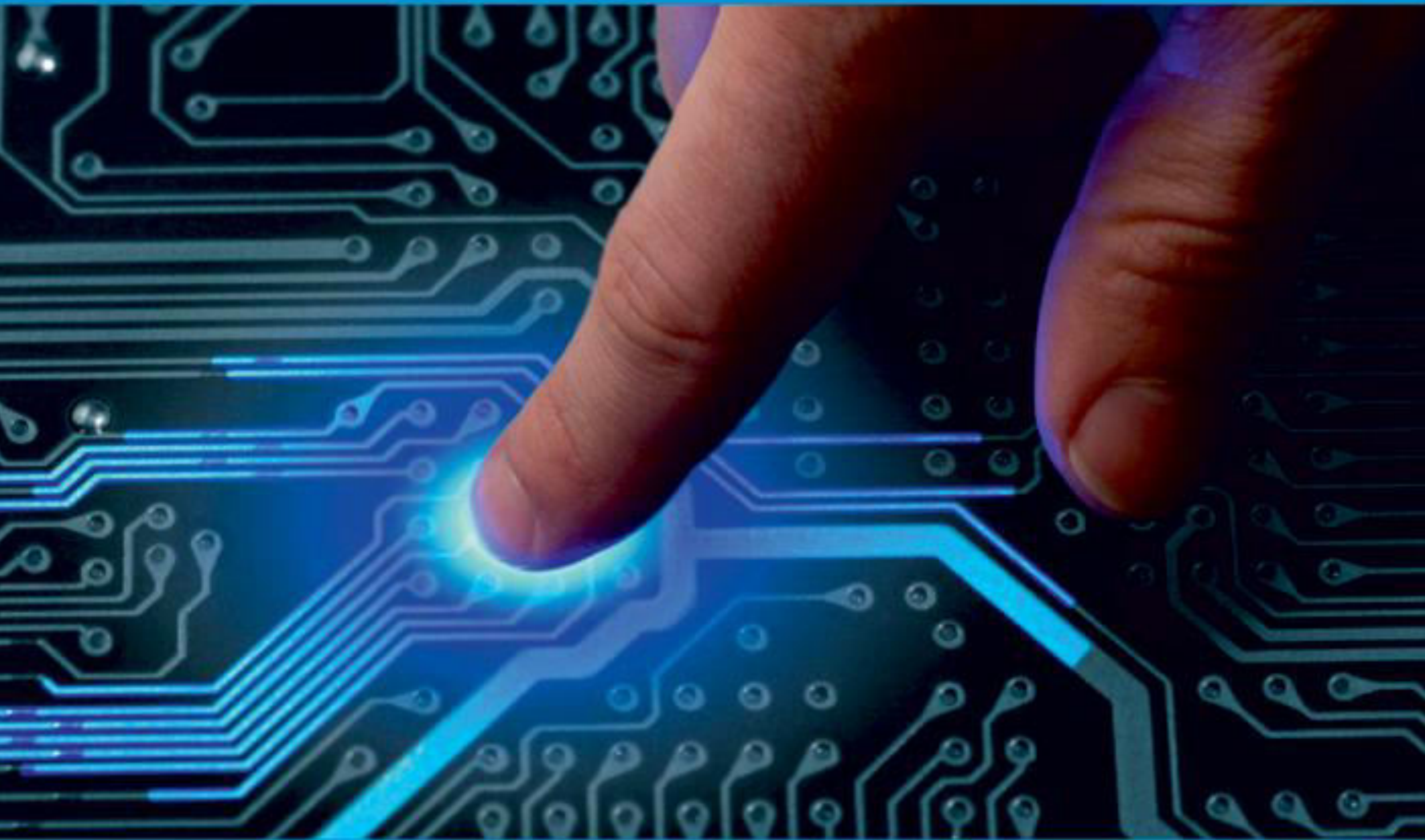
IJIRCCE

e-ISSN: 2320-9801 | p-ISSN: 2320-9798



INTERNATIONAL JOURNAL OF INNOVATIVE RESEARCH

IN COMPUTER & COMMUNICATION ENGINEERING

Volume 10, Issue 5, May 2022

INTERNATIONAL STANDARD SERIAL NUMBER INDIA

Impact Factor: 8.165

| e-ISSN: 2320-9801, p-ISSN: 2320-9798| www.ijircce.com | |Impact Factor: 8.165 |

|| Volume 10, Issue 5, May 2022 ||

| DOI: 10.15680/IJIRCCE.2022.1005178|

Smart Farming (IoT): Identify Farming conditions by Machine Learning

Tabasum Rafiq[1], Shalini Singh[2], Simran Gull[3], Aadil Ahmad Dar[4], Samar Ansh[5]

M.Tech Scholar, Department of Computer Science and Technology, Central University Punjab, Bathinda, India[1,2,3,4]

Cyber Security Scholar, Department of research, Cyber Security Council, Ontario, Canada[5]

ABSTRACT: Smart agriculture is an emerging concept because IoT sensors are capable of providing information about agriculture fields and then acting upon them based on user input. The feature of this paper includes the development of a system that can monitor weather- temperature, moisture, wind, and even the movement if any happens in the field which may destroy the crops in agricultural field through real-time broadcast data. This project aims to use flexible technology i.e. IoT and smart agriculture using automation. Once the software has been developed depending on the change in requirements and broadcast data auto-update.

The network of different devices makes a self-configuring network. The new developments of Smart Farming with the use of IoT, by day, turning the face of conventional agriculture methods by not only making it optimal but also making it cost-efficient for farmers and reducing crop wastage. The aim is to propose a technology that can generate messages on different platforms to notify farmers. The product will assist farmers by obtaining live data (temperature, humidity, soil moisture) in the agricultural area so that they can take the necessary steps so that they can farm wisely again increase their crop yields, and save resources (water, fertilizer, manpower). This will allow the farmer to manage their crop with the new age in farming and productivity.

KEYWORDS: Smart Farming, Internet of Things (IoT), Temperature and Humidity Sensor, Visible Light Sensor, Smart Agriculture, Machine learning.

I. INTRODUCTION

The future of Smart Computing will be based entirely on the Internet of Things (IoT). Transforming "Traditional Technology" from homes to offices to "Next Generation Everywhere Computing" by IoT. The 'Internet of Things gains an important place in research worldwide and especially in the area of advanced wireless communication. Today IoT has begun to affect people everywhere and from the general user space, IoT lays the foundation for the development of various products such as intelligent health services, smart living, smart school education, and automation. And commercially it is used in manufacturing, transport, agriculture, business management, and many other sectors as we see in Figure 1. (As mentioned by Nayyar Anand [1]) Highly researched IoT agriculture. Because the industry is really important to ensure food security as the world's population grows rapidly. Researchers first introduced the ICT-based approach to the field, which was useful at some levels but would not solve our problem over time. So now, they are exploring IoT as an ICT option in agriculture. Agricultural products require uses such as soil moisture monitoring, ambient temperature monitoring, humidity, procurement management, and infrastructure management.

The future of agriculture is accurately agricultural and is expected to grow to 4 billion by 2020. Nerve-generated data in the agricultural sector can be used to analyze the data, which will help farmers to improve crop yields. Therefore, smart IoT-based farming can solve many agricultural-based problems. The purpose of this paper is to introduce an effective product that will allow farmers to access real-time data. The structure of the paper is as follows: Phase 2 will have the importance of IoT-based applications in Smart Farming and its advantages and IoT-based product shortcomings. Phase 3 will consist of a sensor, microcontroller, and other hardware used to create the product with short pictorial information. Since this product is active, there will be prototype model images. Section 4 will give us an idea of the product performance and test data that was measured during the test model testing. Phase 5 will introduce the conclusion and scope of the future in the product with the development of IoT.

| e-ISSN: 2320-9801, p-ISSN: 2320-9798| www.ijircce.com | |Impact Factor: 8.165 |

|| Volume 10, Issue 5, May 2022 ||

| DOI: 10.15680/IJIRCCE.2022.1005178|

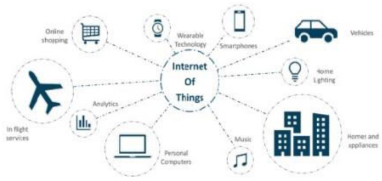


Fig. 1. IoT Connectivity and Access.

II. Related work

“Smart Precision Based Agriculture Sensitive Use”; focuses on developing devices and tools to manage, display and inform users using the benefits of a wireless network system. [1]

"IoT Based Smart Agriculture"; This paper aims to use evolving technologies i.e. IoT and smart agriculture using automation. Environmental monitoring is a major factor in improving the yield of successful crops. Features of this paper include the development of a system that can monitor temperature, humidity, humidity, and even the movement of animals that can destroy crops in agricultural fields through sensors using an Arduino board. [2]

In “Providing Smart Agricultural Solutions to Farmers to Produce Better Production Using IoT”; Cloud computing devices can create an entire computer system from sensors to tools that view data from agricultural landscapes and low-profile actors and feed data accurately to storage and location as GPS coordinates. [3]

“Designing and Developing an Accurate Agricultural System Using a Wireless Nerve Network”; This idea proposes a new approach to smart farming by connecting an intelligent sensory system and an intelligent irrigation system with wireless communication technology. [4]

“Real-Time Automation and Monitoring System for Modernized Agriculture”; proposes an idea of how an automatic irrigation system was developed to better utilize water for crops. In addition, the gate unit handles sensory information. [5]

In “IoT-based Agricultural Protection Program”; is designed with an IoT-based monitoring system to analyze crop locations and how improve decision-making efficiency by analyzing harvest statistics. [6]

“Diagnostic Growth Analysis: Disease Diagnosis and Fruit Measurement”; In this paper image processing is used as a tool to monitor fruit diseases during planting, from planting to harvesting. The variety is characterized by color, texture, and morphology. [7]

"Ioat-Based Agriculture"; The E-system describes details about the design and implementation of flexible rate irrigation and the network of wireless and local sensors in real-time and controls the design and use of appropriate software. The entire system was developed using five sensory channels that collect data and transmit it to the station using a global positioning system (GPS) where the necessary steps are taken to control irrigation according to the information available with the system. [8]

“IoT in Indian Agriculture using a wireless sensor”; The project is closely related to the use of off-grid. The aim is to provide water to the fields by using solar energy as a primary source. In this case, the user can irrigate the fields and protect his crops anywhere through the GSM process.[9]

III. Problem Statement

Provide an effective decision support system using a broadcast network that manages a variety of farm activities and provides useful farm-related information. Information related to soil moisture, temperature, and humidity. Due to the climate, and rising water Farmers are experiencing many negative impacts on agriculture. The water level is controlled by farmers in both Default / Manual using that application. It will make farmers more comfortable. Doing agriculture takes a lot of time.

IV. Objectives

It should use fewer resources depending on hardware and costs. This overcomes the manual labor required to rent and maintain agricultural farms in both automated and manual labor. It should be able to measure the increase or decrease in water level and soil moisture:

a) To collect the peer reviews of a research paper from various security platforms.
b) To extract the features from a peer-review of scientific papers.

| e-ISSN: 2320-9801, p-ISSN: 2320-9798| www.ijircce.com | |Impact Factor: 8.165 |

|| Volume 10, Issue 5, May 2022 ||

| DOI: 10.15680/IJIRCCE.2022.1005178|

c) To analyze and predictthe future for smart farming resource utilization.

V. METHODOLOGY

In the Recent era of IoT, much new research has been conducted in terms of Smart IoT-based product development which will help farmers in Smart Farming in principles of crop management, pest control, agricultural accuracy, and surveillance of agricultural areas using different sensors and Drones. In this part, Smart IoT-based Technology for Agriculture is being developed for live monitoring of Temperature, and Moisture using Internet-connected various devices. The temperature sensor detects the ambient temperature of the farm in different farm conditions. When rain is observed by the sensor, the pump motor will stop pumping the water to the field and updates the user using GSM/GPRS technique. If there is unconditional rain the provided panels will be automatically closed to protect the crop. Alphanumeric LCD is used to display data.

.

VI. MACHINE LEARNING MODELS

Machine learning algorithms have been used in this work for the detection of communication types – Tor (Dark web) /VPN /Open Internet. This includes:

- Decision Tree
- Naive Bayes

The accuracy of these models will be evaluated and the best among them will be considered.

Precision = True Positive / True Positive * False Positive

Recall = True Positive / True Positive * False Negative

F1 = 2 * (Precision * Recall) / Precision + Recall

a. **Decision Tree**

A Decision Tree is a logical model of decisions that performs for possible consequences, including chance event outcomes and utility. The algorithm of the Decision Tree is one way and only contains conditional control statements with machine learning (supervised learning) algorithms that can be used to solve classification. In the decision tree (Model), the data is subdivided into internal and terminal nodes where both nodes of a Decision Tree represent different attributes. Each node performs a test on attributes and branches between the nodes represent the possible outcome based on observed sample data, whereas terminal nodes represent the final result of the dependent variables. The mathematical formula behind the decision tree is as below.

$$Entropy = \sum_{i=1}^{C} -p_i * \log_2(p_i)$$

b. **Naive Bayes**

A Naïve Bayes Classifier is a supervised machine learning algorithm with simple and most effective multi-class Classification algorithms which help in building fast machine learning models that can make quick predictions on text problem-based datasets to train your machine. Naïve Bayes Classifier is a function with a probabilistic classifier to predict based on the probability of available data.The formula for Bayes' theorem is given as:

$$P(A|B) = \frac{P(B|A)P(A)}{P(B)}$$

International Journal of Innovative Research in Computer and Communication Engineering

| e-ISSN: 2320-9801, p-ISSN: 2320-9798| www.ijircce.com | |Impact Factor: 8.165 |

|| Volume 10, Issue 5, May 2022 ||

| DOI: 10.15680/IJIRCCE.2022.1005178|

VII. SIMULATION RESULTS

This section reports on the achieved investigational results of using several machine-learning approaches to fulfill the desired solution and found model of BAG-DT is the best-optimized result of prediction.
Universally broadcast data help to save resources with smart farming by up to 30% and food productivity increase up to 7%.

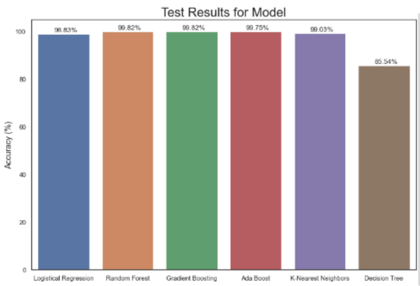


Figure 2. Model Prediction by ML.

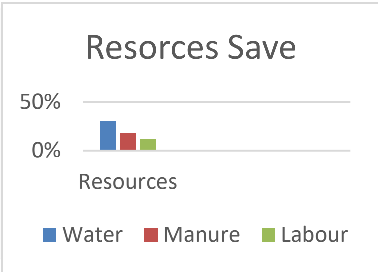


Figure 3. save resources.

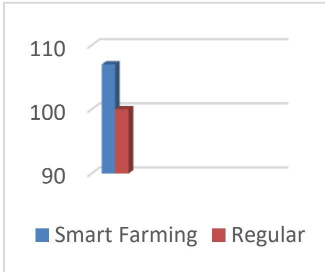


Figure 4. Production growth.

VIII. CONCLUSION

From our results and literature survey of other papers, we saw that the resources we used to develop our porotype allowed us to make an efficient and accurate, as well as cheap product for farmers. That could save and be easily accessible to farmers. Therefore, we can conclude that this porotype will help farmers on small farms to effectively monitor their crops with an easy-to-use and warning system.

IX. FUTURE WORK

Future work would be focused more on increasing share resources to acquire more data especially about Pest Control and by also integrating GPS to enhance this Agriculture IoT Technology to a full-fledged Agriculture Precision ready product.

REFERENCES

1. K. Lakshmisudha et. al, " Smart Precision Based Agriculture Using Sensors", International Journal of Computer Applications (0975- 8887), Volume 146-No.11, July 2011.
2. N Gondchawar& Dr. R.S.Kawitkar, "IoT Based Smart Agriculture", International Journal of Advanced Research in Computer and Communication Engineering (IJARCCE), Vol.5, Issue 6, June 2016.
3. M.K.Gayatri et. al, "Providing Smart Agriculture Solutions to Farmers for Better Yielding Using IoT", IEEE International Conference on Technological Innovations in ICT for Agriculture and Rural Development (TIAR 2015).
4. Chetan Dwarkani et. al, "Smart Farming System Using Sensors for Agricultural Task Automation", IEEE International Conference on Technological Innovations in ICT for Agriculture and Rural Development (TIAR 2015).
5. S. R. Nandurkar et. al, "Design and Development of Precision Agriculture System Using Wireless Sensor Network", IEEE International Conference on Automation, Control, Energy and Systems (ACES), 2014.
6. Joaquín Gutiérrez et. al, "Automated Irrigation System Using a Wireless Sensor Network and GPRS Module", IEEE Transactions on Instrumentation and Measurements, 0018-9456,2013 .
7. Dr. V.Vidya Devi & G. M Kumari, "Real- Time Automation and Monitoring System for Modernized Agriculture" ,International Journal of Review and Research in Applied Sciences and Engineering (IJRRASE) Vol3 No.1. PP 7-12, 2013.
8. Meonghun Lee et. al, "Agricultural Protection System Based on IoT", IEEE 16th International Conference on Computational Science and Engineering, 2013.
9. Monika Jhuria, "Image Processing for Smart Farming: Detection of Disease and Fruit Grading", IEEE Second International Conference on Image Information Processing (ICIIP), 2013.

| e-ISSN: 2320-9801, p-ISSN: 2320-9798| www.ijircce.com | |Impact Factor: 8.165 |

|| Volume 10, Issue 5, May 2022 ||

| DOI: 10.15680/IJIRCCE.2022.1005178|

BIOGRAPHY

Tabasum Rafiq is pursuing M-Tech in the department of Computer Science and Technology (Central University Punjab, India)**.**
Shalini Singhis pursuing M-Tech in the department of Computer Science and Technology (Central University Punjab, India).

Simran Gulis pursuing M-Tech in the department of Computer Science and Technology (Central University Punjab, India).

Aadil Ahmad Daris pursuing M-Tech from the Department of Computer Science and Technology (Central University Punjab, India). He has a bachelor's degree in Computer Science and Engineering from (University of Kashmir, Srinager) India.

Samar Ansh is Cyber Security headin Cyber Security Council, Ontario, Canada and currently pursuing M-Tech in Cyber Security from the Department of Computer Science and Technology (Central University Punjab, India). He has a bachelor's degree in Computer Science and Engineering from (Cambridge Institute of Technology) Ranchi University, India, and an MS in Cyber Technology from De-Montfort University, UK. In the same domain specialized (CEH, CHFI, ISMS, Exploit Engineer, etc.) from different reputed Institutions.

INTERNATIONAL JOURNAL OF INNOVATIVE RESEARCH

IN COMPUTER & COMMUNICATION ENGINEERING

9940 572 462 6381 907 438 ijircce@gmail.com