the garment's built-in electric circuit to create 3800kV and escape. As many as eighty electric shocks may be delivered in the event of a simultaneous assault.

Methodology

INDIAN JOURNAL OF TECHNICAL EDUCATION

ISSN 0971-3034

Volume,12 Issue,1 May,2024



Block diagram

Even when there is no internet connection, the automated danger detection system may still contact emergency contacts and make phone calls in the event that a lady is in imminent danger. On the occasions when women are able to use it, it also has an alert button. The suggested system is based on a wearable gadget that continually measures vital signs like heart rate and temperature and transmits that data to an Arduino board. This data is sent by Arduino to the gateway. Any and all of this data is sent to the cloud from the gateway and stored there. In the cloud, all algorithms for machine learning and computing run continuously. We started by gathering some training data using temperature and heart rate monitor applications on mobile devices in both safe and unsafe environments. Using this training data, we trained a logistic regression algorithm to identify potentially dangerous and non-dangerous situations and to act accordingly. After then, it is done based on real data, regardless of whether threat is there or not. This data travels from the cloud to the gateway, which in turn returns it to the Arduino. The GSM modem, which stands for "global system of mobile communication," is available on Arduino. Using the victim's position data collected by the device's GPS, that GSM modem notifies emergency contacts via phone calls and text messages in the event that danger is anticipated.

The Internet of Things (IoT) Women Safety Band uses global positioning systems (GPS) and real-time location monitoring to increase user safety. The band has a number of sensors, a panic button, and a GPS module. If the user feels endangered, they may hit a panic button and the gadget will execute many operations at once. As a first step, the GPS module provides a precise, real-time position for the user. A linked smartphone receives this location data. The data is then processed by the server or the smartphone app, which promptly notifies the server. By making sure that aid can be requested immediately and that the wearer's position is known, this device not only gives instant help but also acts as a deterrence against prospective threats. Internet of Things (IoT) integration improves personal safety by facilitating instantaneous response and streamlined communication. Through Bluetooth, the user connects the safety band to their mobile device. They set up the emergency contacts using the app on their phone. The user's precise whereabouts are constantly being updated by the GPS module. The microcontroller processes this position data. Depending on the situation, the microcontroller may communicate with the mobile app using Bluetooth if it's within range, or it may use the GSM module to communicate with a server in the background. The user's position on a map is constantly updated by the mobile app or server. The microcontroller instantly gets the current GPS coordinates when the panic button is pressed by the user. With the coordinates supplied, the microcontroller sends a distress signal.

Arduino Uno

One such microcontroller board is the Arduino Uno, which uses the Atmega328 (datasheet). An analog input, a USB port, a power connector, an ICSP header, a reset button, a 16 MHz crystal oscillator, and 14 digital I/O pins (including 6 PWM outputs) are all part of it. All you need is a USB cable, an AC-to-DC converter, or a battery to get it going; it

INDIAN JOURNAL OF TECHNICAL EDUCATION

ISSN 0971-3034

Volume,12 Issue,1 May,2024

comes with everything you need to support the microcontroller. A key difference between the Uno and all previous boards is the absence of the FTDI USB-to-serial driver chip. In its place, you'll find the Atmega8U2 configured to convert USB to serial. The impending release of Arduino 1.0 is being commemorated with the moniker "Uno," which means "One" in Italian. From here on out, the Uno and version 1.0 will serve as the benchmark versions of Arduino. See the index of Arduino boards for a comparison with earlier generations; the Uno is the newest in a series of USB Arduino boards and the platform's standard model.

LIQUID CRYSTAL DISPLAY

In front of a light source or reflector, a thin, flat display device called a liquid crystal display (LCD) arrays a large number of color or monochrome pixels. Two polarizing filters, with their polarity axes perpendicular to one other, and a column of liquid crystal molecules hanging between two transparent electrodes make up each pixel. Light would not be able to travel through them if the liquid crystals weren't interposed. Light that enters one filter is able to pass through the other because the liquid crystal bends its polarity. In order for a program to communicate with the outside world, it needs input and output devices that can directly connect to a person. A liquid crystal display (LCD) is a typical accessory for controllers. 16X1, 16x2, and 20x2 LCDs are among the most popular types of displays that are often linked to the controllers. This equates to sixteen characters on a single line. Two lines with sixteen characters each and twenty-one characters each line, respectively. The usage of "smart LCD" screens allows for the visual output of information by several microcontroller devices. LCD displays built around the LCD NT-C1611 module are simple, cheap, and can even generate a readout with the help of the display's 5X7 dots and pointer.

2x16 LCD Display

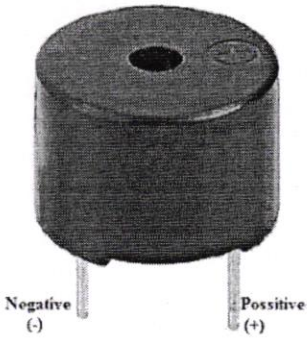
BUZZER

Beepers and buzzers, among other auditory signaling devices, may be mechanical, electromechanical, or piezoelectric. This is mostly used to transform the audio signal into audible sound. Common places to find it include timers, printers, alarms, laptops, and other devices that run on direct current (DC). Alarm, music, bell, and siren sounds may be generated depending on the designs. The buzzer's pin configuration is seen below. Two pins, one positive and one negative, are included. The plus sign or a longer terminal denotes the positive end of this. The positive terminal, denoted by the "+" sign and linked to the GND terminal, receives power from 6Volts, while the negative terminal, indicated by the "-" symbol, is shorted.

INDIAN JOURNAL OF TECHNICAL EDUCATION

ISSN 0971-3034

Volume,12 Issue,1 May,2024



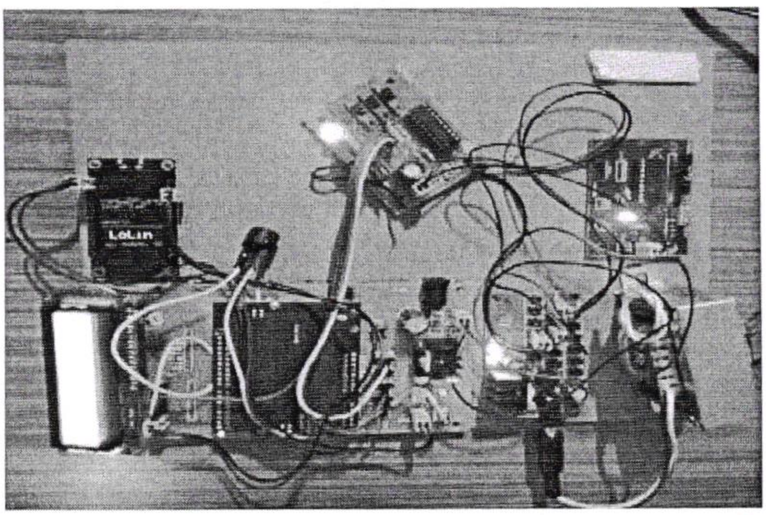
Buzzer

ESP8266 Wi-Fi Module

This project revolves on this. This module is crucial to the project as a whole since it enables the WIFI control of appliances. One remarkable feature of the ESP8266 Arduino compatible module is its included MCU (Microcontroller Unit), which allows for the control of I/O digital pins using a simple programming language that is almost pseudo-code like. This little board also has complete TCP/IP functionality, making it an affordable Wi-Fi chip. The Chinese company Es press if Systems, located in Shanghai, is responsible for making this gadget. The ESP-01 version module, manufactured by third-party producer AI Thinker, was the first to have this chip in August 2014. Connecting to a Wi-Fi network and establishing basic TCP/IP connections are both made possible by this little module. He piqued the interest of many hackers and geeks due to his tiny size, cheap pricing (1.7–3.5$), and potential usage in a wide range of projects. Es press if has been so successful that it now offers a wide variety of models, each with its own unique set of features and dimensions. We have ESP32 as one of our successors. Countless ideas and implementations, such as home automation, data logging solutions, robotics, internet-based control of objects, and even drones and copters, may be found online.

Results

This women's safety band is built on the Internet of Things and uses GPS to keep you updated on your whereabouts in real time. When worn, the band may pinpoint the exact position of its owner by sending signals to a server. By minimizing reaction times in crises and guaranteeing fast aid, this technology promotes safety. An effective instrument for women's protection, the use of IoT technology guarantees constant surveillance.

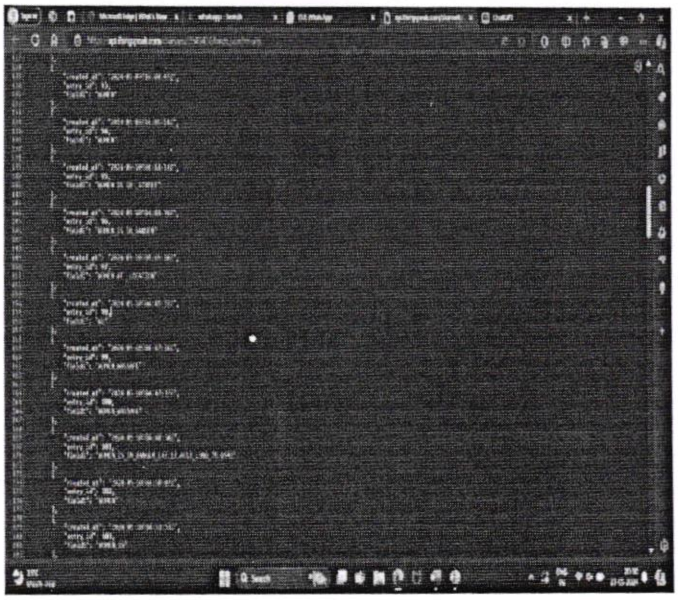


INDIAN JOURNAL OF TECHNICAL EDUCATION

ISSN 0971-3034

Volume,12 Issue,1 May,2024

Output



Output pictures of IOT based women safety band

Conclusion

An innovative development in the field of personal security is the Internet of Things (IoT)-based women's safety band that includes GPS tracking and real-time location push notifications. The gadget gives immediate position updates with the integration of real-time GPS tracking, guaranteeing that help is sent out in the event of an emergency. By allowing for rapid notifications to the server, the technology improves safety and reduces reaction times. This technology gives women the ability to protect themselves with a dependable instrument, which boosts their confidence and security. It is an essential breakthrough in the field of personal safety due to its ability to repel threats, ease of use, and smooth functioning.

FUTURE SCOPE

Internet of Things (IoT)-based women's safety bands with GPS monitoring and real-time location notifications have great potential. Through the provision of real-time location monitoring and fast notifications to emergency contacts and authorities, this technology has the potential to greatly improve personal security. Time to react and cooperation with law enforcement may both be enhanced via integration with smart city infrastructure. Biometric tracking, voice activation, and danger identification based on artificial intelligence are all possible advanced features. A decrease in crime rates and the empowerment of users with increased security measures are both possible outcomes of the proliferation of such devices made possible by improvements in connection and the Internet of Things (IoT).

REFERENCES

INDIAN JOURNAL OF TECHNICAL EDUCATION

ISSN 0971-3034

Volume,12 Issue,1 May,2024

1. N. Bharadwaj and N. Aggarwal, "Design and Development of "Suraksha"-A Women Safety, "International Journal of Information & Computation Technology, vol. 4, no. 0974-2239, pp. 787-792, 2019.
2. Prem kumar. P,CibiChakkaravarthi.R,Keerthana. M and Ravivarma.R'Sharmila.T, "One Touch Alarm System For Women's Safety Using GSM," International Journal of Science, Technology & Management, vol. 04, no. 2394-1537, March 2020.
3. A. Wadhawane, A. Attar, P. Ghodke and P. Petkar, "IoT based Smart System for Human Safety," International Journal of Computer Applications, Vol. 179, No.7 , March, 2019.
4. S. B. Gadhe, G. Chinchansure, A. Kumar and M. Ojha,"Women Anti-Rape Belt," An international journal of advanced computer technology, vol. 4, no. 2320-0790, April,2021.

INTELLIGENT MOVING ROBOT TO ACQUIRE DATA FROM RADIATION AREAS

Dr.K.Vanisree[1], Mothe Pranitha [2], Kancha Ganesh [3], Singireddy Phanidhar [4], Kasuboju Ruchith [5]
Associate Professor & Head Of The Department[1], Students[2,3,4,5], Dept.ECE
Samskruthi College Of Engineering And Technology, Ghatkesar, Hyderabad, Telangana, India.

Abstract – *Winds and radiation always play an import role in the life of every things on this Earth in many ways. Knowing radiation parameters accurately may help in the future radiation prediction which help us and the farmers, scientists, researchers and trackers to plan their work accordingly and helps in making important decisions. But creating radiation station is costly and requires much larger space. This project is aimed to reduce the cost and increase the speed of data collection of radiation parameters as well as it will help in collecting data in rough or unreachable terrains and areas. It can be used for studying and monitoring of radiation. It has GPS implementation which help the Robot to collect the data with its location and with accuracy. The Robot is built using wooden frame with BLDC motors 0f 1400 KV rating and 1045 propellers. The flight controller of Robot is made up of Arduino Uno and ESC (30 A) and it is controlled by using remote with transceiver module HC05.*

Key Words: **Robot, BLDC motor, GPS, Arduino Uno, HC05, Flight Controller, ESC, Cost, Radiation.**

1. INTRODUCTION

In our day to day life radiation affects a wide range of our works and activities such as transportation, agriculture, research work, etc. The Robot (Line follower) radiation station is designed to take the necessary measurements to predict or track the radiation or its movement in a cost-effective way with accuracy. The main aim of this project is to record the radiation parameter such as temperature, humidity, pressure with its tagged GPS location. Using the collected, radiation can be predicted or it can be used for further studying purpose. This project will also help in selecting a specific site for a specific work which requires special detail to the temperature, humidity and pressure of the environment. The mobility of line follower radiation station will help in reaching the rough terrain areas and make the measurements.

The Line follower has MicroSD card slot and WIFI connectivity which can be used to see the data collected MicroSD will store data in KML format which can be read using GOOGLE EARTH application. This paper describes the working and assembly of line follower and data collection method using sensors and GPS module

BLOCK DIAGRAM

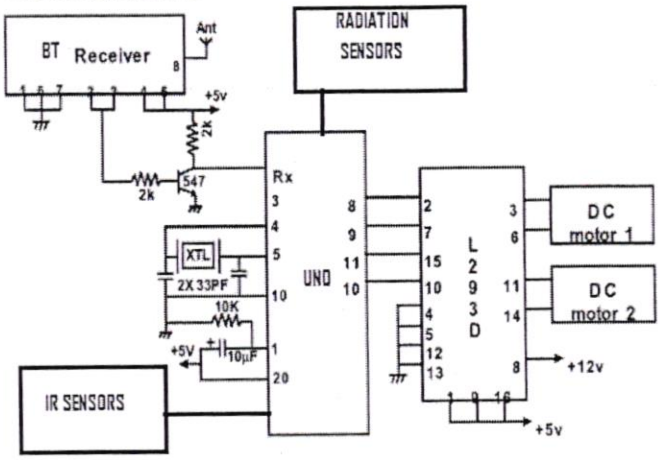


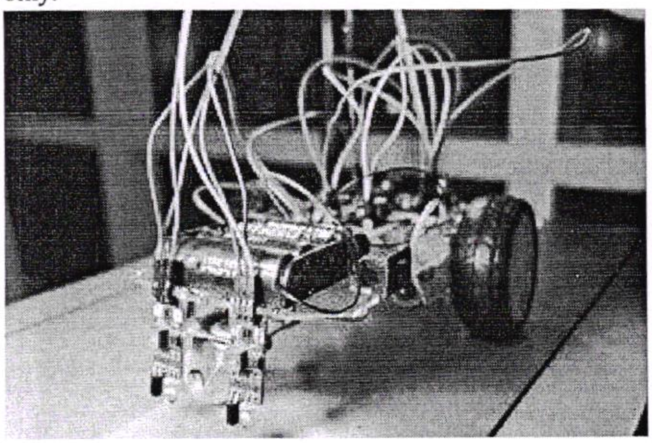
Fig 1: Block Diagram of Line follower and Sensors

Block diagram consists of Arduino, BLDC Motor, ESCs, Li-Po Battery, Transceiver Module. Arduino contains the ATMEGA328P microcontroller which is the main brain of flight controller of the Robot. Esc convert the dc signal to three phase ac signal which is used to run the BLDC Motors. BLDC motors are used here because of their high revolution speed which helps to generate the thrust required to lift the line follower. Li-Po battery has high current output which is required for the BLDC motor to run. We have used 2200mAH battery which can give the flight time of around 20-25 minutes with BLDC motor having 1400 KVA ratings. NRfl24L01 transceiver module is to communicate with the remote. But in testing stage we used Bluetooth module HC- 06 for simulation purpose and used the Mobile app to give the commands to the Line follower.

The sensors block diagram consists of different types of sensors, Arduino Uno, ATMEGA328P, HC05. The sensors may be temperature, Humidity, Pressure, etc. The sensors give analog output to the ADC (Analog to digital converter), which converts the analog input to its digital equivalent and gives it to the microcontroller. The Arduino- Uno is used to take the digital input from the sensors. This input is given to a RF transmitter module that transmits the signal. The signal transmission can be done over Wi-Fi.

1.1 WORKING

It has Arduino with ATMEGA328P. The flight controller of the line follower is the main controlling component for the line follower to fly properly. It has 4 ESCs connected to the digital pins of Arduino. Here, Arduino is powered using 9v Battery. BLDC motors are powered using the Li-Po battery of 2200 mAh. Mpu6050 is connected to the Arduino board using the serial communication pin. HC05 Module is also connected to the Arduino board using RX-TX pin. To power the Mpu6050 and HC05 Module the 3.3v pin and 5 v pin output on the Arduino board is used. The motor has 3 wires which are connected to the esc three output pins. The connections of motors to the ESC is based on in which direction we need to rotate that motor i.e. Counter or clockwise rotation. The rotation speed of motor is controlled using the esc, while programming the input to esc pins are given in the form of degree (min 30) which controls the speed of rotation. The range can vary from 0 to 180 degree only.



MPU6050 helps the line follower in balancing. Sensor network on the line follower measures the parameter in the analog form and gives the input the Arduino Uno. The microcontroller reads the measurement of sensors with the GPS tagged location and store it in the MicroSD or sends the data over WIFI to the receiver device.

2. RESULT

We were able to make a Robot with wooden frame in X - frame form. The flight controller of Robot using Arduino Uno was made and programming was done using Arduino IDE. The program was the main firmware for the flight control which helps the flight controller to work according the user's requirement. As per now, we have used Bluetooth Module HC-05 for reception purpose and used Android mobile app to communicate with the flight controller using Bluetooth. The android app is used to control and give command to the flight controller.

3. CONCLUSIONS

Wireless radiation monitoring system serves as a reliable and efficient system for monitoring of the environmental parameters. Wireless monitoring of field not solely permits user to cut back the human power, but it also allows user to see accurate changes in it. It is much cheaper in cost, consumes less power.

This paper helps in development of Arduino Uno based Line follower for radiation at a less expense. We are using this line follower for wireless radiation station purpose which will have different types of sensors to sense the radiation parameters such as temperature, humidity, pressure, altitude, etc. Using this line follower user can also get to read the radiation parameters on the google earth with their tagged locations.

4. FUTURE SCOPE

In further improvements on small scale it is desired to be cased within an Arduino case either own made or bought as desired. Adding one more sensor LDR (Light dependent sensor) one of the other available cheap sensors can be used to light cloudy radiation or not. One of the future scopes of it as desired is compatible with smartphone apps to give any critical feedback of data. Updating twitter status and performing actions on the basis of that which is one of the most efficient use of IOT. The special feature to be included as an idea in this device is that it can be used for any critical environments or local area rather than expensive radiation stations capable of performing over a large scale. These work on small scale too on public wireless LANs.

This project can be further developed for the study of tornados or areas where radiations are unstable and violent and it can be further developed for the study of another planet's atmosphere.

REFERENCES

[1] Hardeep Saini.; Abhishek Thakur, Satinderpar, Nitant Sabharwal."Arduino based automatic wireless radiation station with remote graphical application and alerts". IEEE(Online) SPIN.2016.7566768 (feb 2016).

[2] Pounds, P.; Mahony, R., Corke, P. (December 2006). "Modelling and Control of a Quad-Rotor Robot".

[3] Mark LaFay, "Robot for Dummies", ISBN: 978-1-119- 04978-4 July 2015

[4] https://www.hackster.io/gius_8/radiation-station-for- Robots-1184cd

[5] https://howtomechatronics.com/tutorials/arduino/ard uino-wireless-radiation-station-project/

International Journal of
Information Technology & Computer Engineering

ISSN 2347–3657

Volume 12, Issue 2, 2024

AN IOT BASED MECHANISM FOR AUTOMATIC CLASSROOM ELECTRICITY SAVING

Dr.V.SANDEEP KUMAR [1], REDDABOENA GOUTHAMI, AERUVA VAISHNAVI, SHYAMALA AKSHAI, KADARI CHAITANYA

Assistant Professor [1], Students, [2,3,4,5], Dept.ECE

Samskruthi College Of Engineering And Technology, Ghatkesar, Hyderabad, Telangana, India.

ABSTRACT—

The Internet of Things (IoT) has revolutionized the way we interact with devices and systems. In this paper, we present an IoT based energy-saving system for the Electrical and Telecommunication Engineering (E&TE) department. The proposed system monitors and controls the energy consumption of devices and equipment in the department, thereby reducing energy wastage and promoting sustainability. The system consists of several components including sensors, microcontrollers, and a cloud-based platform for data storage and analysis. The sensors monitor the motion of human's and send the data to the microcontrollers, through the relay light will be ON/OFF to optimize the energy usage. The cloud-based platform collects and stores the data from the sensors and provides real-time analytics and visualizations for energy management.

Keywords— IOT, ESP8266, PIR, ThingSpeak, Arduino.

I. INTRODUCTION

Recent years have seen a huge increase in the importance of energy conservation due to environmental concerns including climate change and global warming. The excessive use of energy in the creation of electricity is a major contributor to environmental problems. Reduced energy waste and effective energy utilization are therefore urgently needed. Around 20 percent of the energy used worldwide is used by lights, and of that, 50 percent is lost as waste. People use a variety of lifestyles and practices to reduce energy waste. But even so, we sometimes forget to do simple things like turn off the lights and fans during the daily rush, which results in energy waste. The proposed system will therefore automatically complete the routine tasks that are often forgotten to avoid such occurrences.

Regarding this topic, there are already a lot of systems on the market, but they are not very effective and are also very large. In order to fix this flaw in the previous systems, we tried to do so in this one. LDR sensors and IR sensors installed in the rooms are used by the current systems. Implementing these approaches just requires minor changes to the current infrastructure. To maximize efficiency, the suggested system concentrates on implementing the sensors at the micro level. Reducing the amount of electricity wasted by classroom appliances is the major goal. Lights and fans are considered "classroom appliances" in this context. Numerous times, even when nobody is in the classroom, the lights and fans are left on. In the classroom, IR and LDR sensors are utilized to detect people and light, respectively. Furthermore, the hub receives this data. In its simplest form, a hub is a location that collects data from a collection of benches. It is also possible to adjust the status of devices manually, such as lighting, and this information is then transferred to the microcontroller, which causes the system to react appropriately.

II. LITERATURE SURVEY

The study of "IoT" was thorough and included multiple relationships and limitations. The basic objective of "IoT" is to make Internet-based communications and the sending and receiving of information conventionally available when used with "electronic sensor" devices. Contrary to software development, the major goal of the IoT is to incorporate organizations, automation, and mechanization; the most commonly recycled sensors with accelerometers are embedded in camps like "MCUS, MPUs" at the beginning of the programmed. According to the initial assessment, software development in general is comparable to the "IoT phase is separated into criteria, specifications, and implementation." This section explains earlier studies that are relevant to our inquiry. Energy utilization principles are the subject of the majority of research conducted today since they offer the best chance of reducing energy use. Other possibilities include creating green universities and using renewable energy sources like solar electricity. Green universities help with overall university energy needs while reducing environmental pollutants. Walter Simpson asserts that by focusing on the supply side of the energy equation, an aggressive university energy conservation program can reduce university energy use by 30% or more. It entails switching to energy sources and technologies that are clean, renewable, and not carbon-based. The approach includes creating energy regulations for universities, managing the computer explosion, avoiding the problems of electric deregulation, purchasing green power, and applying green building design. This study suggests that one effective strategy to cut university energy use is through technology solutions. Our solution combines the solutions mentioned previously. It is a

ISSN 2347–3657

Volume 12, Issue 2, 2024

monitoring system for the classroom as well as an energy- saving solution. Only individuals are accurately identified and the electrical gadgets are automatically controlled in the energy-saving section. The passive infrared sensor (PIR) was employed for this task. It appropriately recognizes the human body. The proposed system was created to use several types of sensors to automatically regulate the conventional manual switching mechanism.

III. PROPOSED METHODOLOGY

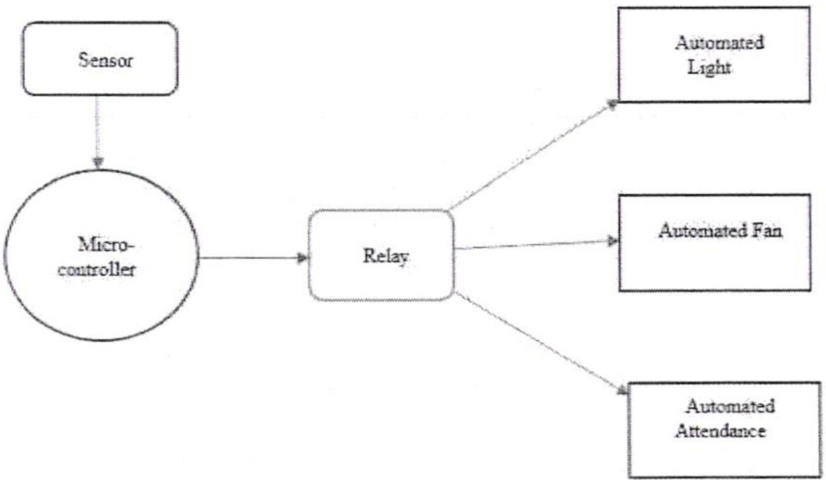
In this section, we discuss the overview of existing model, through literature reviews we have formulated some of the existing methodologies and designed our system based on the difficulties faced by the existing authors.

A. Existing Methodology

There are two methods which is being followed previously. They are.

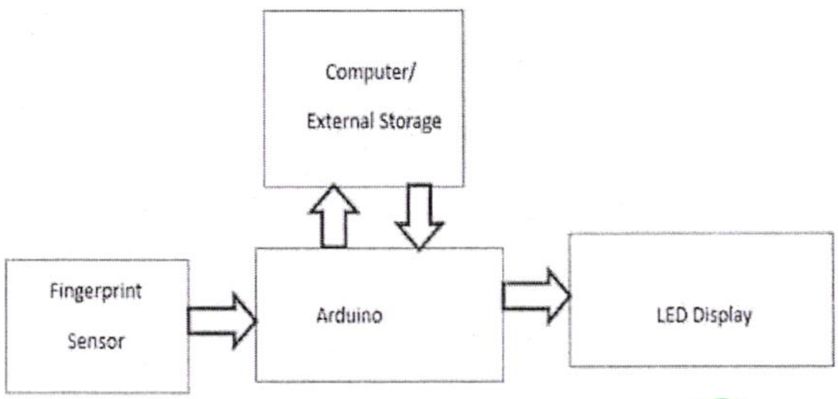
1. Manual method
2. Automation without IoT and individual costly systems.

The block diagram of Existing methodology is shown below in Fig.1



The proposed system contains the following subsystems:

1. **Automated attendance system using fingerprint sensor:** The automatic attendance management technique that integrates fingerprint authentication into the process of attendance management using Arduino and computer. It Comprises of two processes namely; enrolment of ID and authentication of ID. During enrolment, the biometrics of the Student is captured and is stored in a flash memory along with the person's id Number. The main objective of the enrolment module is to register the user using Student's id and fingerprints into a flash memory after feature Collection. During authentication, the biometrics of the Student is captured and are compared with all those that already exists in the flash memory to determine a match for marking the automated attendance. The working of Fingerprint based attendance system is given below in Fig.

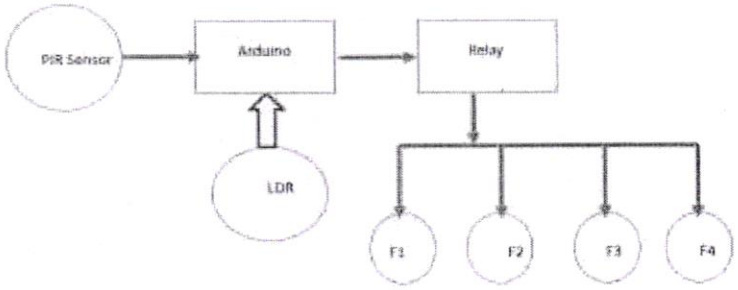


International Journal of Information Technology & Computer Engineering

ISSN 2347–3657

Volume 12, Issue 2, 2024

2. **Automatic Fan and Light Control:** In many classrooms after the class is over the students and teachers leave the school without switching OFF them, at the time of closing the classrooms the security staffs tend to switch OFF them. Hence electrical energy is wasted during the unwanted time. To overcome this PIR sensor and LDR are used to automatically Control them. PIR detects the human presence inside the classroom and switches ON only if there is any human inside the class. LDR detects illumination of the room. During dark hours it will switch on the Lights and vice versa. The block diagram is shown below in Fig.



The main advantages of the existing system are given below.

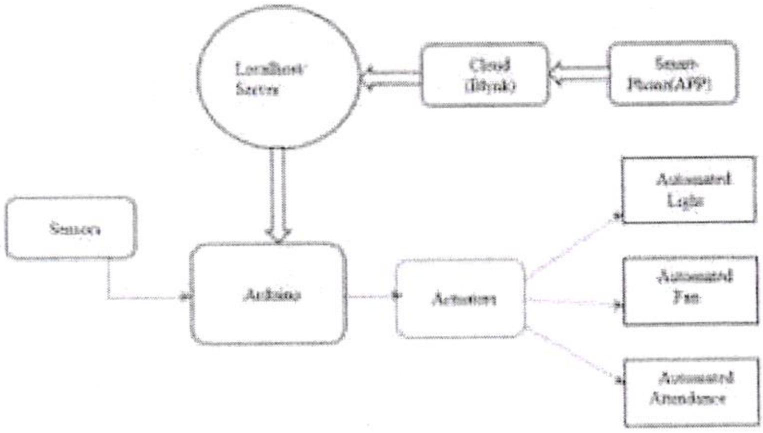
- Manual methods are used in small schools with a smaller number of students.
- Automation can be implemented for only needy systems which may reduce cost.

The main disadvantages of this existing systems are given below.

- Time consuming.
- Relatively high cost
- Contains minimum number of automated systems.
- Students and teachers will get disturbed.
- Electricity is wasted dude to carelessness.
- However, in our system these disadvantages are overcome effectively.

B. Proposed System The proposed system integrates all individual systems under one board. So that the cost of overall system will be reduced efficiently.

The block diagram of proposed system is shown in Fig 2.



<u>Advantages of the proposed system are:</u>

- User friendly Interface
- Easily reprogrammable
- Students and teachers can concentrate on lecture
- Improvised energy saving

ISSN 2347–3657
Volume 12, Issue 2, 2024

- Integrated systems with Minimal Cost
- The main disadvantages of this proposed systems are given below.
- Programming is more complex
- Can't be used in Intranet connections
- Electrical components must be handled with caution.

IV. CONCLUSIONS AND FUTURE SCOPE

The IoT-based smart classroom promotes a sustainable campus in the learning environment, which increases classroom productivity and effectiveness. The need for power has been expanding, thus there should be rapid effort to put low-cost electricity reduction schemes into place to meet the need. For a sustainable future, these initiatives ought to be in accordance with global energy policies. Therefore, everyone on the college campus needs to effectively manage electricity use. Since people in the college were being irresponsible, we determined that this automatic system was one of the main causes of electricity waste. This occurred because the electrical equipment cannot be managed without human involvement and the manual switching system is ineffective. As a result, having an automated system rather than a manual switching mechanism is practically required for the college system. So, to reduce energy waste, we created this system utilizing an ESP8266 controller as a server and a PIR sensor as an IOT client.

REFERENCES

[1]. "S Matta and S. M. Mahmud. An intelligent light control system for power saving."

[2]. S. Tompros, N. Mouratidis, M. Draaijer, A. Foglar, and H. Hrasnica," Enabling applicability of energy saving applications on the appliances of the home environment." IEEE Network, vol. 23, no. 6, pp. 8-16, Nov.-Dec. 2009.

[3]. Thingspeak: J. Han, C.-S. Choi, and I. Lee, "More efficient home energy management system based on ZigBee communication and infrared remote controls, "IEEE Trans. on Consumer Electron., vol. 57, no. 1, pp. 85-89, Feb. 2011

[4]. Jinsung Byun received his B. S and M.S. degree in the School of Electrical and Electronics Engineering from Chung-Ang University, Seoul, Korea in 2008 and 2010.He is currently a Ph.D. candidate at Chung-Ang University. His current research interest includes ubiquitous computing, situation-aware middleware technologies, wireless sensor network, MAC and routing protocols, and embedded system design.

[5]. G W Denardin. C. H. Barriquello, R. A. Pinto, M. F. Silva, A. Campos, and R. N do Prado. "An Intelligent System for Street Lighting Control and Measurement, in Proceedings of the IEEE Industry Applications.

IJITCE

ISSN 2347- 3657

International Journal of
Information Technology & Computer Engineering

Email : ijitce.editor@gmail.com or editor@ijitce.com

INTERNATIONAL JOURNAL OF MATHEMATICAL, MODELLING, SIMULATIONS AND APPLICATIONS
IJMMSA
ISSN 0973-8355
www.ijmmsa.com
Vol 16, Issue 2, 2024

IOT BASED AUTOMATIC SHED SYSTEM TO PREVENT UNWANTED RAIN FOR GROWING CROPS

Dr.K.Vanisree[1], GUNDU DIVYA [2], CHINTHAKAYALA RAJ KUMAR [3], SANDEBOINA VAMSHI KRISHNA [4], GUGULOTH VIJAY KUMAR [5]

Associate Professor & Head Of The Department[1], Students[2,3,4,5], Dept.ECE

Samskruthi College of Engineering and Technology, Ghatkesar, Hyderabad, Telangana, India.

ABSTRACT

With the ongoing fourth revolution, technology has been growing rapidly day by day. One of the most significant and efficient uses of this has been evident in the farming sector. From a basic water sprinkler system to the requirement of Fertilizer for specific crops, the likes of Artificial intelligence and the Internet of things have brought in great changes. One of the issues which need to be addressed is the protection of crops from heavy rainfall which causes significant damage to the crop production and soil yield, also causing huge mental distress to a farmer. We in our proposed model have given a solution to this problem by giving automated as well as manual control. The motivation behind our paper is to keep the crops protected from these heavy precipitations and preserve the same rainwater for future purposes when water is scarce. We use a Moisture sensor with a NodeMCU module to ensure the covering of the estimated field and LCD display to show status of Field.

Keywords: Nodemcu, Artificial Intelligence, Moisture Sensor, LCD Display, Farming Sector.

I. INTRODUCTION

Farming is the science and art of creating plants and creatures. Agriculture was the key headway in the climb of stationary human advancement whereby the developing of prepared species made sustenance surpluses that engaged people to live in urban regions. The chronicled background of agriculture began an enormous number of years earlier. Consequent to get-together wild grains beginning at any rate 1,05,000 years earlier, early farmers began to plant them around 11,500 years back. Pigs, sheep, and cows were prepared over 10,000 years earlier. Plants were autonomously developed in any event 11 districts of the world. Modern horticulture dependent on the enormous scope of monoculture in the twentieth century came to overwhelm agrarian yield, however around two billion individuals although everything relied on subsistence agribusiness into the twenty-first. The natural impact of agribusiness is the effect that diverse cultivating practices have on the general conditions, and how those effects can be followed back to those practices. The characteristic impact of agribusiness fluctuates reliant on the wide combination of agricultural practices [10] used over the world. Finally, the normal impact depends upon the creative practices of the system used by farmers. The relationship between spreads into the earth and the developing system is convoluted, in this manner it depends upon other air factors such as precipitation and temperature. There are two kinds of markers of natural impact: "signifies based", which relies upon the farmer's creation procedures, and "impact-based", which is the impact that developing strategies have on the cultivating structure or spreads to the earth. An instance of a strategies-based marker would be the idea of groundwater that is impacted by the proportion of nitrogen applied to the earth. A marker reflecting the loss of nitrate to groundwater [10] would be impact based. The techniques based on assessment realize farmers' demonstrations of agribusiness, and the impact-based assessment deliberates the genuine effects of the agrarian system. For illustrations, the methods-based analysis may look at pesticides and treatment. Systems that farmers are using, and impact-based assessment would consider the CO_2 which is being released or what the Nitrogen substance of the soil is. The natural effect of agribusiness includes an assortment of components from the dirt, to water, the air, creature and soil assortment, individuals, plants [10], and the nourishment itself. A portion of the ecological issues that are identified with farming is environmental change, deforestation, no man's lands, hereditary building, water system issues, contamination, soil corruption, and waste. These days, during the stormy season the developed harvests get influenced because of overwhelming precipitation. The proposed framework includes security of the harvests via auto rooftop which covers the specific region. The downpour sensor is actuated when there is precipitation, and it will offer implications to the farmer through the GSM module [8] by sending SMS. Hence to close the rooftop, the farmer needs to send an SMS to the GSM module. When the downpour is halted, the controller consequently opens the rooftop. This research paper is more acquainted with the objective and motivation behind the proposed method. Collected fields get influenced or demolished because of substantial downpour and shortage issues. Various existing systems are discussed in the literature survey also listed their practical views and explained proposed strategies to defeat the impediments of the current one and give the best outcomes to farmers. The significant objective of this paper is to keep the reaped crops from the overwhelming precipitation and spare the downpour water. The rain sensor is utilized for the working of the rooftop when there is precipitation.

II. LITERATURE SURVEY

We've examined work on similar projects in the past and know how to do research. Agriculture is the backbone of the Indian economy, according to many ways. Agriculture is the primary source of nourishment for us, making life impossible without it. However, in the current situation, finding farm employees is difficult. Modern development is prompted by the computerization of all industries. Up to a certain extent, the agricultural process is automated here.

P. Goutham Goud et al [1] Rain sensor, a sophisticated microprocessor, and a DC motor are used in a system where the deluge is recognised and a protective shield is wrapped around the rooftop. The rain sensor of such a drying shed protects the harvest from rain and wetness. To automate this task, a rainfall detects the downpour and sends the information to the microcontroller. A defensive wrapper is wrapped over the rooftop top, and the microcontroller forms the information and activates the DC motor control circuit.

Dheekshith et al [2] developed a system for identifying precipitation by using a downpour distinguishing sensor. The sensor is connected to a direct actuator motor and a spread job that protects against rain. When the sensor detects rain, it goes to work and pivots the spreading roll, which covers the gathered merchandise and protects the farmer from losses.

Naveen K B et al [3] suggested a framework that was structured using the Proteus programming language. When the rain sensor detects a deluge, the soil moisture sensor determines dampness content, which is displayed on the LCD. . The value sent to the PIC microcontroller is determined by the soil moisture sensor, temperature sensor, and rain sensor. The automatic rainwater and crop saving system protect crops from excessive rainwater by taking into consideration the attributes.

The current work entails preserving the unique resources that are available to mankind. We can limit the flow of water and so eliminate waste by assessing the status of the soil productively. Water stream can be obligated by substantially sending by knowing the state of moistness, and temperature over with the use of unexpectedness and temperature sensors. There are currently no effective frameworks available in the current situation. The farmer must go to the drying region and cover the gathered fields, which is particularly difficult if the farmer's location is distant from the harvest and the entire crop would be pummeled by the downpour before the farmer arrives.

Limitation of Existing Systems:

- The greenhouse has certain limitations such as it cannot be adjusted to climatic conditions and it will not allow the sun to pass through the crop as shown in figure 3.
- Most of the existing systems concentrated on covering the crop from rainfall by providing a roof over the crop rather than focusing on the water level required for a particular crop.
- If the crop needs a certain amount of water in such case farmer needs to permit the rain over the crop and once it's having sufficient amount of water content then he can protect the crop by covering it with a roof.
- Though we preserve the rainwater during rainfall, later if the farmer wants to use it for the crops it consumes more electrical power.
- The rainwater still is a huge cause of soil erosion as the rainwater from the cover still gets immersed in the soil.

ISSN 0973-8355

www.ijmmsa.com

Vol 16, Issue 2, 2024

III. PROPOSED SYSTEM

To overcome the limitations of existing systems, we have proposed a framework that covers the harvested crops from heavy precipitation and navigates this water to the nearest storage chamber to avoid soil erosion and have the least impact on crop yield. The method consists of ATMEGA328P Micro-controller, NodeMCU wifi module to control the system from a nearby place, Soil Moisture Sensor, LCD which will give live readings to the farmer.

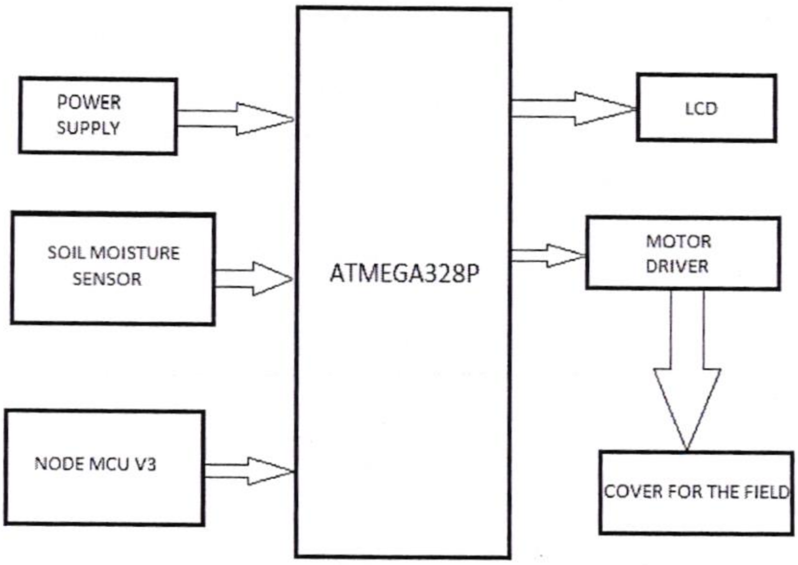


Figure 1: Block Diagram of Proposed System.

IV. CONSTRUCTION AND WORKING

Tables 1: COMPONENT USED

S.No.	Component	Description
1.	ATMEGA328P	It is an open-source stage utilized for building electronic activities. Arduino comprises both a physical programmable circuit board and a bit of programming, or IDE (Integrated Development Environment) that runs on PC used to give orders and control it.
2.	Soil Moisture Detector	The sensor module is used for the detection of moisture in the soil. It gives a signal to the microcontroller to initiate.
3.	NodeMCU V3	It is a low-cost open-source IoT platform. The module is mainly based on ESP8266 a low-cost Wi-Fi microchip incorporating both a full TCP/IP stack and microcontroller capability.
4.	Motor Driver & Relay	A motor driver goes about as an interface between the motors and the control units. Usually, motors work under high current but the control unit requires a low current signal. Relays ensure that the Motor gets adequate current.
5.	Motors	A motor is an electronic device used to transverse electric energy into mechanical energy. They work under the principle of Electromagnetism.

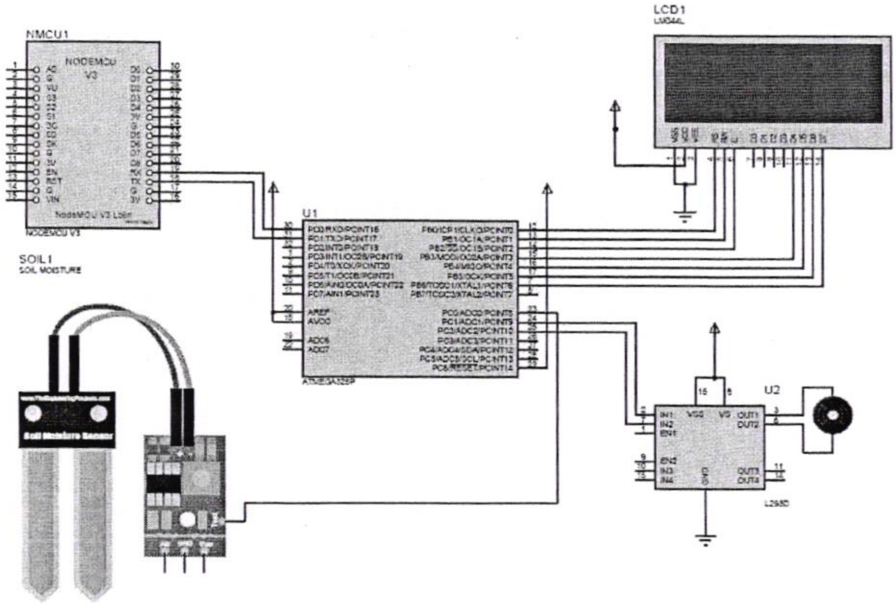


Figure 2: Circuit Diagram

WORKING:

The soil moisture actuates when the circuit between two electrodes is completed due to the presence of water between them and sends the signal to the controller. The controller then sends a signal to the Motor driver to unfurl the cloth/plastic over the designated field area. The NodeMCU module gives precedence to farmers and complete control over the automated system. The module is linked to a browser that shows the live reading of temperature and humidity with an ON/OFF switch to the farmer.

ADVANTAGES:

- Protection of harvested crop from rain.
- Protection of crop from insects.
- The proposed system works for longer period.
- The roof has flexibility to use whenever it is required.
- Preserved rainwater can be used for the crops or household and irrigation purpose.

APPLICATION:

- The proposed framework can be used for drying garments.
- This system can be utilized to save machinery.

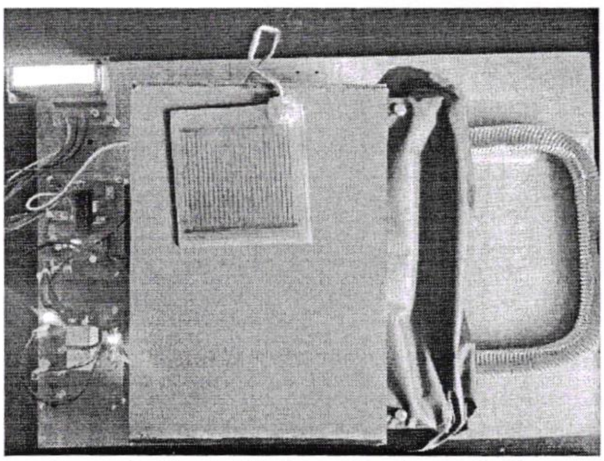


Figure 3: Circuit Diagram (Hardware Project)

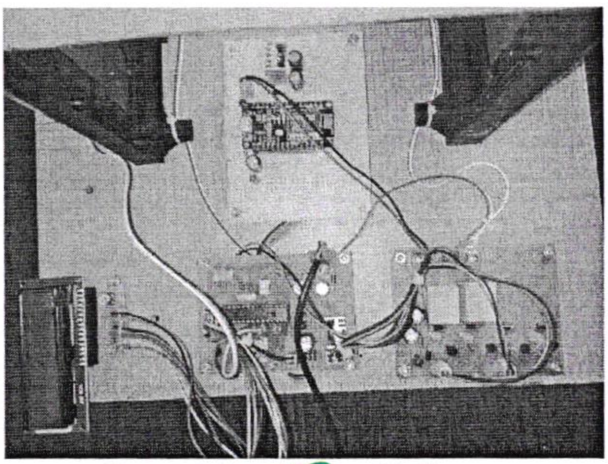


Figure 4: Actual View of Project

ISSN 0973-8355

www.ijmmsa.com

Vol 16, Issue 2, 2024

V. CONCLUSION

Using Arduino Uno as the controller, the proposed architecture addressed how the field can be automatically protected from rain. With this proposed structure, we can successfully rescue tens of thousands of hectares of farmland from destruction. If the water in the soil is insufficient, the excess rain water can be stored and used for crops, as well as for other needs such as household. As a result, the proposed system's findings show that it is reliable and may be used efficiently by farmers.

VI. REFERENCES

[1] P. Goutham Goud, N. Suresh, Dr. E. Surendhar, G. Goutham, V. Madhu kiran "Rain sensor automatically controlled drying shed for crop yield farmers", International Research Journal of Engineering and Technology (IRJET), 2010.

[2] P. Deekshith, P.L.N Varma, P. Tarun Krishna Vamsi "Automatic rain sensing harvested product protector" International Journal of Electronics, Electrical and Computational System (IJEECS), ISSN 2348-117X, Vol. 7, Issue.4, April 2018.

[3] Ajay, Akash, Shivashankar, Patil Sangmesh "Agriculture crop protection with rain water harvesting and power generation" International Journal of Scientific Research and Review, ISSN No:2279-543X, Vol. 07, Issue. 03, March 2019.

[4] Naveen K B, Naveen kumar S K, Purushotham M D, Sagar G H, Yogesh M N "Automatic rain water and crop saving system" International Journal of Advance Engineering and Research Development (IJAERD) Vol. 5, Issue. 05, May 2018.

[5] Sathvik, Vishal V Rane, Abubakkar siddiq, Jason D Souza "Automatic harvested crop protection system with GSM and rain detector" International Journal of Engineering and Research and Technology (IJERT), ISSN:2278-0181.

[6] R. Balathandapani, D. Bhoopathi, S. Jotheeshwaran, G.Arundeva, C.Saranya "Automatic rain water and crop saving system using embedded technology" International Journal of Science, Engineering and Technology (IJSERT), Vol.4, Issue.3, March 2015.

[7] Tony Olsson, David Gaetano, Jonas Odhner, Samson Wiklund, "Open software- fashionable prototyping and wearable computing using the Arduino".

[8] Guy Inchald, "Introduction to GSM", Second Edition.

[9] Islam, N.S. Wasi-ur-Rahman, M. "An intelligent SMS- based remote water metering system". 12th International conference on computers and Information Technology, 21-23 Dec. 2009.

[10] DrashtiDivani, PallaviPatil, and Sunil K, "Automated Plant Watering System," ICCPEIC, 20-21 April 2016.

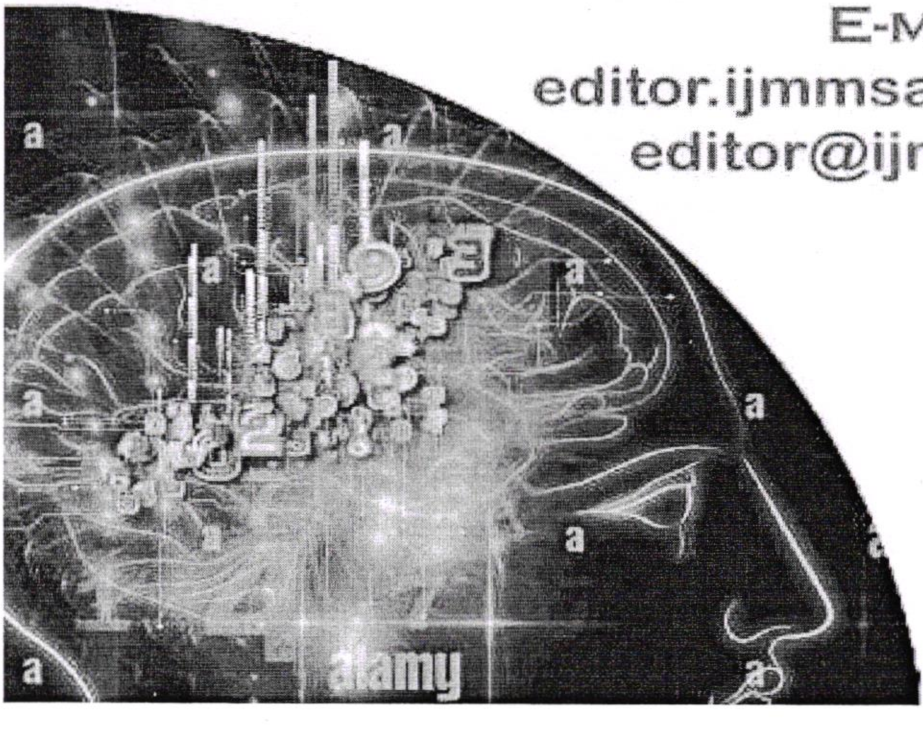
[11] Vinay Mohan, V.Praveen Kumar, Thejesh Kakumani, Dr. T.K. Ramesh, "Automated irrigation system with partition facility for effective irrigation of small scale farms," Ecology, Environment and Conservation Volume 21, Issue 1, Pg.369-375, 2015.

ISSN : 0973 - 8355

www.ijmmsa.com

IJMMSA

INTERNATIONAL JOURNAL OF MATHEMATICAL, MODELLING, SIMULATIONS AND APPLICATIONS



E-MAIL
editor.ijmmsa@gmail.com
editor@ijmmsa.com

International Journal of
Information Technology & Computer Engineering

ISSN 2347–3657

Volume 12, Issue 2, 2024

ANDROID BASED FIRE FIGHTING ROBOT

Mrs.Jalajakshi[1], Bingi Spandana[2], Sunnapuwar Naresh[3], Putta Pratheek Raj[4], Donthamalla Shiva Teja[5]
Asst.Professor [1], Students [2,3,4,5], Dept.ECE
Samskruthi College Of Engineering And Technology, Ghatkesar, Hyderabad, Telangana, India.

Abstract

The project is to develop a robotic vehicle capable of detecting the presence of fire and extinguishing it automatically. It is a movable robot that consists of gas sensor for detecting the fire, gear motor and motor driver for the movement of the robot, relay driver for pump control and a Bluetooth module which are used for the detecting and extinguishing the fire. Usually, the robot moves at a steady speed. When the gas sensor detects the fire in the environment, the signal indicating the presence of fire will be sent to the Arduino through which the extinguishing is done. In the extinguishing process, whenever the detection of fire is positive the robot will stop at the place of fire occurred and starts the pump and sprinkle water through a sprinkler until the smoke is put off. The entire control is achieved using Arduino which is interfaced with the android mobile via Bluetooth module, so that the control of the robot can be made from an android mobile as well.

Keywords: Arduino UNO R3, Gas Sensor, PC with Arduino Software, DC Motor and Driver Circuit, Single Channel Relay Driver Circuit, Pump and Sprinkler

I. INTRODUCTION

As the robotic field is developed a lot, human interaction is made less and the robots are widely used for the purpose of safety. Fire accidents have become common in our day-to-day life and sometimes it may lead to dangerous problems which will be harder for the firemen for protecting the human life. In order to avoid these cases, this robot is used to guard human lives, surroundings and wealth from the fire accidents. For engineering students, who are interested in robotics, this firefighting robot project is an advanced project. The Bluetooth technology for remote operation and Arduino UNO R3 are incorporated in this project.

II. FIREFIGHTING ROBOT

The need for a robot or a device that detects and extinguishes fire on its own is long past due. Fire accidents originate when someone is either sleeping or not at home or due to some carelessness in laboratories, stores etc. By inventing such a device, humans as well as property can be saved at higher rate with minimum damage caused by the fire. As instrumentation engineers, our task was to design and build a prototype system that could autonomously detect and extinguish a fire and also aims at minimizing the air pollution. The possibilities of fire are at any remote area or in an industry such as in garments go down, cotton mills, and fuel storage tanks, electric leakages may result in terrible fire & harm. To the worst case of accidents, fire causes heavy loss both financially and by taking lives. These robots are the best possible way, in orders to guard life of humans, surroundings and wealth. It can navigate alone actively and scan the presence of fire and extinguish t. In cases this robot can be used as an emergency device. It is designed in such a manner that could identify the fire as soon as the fire catches and extinguish before the fire spread out and cause heavy damage. The firefighting robot will have future scope that it can work with firefighters, which greatly reduce the danger of injury to victims. It is a innovative work in the field of robotics that operates towards a sensible and obtainable access to save the lives and prevents the danger to property.

III. HARDWARE ARCHITECTURE

A. *Arduino UNOR3*

The fire-fighting robot works under the control of the Arduino UNO R3.It is a open source prototype that is based on an easy-to-use software and hardware. In this, a circuit board is present that referred as microcontroller that can be programmed according to the user need. It consists of ready-made software called Arduino IDE (Integrated Development Environment), in which the computer code can be written and upload to the physical board. Arduino boards are capable of reading analog or digital input signals from various sensors and gives output by turning LED on/off, activating a motor, connecting to the cloud etc. It is a control

International Journal of
Information Technology & Computer Engineering

ISSN 2347–3657

Volume 12, Issue 2, 2024

board that can be functioned via Arduino IDE by sending a set of instructions to the microcontroller on it. Arduino does not need an extra piece of hardware (called a programmer) unlike most previous programmable circuit boards, in order to load a new code to the board. By simply using a USB cable the interfacing can be done. A simplified version of C++ is used in the Arduino IDE that makes it easier to learn the program. However, it provides a standard form that breaks the functions of the micro-controller into accessible package.

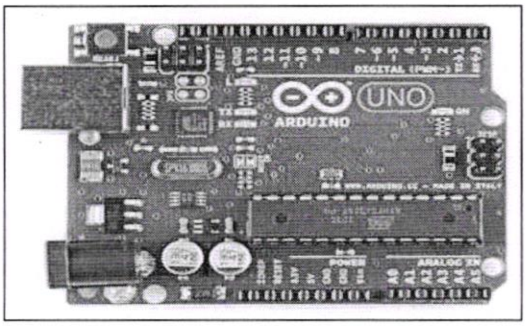


Fig. 1: Arduino UNO R3

B. GAS SENSOR

The MQ-135 gas sensor is capable of sensing the gases like ammonia nitrogen, aromatic compounds, sulfide, smoke, oxygen, alcohols. It consists of a boost converter within it called PT1301. The operating voltage of this gas sensor is from 2.5V to 5.0V.This gas sensor has a lower conductivity to clean the air as a gas sensing material. The principle of this sensor is that ,as the concentration of polluting gas in the atmosphere increases ,the conductivity of gas sensor increases. This gas sensor can be used to detect the smoke, benzene, steam and other different harmful gases. The MQ-135 gas sensor cost is low to purchase. The image of the MQ-135 gas sensor is given below.

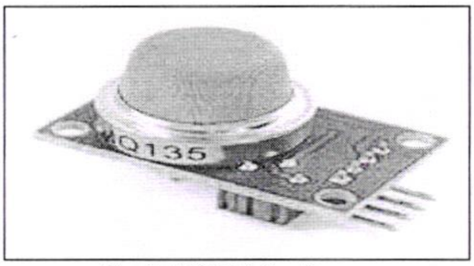


Fig. 2: MQ-135 Gas Sensor

C. Motor Driver

L293D is a typical 16-pin Motor driver IC which allows the DC motor to drive on either direction. It can control a set of DC motors in any direction simultaneously i.e. it can control two DC motor with a single IC of L293D by the Dual H-bridge Motor Driver integrated circuit(IC).This IC can drive small and as well as big motors. Its working is based on the concept of H-bridge. It is a circuit that allowing the voltage to be flows in either direction. H-bridge IC are ideal for driving a DC motor, As you know voltage need to change its direction for being able to rotate the motor in both clockwise and anticlockwise direction. Two dc motor can be able to rotate independently by a single L293D chip where there are two H-Bridge circuit inside the IC. It is widely used in robotic application for controlling DC motors due to its smaller size.

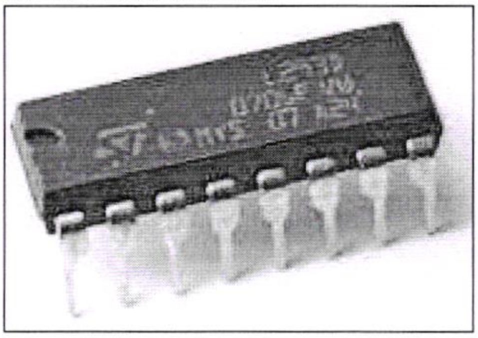


Fig. 3: L293dc Motor Driver IC

International Journal of
Information Technology & Computer Engineering

ISSN 2347–3657

Volume 12, Issue 2, 2024

D. *Gear Motor*

The 12V DC gear motors are simply an extension of the DC motors. It consists of a gear assembly attached to the motor. The gear assembly is used for reducing the speed and increasing the torque of the motor. The speed can be reduced to any desirable figure by using the correct combination of gears in a gear motor. Gear reduction is the concept where gears reduce the speed of the vehicle but increase its torque. The speed of motor is counted in terms of RPM (rotations of the shaft per minute).This 12V DC gear motor has a RPM of 500.This speed is capable of changing its value, according to the input voltage given to drive the motor. The structure of 12V DC gear motor is described in the following.

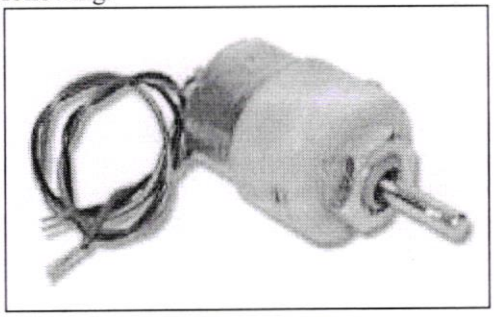


Fig. 4: 12V DC Gear Motor

E. *Relay Driver*

Single channel relay driver is an electrically operated device which has a control system and controlled system. A control system is also called as input circuit or input contactor and the controlled system is also called as output circuit or output contactor that are frequently used in automatic control of a circuit. It is an automatic switch that controls a high-current circuit with a low-current signal. Some advantages of a relay are its lower moving inertia, stability, high reliability and small volume. It has wider application in power protection device, automation technology, sports, remote control, reconnaissance and communication and in electro mechanics and power electronics devices. A relay consist of an induction part that is capable of reflecting the input variable like current, voltage, temperature, pressure, speed, light, power, resistance and frequency etc. To energize or de-energize the connection of controlled circuit an actuator module (output) is present inside it. For coupling and to isolate input current as well as to actuate the output there is an intermediary part between input part and output part is used for the operation to be dones. The controlled output circuit of relay will be energized or de-energized when the rated value of input (voltage, current and temperature etc.) is above the critical value.

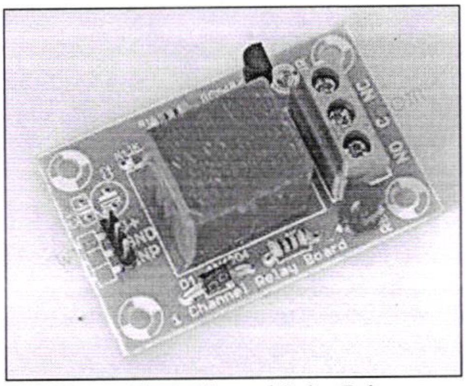


Fig. 5: Single Channel Relay Driver

F. *Bluetooth Module*

The HC-05 Bluetooth Module makes a great solution for wireless communication as it can be used in a Master or Slave configuration. To establish a connection between MCU and GPS, PC to your embedded project, etc you can use it simply for a serial port replacement. The HC-05 Bluetooth Module has 6 pins namely-VCC, GND, TX, RX, Key and LED. It is pre-programmed in a Slave mode, so there is no need to connect the Key pin, unless you need it to change it to Master mode. The main difference between a Master and Slave modes is given as, the Bluetooth module cannot initiate a connection, it can however accept incoming connections in a Slave mode. The Bluetooth module can transmit and receive data regardless of the mode it is running in, after the connection is established. To connect a mobile phone to the Bluetooth module, it can be simply used in the Slave mode. This module has a default data transmission rate of 9600kbps and the range for Bluetooth communication is usually 30m or less.

ISSN 2347–3657

Volume 12, Issue 2, 2024

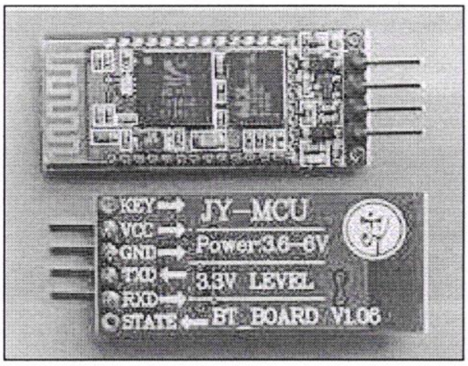


Fig. 6: HC-05 Bluetooth Module

G. *Robot Body*

The robot body consists of wheels which are to drive the robot and extinguishing components like water tank, pump, and sprinkler. A water tank with pump is placed on the robot body and its operation is carried out from the Arduino o/p through the proper signal from the transmitting end. The entire operation is controlled by a Arduino. A motor driver IC is interfaced to the Arduino through which the controller drives the gear motors for the movement of the robotic vehicle.

IV. Block diagram

As discussed earlier, the Block Diagram consists of several components which are used for the control and interfacing of the android controlled fire-fighting robot. The Main components that are used in this firefighting robot are given below.

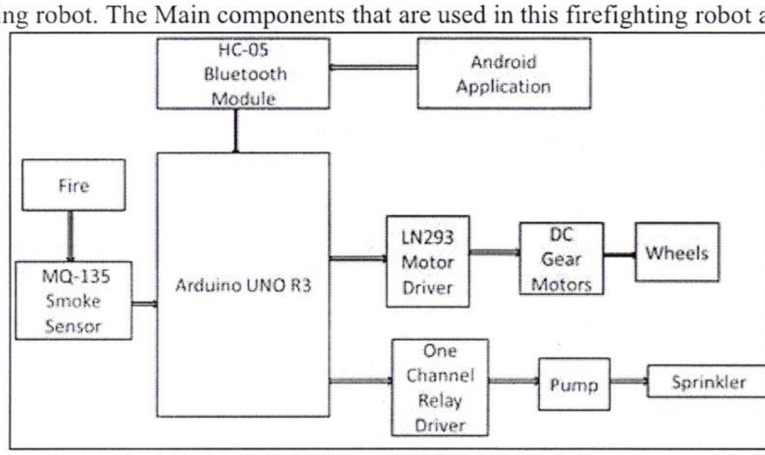


Fig. 7: Android Controlled Fire Fighting Robot

In this project, a smoke sensor is used to detect the occurrence of the fire in the surrounding environment. Actually here a smoke sensor is connected to a circuit which produces an analog output when the fire is detected. This analog output is connected to the Arduino pin as interrupt signal. A motor driven program or a part of it is written in the interrupt service routine which is executed when the sensor output is high (interrupt signal to Arduino).A water sprinkler mechanism is connected to the shaft of the dc motor, which will sprinkle the water and extinguish when the fire is detected by the sensor.

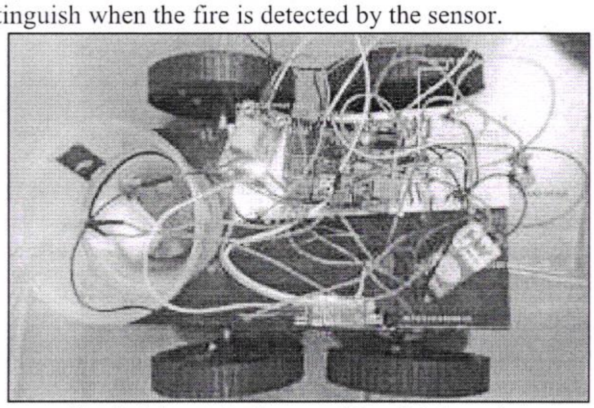


Fig. 8: Schematic diagram of fire-fighting robot

ISSN 2347–3657

Volume 12, Issue 2, 2024

V. Software architecture Arduino UNO R3 programming

To program Arduino UNO R3, there is a need for the open source Arduino IDE software that the card manufacturer company written. This is a software programming that is written by Java language which is used to program the Arduino cards and for downloading the Arduino cards to Arduino cards. It contains a text editor used for writing code, a text console, as message area, a toolbar with buttons for the common functions and for a series of menus. It consists of an editor which uses the Wiring/ processing language, commands that supports the utilities for the projects and resemble the C language in some cases. The programming work can easily be performed by making the necessary settings and definitions in the IDE program. It connects to the Arduino hardware to upload programs and communicate with them.

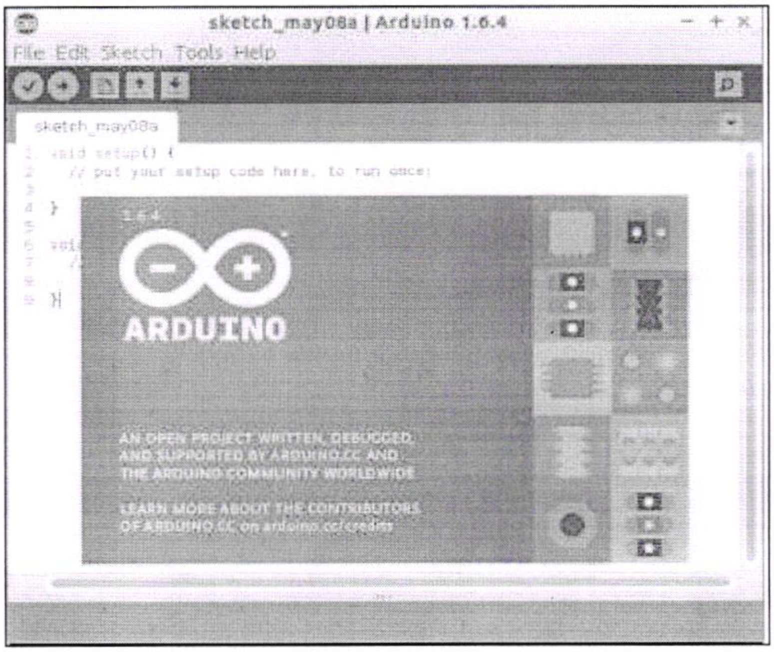


Fig. 9: Arduino IDE program

VI. Conclusion

This project describes about the real time firefighting robot which moves in a constant speed, identify the fire and then extinguish it with the help of pumping mechanism. The detection and extinguishing was done with the help of Arduino in which the gas sensor, gear motor and its driver, relay driver etc. are interfaced. The robot is connected with mobile phone through the Bluetooth module and processes the analog and digital data received from the sensors in the Arduino control determine the fire in the environment. Both hardware and software has been realized successfully in this project. The "Android controlled firefighting robot" can be used easily in everyday life such as in homes, laboratories, parking lots, supermarkets, stores, shops etc. The fire extinguishing was done with the help of water through the pumping mechanism. Some alternatives in these aspects are blowing wind by fans, fire extinguisher gel tightening with the help of servo motors etc. However, in this project, extinguishing of fire is done with the water which is most suitable for both time and material work.

References

[1] Intelligent sprinkler handbook of robotics mini system-International journal of computers-Bruno Sicilianos, vol.1, issue21, 2013.

[2] Development &Applications of Automatic Fire fighting robot-International Journal of Advanced Research in Computer Engineering & Technology- Paul E Sandin,vol.2,issue14,2013.

[3] International Journal of Recent Research in Mathematics Computer science and Technology-Abilash, Dhumathar, Sumit, Bhiogade, vol.2, Issue., April 2015.

[4] International Journal of advanced Research in Computer and communication Engineering, IJARCCE DOI.1017148\2015.494612,VOL.4,Issue9,September 2015.

INDIAN JOURNAL OF TECHNICAL EDUCATION
ISSN 0971-3034
Volume,12 Issue,1 May,2024

ZIGBEE BASED COAL MINE SAFETY MONITORING SYSTEM

Selvam Sowndarya, M.Maneesh Reddy, Mora Abhilash,
Anup Tiwari,(Assitant Professor),
U.G Students,
Electronics And Communication Engineering,
Samskruti College Of Engineering And Technology Hyderabad.

Abstract:

In any field, safety is of the utmost importance. Damage to high-quality equipment, a drop in productivity, or even human casualties might result from safety-related negligence. Everything in the mining sector revolves around the paramount importance of safety and security. In order to stay clear of any unwelcome occurrences, the mining sector adheres to a set of fundamental precautions. In order to prevent risks associated with production, security, and human resource management, communication is the most important aspect nowadays. This is because it allows us to continually monitor various metrics and respond appropriately.

In order to keep everyone safe and prevent any harm to their health or property, it is crucial to have a solid security and safety system in place, together with a trustworthy and dependable communication system, while working in underground mines. For underground mines to be safer, more productive, and secure, a dependable communication system must be set up between the mine and a stationary base station. There can be no downtime in the communication network under any circumstances. Underground mines do not have an optimal infrastructure for wired communication networks.

Consequently, a mine safety monitoring system's wireless equipment is designed to accurately detect gases such as flammable and poisonous gases, humidity, and temperature. It then alerts workers through a buzzer or alarm and transmits this information to the monitoring station through zigbee communication. An Arduino nano controller interfaced with a personal computer was used to create the reception portion at the base station. The data is automatically sent to the base station and notifies the authorities if something out of the ordinary happens. Upon pressing the emergency button at the base station, data will be immediately communicated to the other unit (mine) by zigbee and an alarm will be triggered to notify the workers. Consequently, the team has built up a two-way communication set employing zigbee technology.

Introduction

Mine working environment monitoring is crucial because coal mine catastrophes occur because of the mine environment's complexity and the range of coal mine operating conditions. At present, the conventional cable transmission is being used to monitor and regulate the many environmental parameters of the mine safety system, including temperature, oxygen, carbon monoxide, methane, and so on. Mine methane and carbon monoxide gas buildup areas are automated and cannot be monitored. As a result, security criteria, such as the dead gob wire, cannot be anticipated, and alarms cannot be predicted. Mine safety wireless networks should be able to transmit data, be flexible and scalable, and have their own set of network capabilities; they should also be compatible with the current diversity of coal mine safety products and the variability space of underground coal mining processes. Simple sensor network protocols, easy network self-organization, and self-healing capabilities are required by the mine's unique uses. Using Zigbee, a short-range, secure, and dependable wireless communications technology, you can gather data from the terminal's transmitted parameters at the tunnel gateway. From there, you can use wired data transmission to the gateway at the ground-based central control computer, and finally, you can use computer analysis and comparison to determine the mine's security situation. Scientific relief may be achieved by collecting data remotely, which includes environmental and other factors, in order to reach the desired area underneath. There are more demanding standards due to factors such as the complexity of power consumption in an underground mine, interference immunity, and the environment itself.

In the mining and tunneling sectors, underground safety is of the utmost importance. A thorough monitoring system with independently certified equipment that is suitable with the demanding environment is necessary due to the huge number of possible risks that might arise in such demanding environments.

Because of how secluded and far away you are in an underground mine, it is crucial that you be warned of any dangers as soon as they arise. Each sensor device has its own CPU for data storage, and the subterranean safety systems provide realtime data feedback both below and above ground. This way, you can keep an eye on any changes that could compromise the security of your mining site or equipment over time, which in turn improves efficiency, cuts down on unscheduled downtime, and requires less maintenance.

For use in subterranean mining, this project introduces a ZigBee protocol-based wireless sensor network that is both cost-effective and energy efficient, and which can offer intelligent monitoring and safety features. Multiple nodes are connected wirelessly to form the system. The zigbee protocol and a high-performance, low-power microcontroller are the key components of a sensor node. This demonstration just shows one point. You can connect whatever little gas, humidity, or temperature sensor you choose to this tiny, low-power gadget. In order to form a ZigBee-based wireless sensor network, individual sensor nodes connect to one another using a predetermined multi-hop mesh network architecture. Underground miners have a reliable monitoring and safety system that is simple to install thanks to this network. In particular, it enables the safe and dependable transmission of real-time data between the surface control room and the miners below. The current system for early warning monitoring and miner safety is enhanced by the proposed system.

Literature Survey

A ZigBee-based agent-based wireless local positioning system is suggested for use in industrial settings in [8]. An economical ZigBee-based wireless mine monitoring system that includes early-warning intelligence on temperature, humidity, and methane in the mining region is suggested in [9]. Yet another article [10] details the creation of a ZigBee network-integrated system that measures whole body vibration for people in vibratory environments. The ZigBee specification's low power consumption and reducing development cost have led numerous manufacturers to include it into various products. The offered work makes use of the Digi make ZIGBEE24 device for wireless data transmission and reception.

A wireless sensor network-based automated method for monitoring coal mine safety was suggested by Jingjiang Song and Yingli Zhu [1]. The nRF2401 and MSP430F form the basis of this coal mine safety monitoring system's design. In a subterranean mine, a network of sensors regulates environmental conditions like temperature and humidity. The wireless module receives the measured parameters from the microcontroller. A remote monitoring center is linked to the gathered information. The hardware is the main issue with this approach.

The system might be damaged by falling from a great height or by natural calamities. Consequently, the dependability and longevity of traditional communication methods are lacking. Due to the severe mining conditions, this equipment is very difficult to install and maintain. The miner also doesn't get the right message because of the huge distance between them and the system and the very loud working circumstances.

It is Pranjal Khazarika [4] who first suggests that miners wear safety helmets. Detectors for carbon monoxide and methane are included into this helmet. The Zigbee wireless module allows the gas detector to send its readings wirelessly to the helmet. In order to avoid accidents and protect the safety of the plant and operator, alarms are activated when the concentration of carbon monoxide or methane surpasses a certain threshold. Whether a miner is wearing a helmet or not, the system will not be able to tell.

INDIAN JOURNAL OF
TECHNICAL EDUCATION

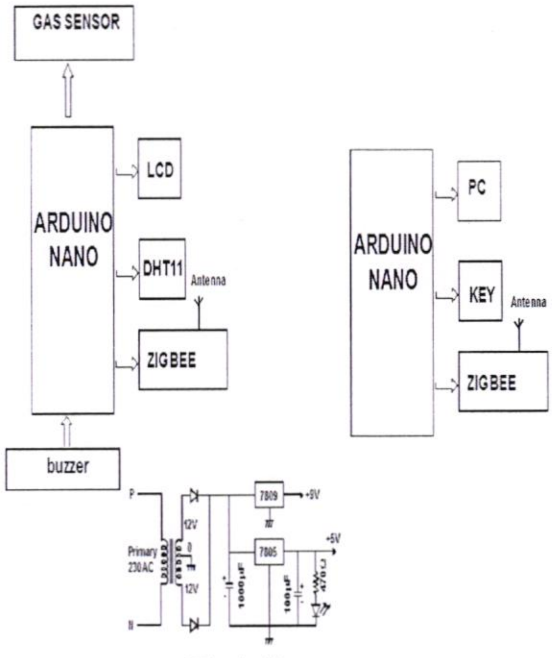
ISSN 0971-3034

Volume,12 Issue,1 May,2024

The authors Rajkumar Bodduetal. and colleagues [5] have created a mechanism to keep coal mines safe. In this process, a secure coal monitoring system takes the role of the conventional cable network system often used to monitor coal mines. In order to mine coal safely, it is needed. The mining area and mine depth have been steadily rising, turning many occupations into blind areas with concealed risks. It takes a lot of time and isn't feasible to run pricey wires. We have created a wireless sensor network-based security monitoring system for coal mines to address this issue. Consequently, there will be fewer accidents in mines and a higher degree of control over workplace safety. Coal mine safety issues may be better addressed with the use of LiFi technology.

Methodology

All that's really going on in the transmitting part is the actual mining site. The gas, humidity, and temperature sensor circuits, alarm, and Zigbee module are the primary components of this device, which also includes the arduino NANO controller ATMEGA 328. To modulate the Zigbee module, the controller creates a one-of-a-kind 8-bit binary code that depends on the parameter circumstances. What follows is a condensed version of the information on sensing circuits.



Block diagram

DHT 11

The foundation of this project's operation is serial communication over a single cable. Following a start signal from the node mcu controller, the DHT module provides data on humidity and temperature in a response signal. The 16x2 LCD receives data from the humidity and temperature sensors, which are collected and extracted by the Arduino.

For this project, we used a DHT11 sensor module. In other words, the DHT11 sensor module is a hybrid device that can detect both temperature and humidity, and then provide a calibrated digital signal as an output. DHT11 guarantees great dependability and long-term stability while providing us with very accurate humidity and temperature readings. This sensor is offered in a 4-pin single row package and has an 8-bit microcontroller that measures humidity and temperature using a resistive type and an NTC type component, respectively. It has a rapid

INDIAN JOURNAL OF TECHNICAL EDUCATION

ISSN 0971-3034

Volume,12 Issue,1 May,2024

reaction time and is cost-effective. The following chapters provide a detailed explanation of the DHT 11 sensor.

One wire, or serial connection, is all that's needed for the DHT11 module to function. This module transmits data in the form of a time-stamped pulse train. A time-delayed initialize instruction is required before data can be sent to the Arduino. All all, the entire thing takes about 4 milliseconds. The following is the data format for this procedure, and a whole data transfer uses 40 bits:

Included in the data set are 8 bits of integral RH, 8 bits of decimal RH, 8 bits of integral T, 8 bits of decimal T, and a 4-bit checksum.

To start, in order for DHT to be detected, the Arduino transmits a high-to-low start signal to DHT11 with a delay of 18µs. Then, after 20 to 40 microseconds, the Arduino will wait for DHT to respond by pulling up the data line. After the DHT receives the start signal, it will transmit a response signal to the Arduino with a low voltage level and a delay of around 80µs. Afterwards, the DHT controller arranges for the data to be sent by pulling up the data line and holding it for 80µs.

A low voltage level on the data bus indicates that the DHT11 is transmitting a response signal. After that, DHT prepares data transmission by performing data line pull-up for 80µs again. Whether a data bit is a "0" or a "1" is determined by the duration of the high voltage signal, which starts with a low voltage level of 50µs and is sent to the Arduino via DHT.

GAS DETECTOR

There is a gas detector in the mine where the employees work that can detect the presence of dangerous gases in the mine or tunnel. With the help of a Zigbee signal, this circuit notifies the controller, which in turn starts the exhaust fan and notifies the monitoring station of any harmful gas emissions. This is the high-level overview of the gas detector.

Gas detectors in the MQ series have an electrochemical sensor and a tiny heater within. Use them inside at room temperature; they're sensitive to a variety of gases. You can read the output using an ADC or an Op-Amp since it's an analog signal. For both residential and commercial gas leak detection, the MQ-2 Gas Sensor module is an excellent choice. In addition to detecting hydrogen, i-butane, propane, methane, and alcohol, it can also detect smoke. To fine-tune the sensor's sensitivity, some modules come with an integrated variable resistor.

ARDUINO NANO

Created and published by Arduino.cc in 2008, the Arduino Nano is an open-source microcontroller board that is compatible with breadboards. It is based on the Microchip ATMEGA 328P MCU. Although it is smaller than the Arduino Uno board, it has all of the same connections and specifications.

The 30 male I/O headers on the Arduino Nano are arranged in a DIP-30-like fashion; they can be programmed using the Arduino Software IDE, which is ubiquitous across all Arduino boards and can be used both online and offline. You may use a 9 V battery or a type-B mini-USB cable to power the board.

The Arduino Nano came out in 2008. The Arduino Nano Every, an updated version of the Nano that uses pins instead of headers, was introduced by Arduino in 2019. The ATmega4809 microcontroller (MCU) is three times more RAM-efficient.

Liquid Crystal Display

INDIAN JOURNAL OF TECHNICAL EDUCATION

ISSN 0971-3034

Volume,12 Issue,1 May,2024

At the base or monitoring station, the 89C51 controller is linked to the LCD, which shows the mine data like as temperature, humidity, hazardous gas levels, and more. The rescue crew might use this data to their advantage when they enter the mine or tunnel. LED screens, which can only show numbers, are losing ground to LCD displays, which can show letters, numbers, and even unique symbols. These LCD screens are great for showing user messages and information. There is a wide variety of formats available for LCD screens. A typical 2 x 16 matrix has two lines of 16 alphabetic letters. The ability of LCDs to show numbers, characters, and drawings has led to their widespread replacement of LEDs in recent years; other formats include 3x16, 2x40, 3x40, etc. Another advantage is that you can show more information visually or textually because to its small size and easy character and graphics programming. In addition to the 8-bit data bus, the majority of LCD modules' interfaces also include a number of control lines. Port 2 is where the control lines are linked, whereas port 0 is where the 8-bit data bus is attached. Although eight bits of data transmission is the norm when connecting the LCD module to an external device, four of the eight data lines may actually be used to interact with the module. Because the R/W connection is grounded, the CPU can only write data to the LCD and cannot read its status information.

ZIGBEE TECHNOLOGY

By combining with various sensors and transmitter/receiver devices, ZigBee may be set up to form large-scale sensor networks with little power consumption. Foundational technology for detecting, monitoring, and regulating is this sort of construction.
Due to its many advantageous features, such as its low cost, long battery life (two years on two AA batteries), ease of network configuration, scalability (up to 65,000 nodes), and reliability (immediate recovery function from data transmission errors), ZigBee has been acknowledged as the next generation standard for short-distance wireless communication. For the best transmission success rates, ZigBee is highly recommended because of its multi-hop capability.

BUZZER

The term "buzzer" originates from the rasping sound produced by electromechanical buzzers that were powered by stepped-down AC line voltage at 50 or 60 cycles. These devices now serve as signaling devices. A ring or beep are two more typical noises that are used to signal the pressing of a button.

One kind of auditory signaling device is the buzzer, which is also called a beeper. Buzzers and beepers are often used in alarm systems, timers, training, and to validate user input such a mouse click or keyboard.

Results:

Conclusion

We have effectively planned and developed the project work. A prototype module is built for the purpose of demonstration, and the outcomes are good. The fact that it is a prototype module means that it is built to be basic and has numerous potential uses. We sought the advice of a small group of specialists in embedded systems from several Hyderabad-based companies as we planned and built this prototype module. Their input was invaluable in the final product. A little amount is invested as it is a prototype module. All of the parts used to build the machine are sourced from nearby areas. In order to make it a genuine functioning system, several design alterations are necessary.

REFERENCES

INDIAN JOURNAL OF TECHNICAL EDUCATION

ISSN 0971-3034

Volume,12 Issue,1 May,2024

1. Linear Integrated Circuits – By: D. Roy Choudhury, Shail Jain
2. Digital Electronics. By JOSEPH J.CARR
3. Fundamental of Radio Communication: By A.SHEINGOLD
4. Digital and Analog Communication System By: K. sam Shanmugam
5. The concepts and Features of Micro-controllers - By: Raj Kamal
6. The 8051 Micro-controller Architecture, programming & Applications - By: Kenneth J. Ayala
7. Programming and Customizing the 8051 Micro-controller - By: Myke Predko
8. Electronic Circuit guide book – Sensors – By JOSEPH J.CARR

INDIAN JOURNAL OF TECHNICAL EDUCATION

ISSN 0971-3034

Volume,12 Issue,1 May,2024

UNDERGROUND CABLE FAULT DETECTOR USING NODEMCU

Muraboina kalyani, Kanakaraju Guthi, Bollam kalyan ,MD.Zainul Aabedin, RAJESHWARI ARPULA

Mr.G.Veeranna, Assitant professor,

U.G. Students,

Electronics and communication engineering,

samskruthi college of engineering and technology

Abstract

Finding out, in meters or kilometers, how far away the fault is on the subterranean cable from the base station is the main goal of this research. In many cities, people use the subterranean cable system. When a problem arises with a cable, pinpointing its precise position is essential for effective repair. However, this is not always the case. Discovering the precise spot of the malfunction is the goal of the suggested method. When it comes to finding and fixing problems with underground distribution cables, there are often a variety of technical challenges. Their exceptional charging currents, the design of the cables, and differences in their equivalence caused by different bonding and grounding techniques are all contributing elements to these problems.Faults may occur in the underground power transmission and distribution system. It is critical to accurately locate transmission line faults. Power distributors and merchants need rapid fault detection and analysis. An approach to fault localization based on highly computational methods is proposed in this study. Reducing power outages and substantial income loss is another goal of the project, which is why it also includes design requirements for fault identification and remote indication.

Introduction

Prior to the previous few decades, cables were laid above. However, the modern approach of laying wires underground is more preferable. For the simple reason that subterranean cables are impervious to pollutants, storms, snow, and severe rains. However, it is not easy to pinpoint the exact location of a cable issue. We shall proceed to pinpoint the precise position of the problem. Since everything is becoming digital these days, the project's goal is to find the source of the problem using technology. Many metropolitan regions choose to use the subterranean cable infrastructure. It is difficult to repair a cable when the problem arises for no apparent reason since the precise location of the cable defect is unknown.

Moving power from the power plant to the end users is what the electrical transmission and distribution networks are all about. In most cases, the power system has to be able to identify faults in transmission lines in order to remove them before the harm to the system worsens. While the dependability of the subterranean cable system is better than that of the overhead line system, pinpointing the exact site of a defect may be somewhat challenging. A method of fault localization has been developed in response to the requirement for dependable service. Fault diagnosis has come a long way in the last many years, thanks to advances in transient based approaches and signal processing applications.

Transmission lines are the fundamental components of power networks in the electrical utility industry. Restoring electricity services and minimizing outage time as much as possible depends on precise fault location for transmission lines, which is critical in terms of dependability and maintenance costs of power supply. Utilities rely on accurate fault identification on high voltage transmission networks to facilitate rapid repair team action.

The dependability and environmental friendliness of underground power connections have led to their widespread implementation. Reducing interruption time during faults—that is, restoring services by accurately identifying a faulty section in a timely way—is essential to improving distribution system dependability. The traditional method of defect detection involves searching extensively over greater distances. This wastes a lot of time and doesn't work very well.

INDIAN JOURNAL OF TECHNICAL EDUCATION

ISSN 0971-3034

Volume,12 Issue,1 May,2024

project is put together using resistors that stand in for the cable length in meters. At each known distance, a series of switches is used to create a fault and verify that the length is accurate.

Using a basic potential divider network approach, we can determine the distance to an underground cable problem. The distance at which the problem occurred may be determined by connecting a fixed resistor (R1) to the cable (R2). The ADC pin is linked to the beginning point of the cable (R2) so that the voltage may be read as a function of the cable's resistance change. Simply said, this is the process of distinguishing the fault distance by attaching a potential divider network to the fault wire.

An electrical device that passively divides the input voltage (Vin) into a smaller voltage (Vout) is called a voltage divider, which is another name for a potential divider. By dividing the input voltage among the divider's components, voltage division is achieved. Two series-connected resistors provide a basic voltage divider: an input voltage is placed across the pair of resistors, and the output voltage is the result of the connection between them.

Common applications for resistor voltage dividers include attenuating signals at low frequencies, generating reference voltages, or reducing the amplitude of a voltage for measurement purposes. A voltage divider constructed entirely of resistors may be precise enough for direct current and low frequencies; however, when a broad frequency response is needed (such in an oscilloscope probe), capacitive components are added to the divider to compensate for load capacitance. A capacitive voltage divider measures high voltage in electric power transmission.

Due to the analog voltage nature of the potential divider network's output, the controller will be unable to read it. Consequently, the node MCU controller receives digital inputs from the built-in ADC, which transforms the analog voltages. Through the built-in wifi to cloud memory blynk app, the data is received and processed internally by the node MCU controller, which then shows the cable fault length (meters) on the LCD.

NODEMCU (ESP8266)

A microcontroller unit, or MCU for short, is essentially a minicomputer that fits into a single chip. A microcontroller is a small integrated circuit that typically has a central processing unit (CPU), memory, and programmable I/O peripherals. You may find them in a wide variety of automated devices, including those for cars, medical implants, home appliances, power tools, toys, and office equipment.

When it comes to developing new Internet of Things devices, development boards like Raspberry Pi and Arduino are popular options. These development boards are like little computers on a stick; they can be controlled and programmed using a regular computer. The development boards may link to field sensors and control them after they have been programmed. The "I" in "Internet of Things" refers to the internet, hence the development boards must have a means to link to the web. Wireless networks are the most practical means of connecting to the internet when out in the field. Unfortunately, wireless network functionality is not native to Arduino and Raspberry Pi. A wifi or cellular module may be added to the board by developers, who will then need to build code to access it. ESP8266, often known as NodeMCU, is an open-source Internet of Things development board. It simplifies the creation of Internet of Things applications because to its built-in support for wifi networking, which is one of its most distinctive characteristics.

BLYNK APP

You can control your Arduino or Raspberry Pi from anywhere using Blynk, a platform that has apps for both iOS and Android. It's a digital dashboard that allows users to create a graphical user interface by dragging and dropping widgets. To talk to another ESP8266 module, or to communicate ESP8266 to ESP8266, you may use the Blynk bridge. Using the Blynk server in the cloud as a real-time central transaction manager, it may link all of its projects together.

INDIAN JOURNAL OF TECHNICAL EDUCATION

ISSN 0971-3034

Volume,12 Issue,1 May,2024

The database was also developed in this Blynk app to record the leakage level measured by the rain and ultrasonic sensors.

Liquid Crystal Display

LED screens, which can only show numbers, are losing ground to LCD displays, which can show letters, numbers, and even unique symbols. These LCD screens are great for showing user messages and information. There is a wide variety of formats available for LCD screens. A typical 2 x 16 matrix has two lines of 16 alphabetic letters. The ability of LCDs to show numbers, characters, and drawings has led to their widespread replacement of LEDs in recent years; other formats include 3x16, 2x40, 3x40, etc. Another advantage is that you can show more information visually or textually because to its small size and easy character and graphics programming. In addition to the 8-bit data bus, the majority of LCD modules' interfaces also include a number of control lines. Port 2 is where the control lines are linked, whereas port 0 is where the 8-bit data bus is attached. Although eight bits of data transmission is the norm when connecting the LCD module to an external device, four of the eight data lines may actually be used to interact with the module. Because the R/W connection is grounded, the CPU can only write data to the LCD and cannot read its status information.

Power supply

Unlike other Arduino components, the ESP8266 just needs 3.3 volts to function. The device is charged with a micro USB connection and distributes 3.3 volts to other components via three pins that are uniformly distributed around the unit's perimeter. This design eliminates the need for a separate power socket, which helps to conserve space. The ground pin is one of four. To simplify circuit construction, we recommend soldering the 3.3v and ground pins to the breadboard's outside rails.

Results

Conclusion

We have completed the design and development of the "Cable fault detector with distance location" project, built a prototype device, and are pleased with the outcome. Here, we use a microcontroller to pinpoint, to the nearest meter or kilometer, the precise position of a short circuit defect in an underground wire running from the feeder end. In order to make defect detection and repair easier, we use the basic idea of OHM's law. We employ an ac circuit that uses a capacitor to monitor the change in impedance and compute the distance of the fault to identify open circuit faults; however, we also detect short circuit faults in subterranean cable lines.
The controller with the built-in ADC was chosen since space efficiency is not a priority in this project. Professionals from several Hyderabad-based firms advised us on the design and development of this prototype module because of their extensive expertise in the relevant domains. This project's control circuit can be easily adapted for use in real-world situations.

INDIAN JOURNAL OF TECHNICAL EDUCATION

ISSN 0971-3034

Volume,12 Issue,1 May,2024

LANDMINE DETECTION AND BOMB DIFFUSING ROBOT

N.Ravindar,(Assistant professor),B.Jyosthna priya, G. Nithin, L. pranav, B.Vijay,
U.G.Students,
Electronics and communication engineering,
Samskruti college of engineering and technology Hyderabad.

Abstract

A vehicle's metal detector system may be activated and deactivated using a remote control device that is Bluetooth based. With minor adjustments, the same technology may be used as a combat vehicle in combat zones. The system is integrated with a metal detector and a diffusing system, which can be operated using the Android device's Bluetooth interface. It is intended as an unmanned vehicle. With a Bluetooth app on an Android phone, you may steer the car in any direction. When a metal mine is identified, the vehicle will instantly stop and relay the information to an Android smartphone over the same Bluetooth module that is interfaced to the control unit. This allows the driver to reverse the car and engage the dispersing system, which makes use of a water spray and a cutting mechanism. The metal mine may be thoroughly diffused by cutting wire with the cutter and then sprinkling water over it.

A module for a wireless video camera Through its Bluetooth interface, an Android handset may operate the car, and an ESP 32 cam is mounted on top of the vehicle to record live footage of the surroundings. Rescue operations in the aftermath of natural disasters, usage as a combat vehicle on battlefields, etc. are just a few of the many potential uses for the technology developed here. A wireless video camera allows the system to transmit visual signals of the location, and it is built as an unmanned vehicle. A wireless video analyzing system allows the operator to monitor the situation and manage the vehicle's movement, as well as the cutter and water spray, allowing them to defuse the device.

Introduction

The overarching goal of this project is to provide a tool that will facilitate the efficient and less destructive disposal of bomb threats by law enforcement or the bomb squad. The police, particularly the bomb squad, put themselves in harm's way whenever they respond to a bomb threat. The bomb squad and other police units have tragically lost members in the past due to incidents involving explosives. A far more secure option would be to send in an unmanned ground vehicle (UGV) to eliminate this danger. The goal of this project is to create a drone that can detect explosives and safely dispose of them. Making the UGV as inexpensive as possible is another goal of the project, with the hope that police forces in developing nations might use it in their battle against terrorism.

There are always two modules in a bomb. C4 and nitroglycerin and other explosives make up the first module. Additionally, the second module has an electronic triggering mechanism that may be activated by various means such as mobile phones, remote controls, etc., to set off the explosive. Making the device inactive by essentially deactivating its electronics is the main goal of the endeavor. Two components make up the UGV. A metal detector is included into the first module so it can identify any dangers and notify the operator. In order to safely detonate the device, the second module cuts the trigger wire.

The goal of this research is to find metallic mines in the field, but it may also find subterranean explosives and bombs. Manually detecting these explosives with standard portable metal detectors is extremely risky because terrorists are incorporating sophisticated technologies into their bomb designs. Terrorists can detonate these devices in a variety of ways, including through mobile phones, timers, pressure sensors, remote controls, etc., and they can

INDIAN JOURNAL OF TECHNICAL EDUCATION

ISSN 0971-3034

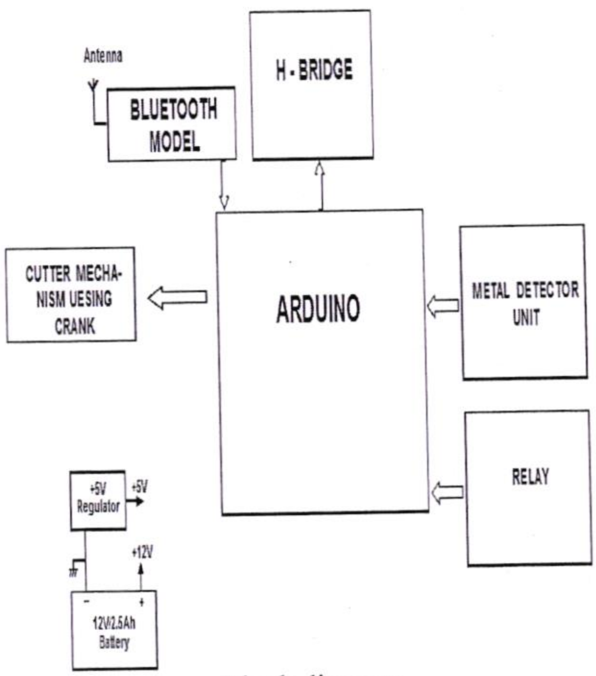
Volume,12 Issue,1 May,2024

do it from anywhere in the world. In the midst of a search for explosives, anything can suddenly go boom, causing extensive damage. The people tasked with finding the explosives—often referred to as the bomb squad or search party—need specialized metal detectors so they can avoid the dangers they face. Within this context, the task of detecting metal mines or explosives including metallic items (such as nails, balls, sharp metal bits, etc.) or fires in a specific area is being undertaken by means of this project's mobile robot. There are a number of techniques that may be used to defuse a bomb. The majority of bombs are detonated by lighting them from a distance. In this scenario, the system should be able to diffuse or remove the device without detonating it, regardless of whether it is above or below ground.

Literature Survey

The use of robots in search and rescue operations is covered in detail in paper [1]. To wirelessly operate the robot, RF technology is used here. Using an ultrasonic sensor, the impediments are identified. An integrated smartphone camera on the robot's arm offers full control of the robot is made possible by its 360° vision. Unmanned ground vehicles, often known as self-controlled robots, are used for border patrol, surveillance, and active warfare (document [3]). The robot is guided to go from one location to another by human navigation controls.Human hand gestures might control the robotic arm, as shown in paper [4]. Particular modes of operation, such those controlled by hand waves or gestures, are used here. The PC-Based Robotic Arm (PC-ROBOARM), created to validate simulation findings, is the subject of paper [7]. Here, the design and control solution for robotic arms is implemented using computer software named Smart arm. There are six degrees of freedom discussed as well.

Methodology



Block diagram

INDIAN JOURNAL OF TECHNICAL EDUCATION

ISSN 0971-3034

Volume,12 Issue,1 May,2024

Two direct current motors (DC motors) propel the metal mine detector and diffuser in any direction, while a third DC motor controls the cutting mechanism that detonates the explosive. The microcontroller is instructed via the remote Android smartphone to run the DC motors that have an integrated reduction gear mechanism. A battery-backed device, which can be charged using either solar or conventional electricity, is intended for use in outdoor circumstances. Although the demo module does not have this feature, it is absolutely necessary for the actual operating system to have solar panels built into the vehicle's body. In this setup, the primary power source provides the DC current that the battery charger needs to charge the battery. You can get the most out of your vehicle's gas tank since the system uses a rechargeable battery. The project also includes a regulated power supply unit that supplies 5V dc to all of the electronic and IC components.

The primary objective of this project is to develop a functional search navigation system that can be used in a metal mine detection vehicle operating in environments such as forests and mountainous terrains. The user may efficiently operate the vehicle and disperse the bomb using a video analyzing system if this module is fitted with a wireless video camera that feeds image signals to a monitoring station.

The metal mines can be located using a metallic detector—a pick-up coil that is energized by an oscillator—and a high output—given to the micro controller—evidenced by a change in the reluctance of the coil—every time an object with a metallic composition is detected. The system will immediately come to a halt and sound an alert if it senses the presence of any metal item.

The multi-function vehicle draws power from its batteries, and all of its electronics, including its DC motors, is intended to run at 12V DC. A 1.3 Ah maintenance-free battery serves this function. With the employment of reduction gear mechanism motors, the vehicle is able to transport high weights thanks to the increased torque and lowered speed. A dedicated battery charger with a 12V step-down converter is required to charge the battery using 230 V AC Mains.

Working in tandem, microcontrollers and Bluetooth modems have the potential to bring about revolutionary technological shifts; as technology advances, especially in the realm of energy management systems, it will be possible to do anything from the most fundamental to the most complicated tasks. In subsequent chapters, you will get a comprehensive explanation of Bluetooth technology.

There is still no universal model or design for the amazing remote controls that have emerged with the proliferation of wireless phones, robots, and other forms of modern information technology. We thus suggest a Bluetooth-based environment controller in light of this aspect. When used in conjunction with Bluetooth's radio wave transmission, we may overcome the spatial barriers present in a complex, opaque structure made up of several items. Two main components make up the system: a microcontroller and a Bluetooth module.

BLUETOOTH MODULE

Bluetooth, a wireless technology, is about to change the way we think about and use electronic gadgets at home and in the workplace. Now they're more than simply standalone gadgets; thanks to the built-in Bluetooth technology, they connect to create a network where appliances can exchange data with one another. When there is little to no infrastructure for long-distance wireless communication, this technique shines. It can connect digital devices within a range of 10 m (roughly) using the unlicensed, generally accessible frequency of 2.4 GHz. Expanding on this idea, it's planned to use Android's Bluetooth capabilities to operate a robotic car.

The Android smartphone and the Arduino BT board (Bluetooth module) are the two primary components of this project. Several Bluetooth applications are preinstalled on the Android mobile phone, giving the user access to the control instructions. Since Android has a large user base and is open source, we have decided to focus on it for this project. Android is a mobile device software stack that comprises an OS, middleware, and essential apps. Operating

ISSN 0971-3034

Volume,12 Issue,1 May,2024

system for Android devices is Linux. Android apps are developed using Google's own virtual engine called Dalvik, which is similar to Java. If you want to start building apps for the Android platform using Java, you can get all the tools you need in the Android SDK. Since Android 2.3.4 Gingerbread and Android 3.1 Honeycomb and later versions, accessory mode has been available as an OS feature.

METAL DETECTOR

Metal detectors come in several varieties; the most simple ones just generate a strong signal if they're close to metal, while more sophisticated models use a variety of detecting principles to determine both the kind of metal and its depth. Here we build a basic metal detector that doesn't know what sort of metal it is or how deep the metal is. A complicated, high-tech circuit with the right software is required to know all these things. As a result, it is disregarded and the rover's primary mission is to locate the metal mine.

Mines containing different metals may also be located with the use of a magnetic pick-up coil. A low-frequency oscillator provides the energy for this coil, and the presence of any metal mine causes it to counteract the magnetic flux generated by the coil, resulting in a reduction of the current running through it. The circuit will pick up on this drop in current and send a logic signal to the microcontroller to let it know about it. Because the search vehicle uses a 12V battery, a battery charger that includes a step-down transformer, full-wave rectifier, and series voltage regulator is also part of the setup.

RESULTS

Conclusion

We have completed the design and development of the "Bomb detection and diffusing robot using arduino" project. A prototype module is built for the purpose of demonstration, and the outcomes are good. A basic robot with various potential uses is built using this prototype module. In this setup, the operator uses an Android mechanism to run a remote control that in turn controls the robot. The same module may be improved and expanded with a large number of degree variations for real-time activities. Building a low-cost, highly-precision, remote-controlled robotic vehicle was the focus of this research. At now, the system is limited to a range of less than 10 feet due to the use of Bluetooth remote technology, which has less transmitting capacity. This spectrum is sufficient, depending on the dimensions of the apparatus. You can't run these kind of modules for too long without compromising visibility, thus range limiting is always a must.

REFERENCES

(1) Robotic Engineering an Integrated Approach

By: Richard D. Klafter, Thomas A. Chmiclewski, Michael Negin

(2) Mechatronics – Electronic Control Systems in Mechanical and Electrical Engineering – By: W. Bolton

(3) Introduction to Robotics - By: Saeed B. Niku

(4) The 8051 Micro-controller Architecture, programming & Applications

By: Kenneth J. Ayala

INDIAN JOURNAL OF TECHNICAL EDUCATION

ISSN 0971-3034

Volume,12 Issue,1 May,2024

(5) Programming and Customizing the 8051 Micro-controller By: Myke Predko

(6) The concepts and Features of Micro-controllers By: Raj Kamal

(7) Television and Video Engineering by AM Dhake

(8) Basic Radio and Television by SP Sharma

(9) Fundamental of Radio Communication: By A.SHEINGOLD

INDIAN JOURNAL OF TECHNICAL EDUCATION

ISSN 0971-3034

Volume,12 Issue,1 May,2024

A SMART IOT PLATFORM FOR AIR QUALITY MONITORING SYSTEM

Butta Kalyan, Thungar rajesh, A.Hemanth kumar, B.Gopi, k.samba siva,
Mrs.M.Swapna,(Assitant professor),
U.G.Students,
Electronics and communication engineering,
Samskruti college of engineering and technology, Hyderabad.

Abstract

One of the biggest issues today is air pollution, which has direct consequences that kill millions of people annually around the globe. Pollutants in the air may originate from both man-made and natural causes, such as volcanic eruptions, fires, and wind-borne dust. Air pollution is a global health and environmental problem, but it disproportionately affects nations with poor or medium incomes. Asthma, heart disease, lung illness, and many other conditions are all brought on by air pollution, which affects people of all ages. Developed nations enacted legislation to lessen the impact of air pollution on public health. Having said that, there is a great deal more we can do to help everyone. Accordingly, the concept is pitching a wearable gadget based on an intelligent system that can measure the amount of air pollution in real-time using a number of different sensors. No matter where you put or carry the gadget, it will detect the degree of indoor air pollution. Not only will this approach cut down on deaths, but it will also pave the way for more people to prioritize their health.

The rise in the number of automobiles on the road, together with other effects of industrialization and urbanization, has made air pollution a major problem in modern times. The rise of pollution levels has devastating effects on economic growth. The design and implementation of a system to detect air pollution are detailed in this project. The innovation here is an actual implementation of the IoT concept. In a world where environmental health is becoming a real concern, this in-depth piece investigates the potential uses of this breakthrough. The Node MCU microcontroller board is used to make the task happen. We will be using the Blynk IoT app to track air quality over a web server; if the air quality drops below a certain point, we will know that there are dangerous levels of gases like CO2 in the air, and we can take action accordingly in this project. There are three levels of air quality that may be readily monitored on the LCD and webpage: "Fresh Air,"

"Bad Air," and "Harmful Air." The levels are measured in PPM, or parts per million. The research makes use of two gas sensors—the MQ2 and the MQ135—to measure the air quality. The Node MCU controller monitors the air quality in a specific region by receiving both of these sensor outputs. If we want to show how the air quality is assessed in parts per million (PPM), we'll use the following range: 0–500 PPM for good air, 500–1000 PPM for bad air, and 1000 PPM and above for harmful air. All of the electricity needed by the module comes straight from the mains.

Introduction

The world's population is growing at a fast pace every year. On a yearly basis, the population grows by around 83 million. People are moving to cities in search of better lives. Every day, new factories and enterprises spring up. Global warming is the direct cause of all these changes. Over the last century, global temperatures have increased by around 0.85 °C. One of the main reasons why the earth is overheating and killing millions of people every year is air pollution. Here we have air pollution caused by pollutants that pose a threat to human health. Air contaminants come in a wide variety of forms. Complex air pollutants are emitted by a variety of sources, including gases (such as ammonia, carbon monoxide, sulfur dioxide, nitrous oxides, methane, and carbon dioxide), factories, homes, and vehicles (such as automobiles and trucks). Portable sources and fuel burning are the main culprits when it comes to fine particulate matter. Vehicles, power plants, industries, homes, and biomass burners are all examples. All of these things add up to

INDIAN JOURNAL OF TECHNICAL EDUCATION
ISSN 0971-3034
Volume,12 Issue,1 May,2024

a long list of potential health problems, including lung cancer, COPD, and heart disease. There were 4.2 million fatalities in 2016 due to ambient air pollution. Approximately 29% of lung cancer cases, 43% of chronic obstructive pulmonary disease (COPD) fatalities, 25% of cases of ischaemic heart disease (IHD), and 24% of stroke cases are attributed to air pollution on a worldwide scale. Although it is a global issue affecting people's health, poor and medium income nations bear a disproportionate share of the impact.

Chemical chemicals that are discharged into the air may have an impact on both people and other living things, in addition to the environment (Al Ahasan et al., 2018). As reported by Malaysiakini (2019), haze outbreaks in 2019 exacerbated air pollution difficulties in Malaysia. The problem of air pollution necessitates new approaches that can measure gas emissions in the area in real time. Using an ESP 32 linked to a gas sensor MQ135 and the ThingSpeak and Twitter platforms, the output for each parameter may be seen in the innovation (Nettikadan and Raj 2018).

The Node MCU was chosen as the controller after careful consideration of existing advances. To measure air quality, the MQ2 and MQ135 gas sensors are used. We went with the Node MCU Module as our controller since it's inexpensive and simple to operate. Reasonably priced and capable of detecting a wide range of gases, the MQ series gas sensors were selected. The result value has been shown using Blynk apps. Users may examine the output value by using the Blynk app on their mobile phones and visiting the Favoriot website. Because of its small size and light weight, this product is not only affordable, but it can also be transported anywhere. The ability to monitor air pollution levels in real time and notify users when they go beyond a certain threshold is just one more way this innovation has significant societal benefits.

In order to significantly lower the amount of air pollution, we must all work together. The goal of this proposal is to develop a cheap, smart gadget that can monitor air quality in real-time and be accessible to everyone. The concept not only detects levels of air pollution but also notifies the user. Consider a region where an industrial oven is constantly emitting smoke: the air pollution level would be very high. Based on the air particle count, the gadget might provide an instant alert. The user has two options for protection: either wear a mask or get out of there quickly. Anyone can carry it about like a cell phone since that's the whole point of making it portable. So, there's no need to worry about another piece of equipment that has to be taken care of. The concept would also facilitate the collection of area-specific air pollution data via crowdsourcing, the provision of timely data, and the subsequent sharing of this data with the relevant entity (e.g., healthcare or government) for the purpose of further study.

Determining air pollution levels using a combination of low power and many sensors is fraught with difficulty. Countless technologies on the market today can also detect levels of air pollution, but they are either prohibitively costly or not portable. It turns out that there has to be a lot of infrastructure and a lot of trained people to identify levels of air pollution. There aren't many gas sensors that can work with decreased power usage and provide correct readings instantly, according to research. Important aspects of the system are response speed and accuracy. It's possible that low-power, low-cost sensors are easily fooled by little changes in surrounding conditions, such as humidity, temperature, and barometric pressure. Furthermore, they aren't dependable for extended use. Businesses see potential in the portable air quality monitor sector and are making investments in this area. These two emerging technologies were discovered during our online search for a comparable concept.

Literature Survey

Although we perused several journals in our quest to develop a portable intelligent system capable of real-time air quality detection, we will focus on four key ones, one of which is a book, in order to meet the requirements:

An article titled "IoT Personal Air Quality Monitor" was the source of the central concept, to which four researchers contributed. According to the World Health Organization's (WHO) air quality guideline, they intended to identify the most common air pollutants. A number of sensors were made available by the researchers so that low power consumption could be maintained while high precision was monitored. A radio protocol known as "LoRa" transmits information using radio waves on a designated network node. Users may see the data visualized via a web-based dashboard and a mobile app.

Secondly, in the middle of Bangkok, in a neighborhood named Sai Mai, a group of Thai students made a concerted effort to measure the air pollution level. The World Health Organization reports that emerging nations, such as Thailand, have very high levels of air pollution. The several suggested sensors were identified after a comprehensive analysis of the study article. On the other hand, the article also used the World Health Organization's approved method for detecting the air pollutant. In general, the investigation looked at five particles: particulate matter (PM2.5 and PM10), ozone (O3), nitrogen dioxide (NO2), sulfur dioxide (SO2), and carbon monoxide (CO). The study detailed the creation of NB-IoT-based air pollution detecting devices for use in Thailand's smart cities. Not only that, but there were additional sensors. The gadget, nevertheless, was permanently installed in the city and could not be moved. The information was sent to the specified destination by means of the LET network. Users may see the AQI graph on a website and use a mobile app to see the data visualized.

Delhi, India's air pollution is the third main topic of the article. New Delhi is the most polluted city in India, and 30 of the world's worst cities are located in India. The study takes vehicle-related air pollution into account. It provides an immediate answer by limiting traffic in very polluted regions and keeping tabs on pollution levels. A sensor-based hardware module was to be installed in the light posts at the specific intersections. The gadget sends the information to the distant server using wireless means. Information obtained is also useful for traffic control. To bypass the congested, dirty region, commuters may use a smartphone app to access other routes that have better air quality.

In our latest piece of journal study, two students from India's IT University at Dehradun have provided their findings. Since automobiles are the primary source of air pollution, the idea was to construct hardware with a number of sensors using IoT devices. This hardware would then be installed in vehicles. A field sensor MQ135 detects ammonia, carbon dioxide, smoke, and dust via a connection to an Arduino ESP 8266 in the suggested model. Within the city, the gas and dust sensors may be connected to a vehicle or a rickshaw. Once the hardware device detects a specific air pollution, it transmits the data to a cloud server for further analysis. The air pollution level may be seen on an Android app, which raises awareness among the city's inhabitants. Notifications will be sent to the app and the nearby city office when the air pollution level reaches a certain threshold, advising users to stay away from that region.

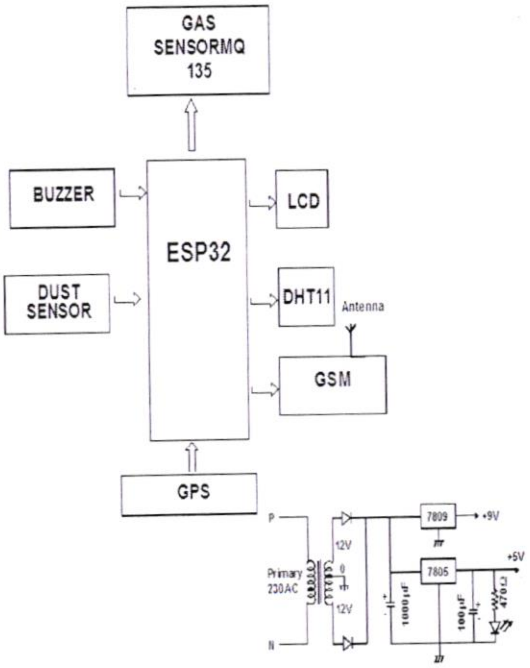
Finally, on September 22, 2021, the World Health Organization released its worldwide air quality recommendations, which is the book we'd want to discuss. In a nutshell, the book goes over all the dangerous airborne particles that are bad for people and all other forms of life. Clear air is essential for good health, says the World Health Organization (WHO). Millions of fatalities and healthy years lost are still attributed to air pollution. Modern estimates place the illness burden from air pollution on par with that from other major global health hazards like sedentary lifestyles and fatty foods. A historic resolution on air pollution and human health was approved by the World Health Assembly in 2015. Air pollution is acknowledged as a contributor to non-communicable diseases, including cancer, heart disease, stroke, asthma, COPD, and other respiratory illnesses. An improved worldwide response is necessary due to the challenge's global dimension.

Methodology

INDIAN JOURNAL OF
TECHNICAL EDUCATION

ISSN 0971-3034

Volume,12 Issue,1 May,2024



Block diagram

The suggested system is an attempt to provide a workable solution for a handheld air quality monitor that can reliably assess air pollution levels in real-time and on a continuous basis. As soon as the air pollution level reaches an alarmingly high level, the user will get an urgent notification to safeguard themselves. Thus, it will also serve as an alert mechanism. Healthcare facilities and government agencies concerned about air pollution levels would also benefit from the gadget. From the user interface, data may be sent directly to a designated recipient or group. One approach to talking about the UI is using a mobile app. A heatmap and specific graphs are available in the mobile app for data visualization. The data will be accessible whenever the user wants it to be.

The air quality is being tracked by a system that keeps tabs on it. Developed and emerging nations alike are seeing rising air pollution rates, necessitating more affordable and easily transportable air quality monitoring equipment. Developed nations have pollution measurement chambers at their disposal. Air pollution poses serious health risks. Almost no services are accessible in underdeveloped nations. This document provides a comprehensive overview of several air quality monitoring technologies. Oxygen, carbon dioxide, nitrogen dioxide, and sulfur dioxide concentrations are measured by these devices in that order. Led will show all readings. The alarm will go off when the readings of the sensors reach certain thresholds. In addition to improving air quality, these technologies eliminate potentially harmful health issues

MQ135

A gas quality sensor is a tool for detecting, measuring, and monitoring gases such as ammonia, benzene, sulfur, carbon dioxide, smoke, and other dangerous gases. One of the most popular air quality sensors for detecting smoke and hazardous chemicals is the MQ135, which is part of the MQ gas sensor line. Here is a quick rundown on how to use a MQ135 air quality sensor to measure and identify gases.

Ammonia (NH3), sulfur dioxide (SO2), and carbon monoxide (CO) are among the gases that may be detected by the semiconductor air quality check sensor known as the MQ135 gas sensor module. The principle behind it is a gas sensor called a metal oxide semiconductor (MOS) that employs semiconductors to identify gasses. Among the many gas

INDIAN JOURNAL OF TECHNICAL EDUCATION

ISSN 0971-3034

Volume,12 Issue,1 May,2024

sensors included in air quality control equipment, the MQ-135 stands out. With input voltages ranging from 2.5V to 5.0V, it offers digital and analog output options.

Even in perfectly clean air, the MQ 135 Node MCU Air Quality Detector Sensor Module's conductivity is modest. As the concentration of the desired flammable gas increases, so does the conductivity of the sensor. Make the gas concentration output signal that corresponds to the change in conductivity. Not only is the MQ135 gas sensor very sensitive to smoke and other dangerous gases, but it is also very sensitive to ammonia, sulfur, and benzene steam. It is affordable and versatile, making it ideal for uses like detecting dangerous gasses and smoke. You can find gas leaks in homes and businesses with the help of the Gas Sensor (MQ2) module. Propane, alcohol, smoke, CH4, LPG, and H2 are all detectable with this device. Because of its lightning-fast reaction speed and extreme sensitivity. Quick measurements may be taken. A potentiometer allows the user to fine-tune the sensor's sensitivity.

DHT 11

The foundation of this project's operation is serial communication over a single cable. Following a start signal from the node mcu controller, the DHT module provides data on humidity and temperature in a response signal. The 16x2 LCD receives data from the humidity and temperature sensors, which are collected and extracted by the Arduino.

For this project, we used a DHT11 sensor module. In other words, the DHT11 sensor module is a hybrid device that can detect both temperature and humidity, and then provide a calibrated digital signal as an output. DHT11 guarantees great dependability and long-term stability while providing us with very accurate humidity and temperature readings. This sensor is offered in a 4-pin single row package and has an 8-bit microcontroller that measures humidity and temperature using a resistive type and an NTC type component, respectively. It has a rapid reaction time and is cost-effective. The following chapters provide a detailed explanation of the DHT 11 sensor.

One wire, or serial connection, is all that's needed for the DHT11 module to function. This module transmits data in the form of a time-stamped pulse train. A time-delayed initialize instruction is required before data can be sent to the Arduino.

ESP 32

The ESP32 family of microcontrollers is a low-power, system-on-a-chip option with built-in Wi-Fi and dual-mode Bluetooth. Antenna switches, RF baluns, power amplifiers, low-noise receive amplifiers, filters, and power-management modules are all integrated into the ESP32 series, which uses a variety of microprocessors including the RISC-V, Xtensa LX7, or the dual-core Tensilica Xtensa LX6. TSMC uses their 40 nm technology to produce ESP32, which is designed and developed by the Shanghai-based Chinese business Espressif Systems. The ESP8266 microcontroller was succeeded by it.

GSM

In this project, GSM (Global System for Mobile Communication) serves as both a receiver and transmitter of short message service (SMS) messages at a baud rate of 9600 bits per second. In its most basic form, the GSM architecture is just a computer network. The system must divide the available frequency spectrum into smaller portions and allocate each base transreceiver station just those frequencies. It must also maximize the reuse of the precious frequencies. Although the 900 MHz band was initially reserved for GSM, the 1800 MHz band became more popular for cellular applications later on. While both the 1800 MHz and 900 MHz GSM bands have almost identical specs and design, the former makes mobile exchange construction simpler and benefits from high frequency synergy effects.

Results

INDIAN JOURNAL OF TECHNICAL EDUCATION

ISSN 0971-3034

Volume,12 Issue,1 May,2024

Conclusions

The project's design and development went off without a hitch, and the results were good enough to warrant building a prototype module to show off. Professionals from several Hyderabad-based firms advised us on the design and development of this prototype module because of their extensive expertise in the relevant domains. This project's control circuit can be easily adapted for use in real-world situations.

The goal of the suggested AI system was to fill a need in the existing industry for air pollution detecting systems. The research publication cited in the literature review provided strong support for the recommended approach. One of the important points of the concept was the low power usage. The portable air quality monitoring device may take some time for users to adjust, but we're optimistic about its future. Take the widespread availability of mobile phones as an example; this was not the situation even a decade ago. Despite its price tag, the mobile phone quickly became a popular means of instantaneous communication. Thus, the handheld device for checking air quality will also be around in the future; when everyone gets there is the only question.

With the rapid advancement of technology, especially in the realm of global telecommunication networks, consumers are anticipating better service for a range of non-personal applications via IoT. With this in mind, a wide variety of IoT modules are created.

FUTURE SCOPE

There is a lot of room for future work to enhance the hardware and incorporate new technologies into the data processing in the suggested unique solution. A machine learning method may warn the user not to go to a location where the air pollution is very bad, for instance. Machine learning models have the ability to accurately forecast future movements using the current data. Conversely, a variety of sensors may be obtained to provide low latency and quick reaction times, allowing for more precise projects. In addition to the air pollutants suggested by the World Health Organization, additional air pollutants may be more useful to monitor.

REFERENCES

1. Linear Integrated Circuits – By: D. Roy Choudhury, Shail Jain
2. Digital Electronics. By JOSEPH J.CARR
3. Fundamental of Radio Communication: By A.SHEINGOLD
4. Basic Radio and Television: By S.P.SHARMA
5. Digital and Analog Communication System By: K. sam Shanmugam
6. Relays and their applications - By: M.C.SHARMA
7. Op-Amps Hand Book - By: MALVIND
8. The concepts and Features of Micro-controllers - By: Raj Kamal
9. The 8051 Micro-controller Architecture, programming & Applications - By: Kenneth J. Ayala
10. Programming and Customizing the 8051 Micro-controller - By: Myke Predko
11. Electronic Circuit guide book – Sensors – By JOSEPH J.CARR