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Intellectual Identification and Forecasting of Methane Crop Production Using Enhanced Machine Learning Techniques

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Abstract

An important economic factor is agriculture. It is necessary for a healthy ecosystem. A wide range of agricultural products are necessary for human life in almost every way. While producing more food with more nutritional value, farmers must adjust to climatic change. In order to maximise crop production and growth, the farmer must be informed of the meteorological conditions, which will aid in selecting the optimum crop to cultivate under those conditions. Methane gas-based smart farming improves the overall agricultural system by constantly monitoring the field. It provides a clear real-time observation and regulates a variety of variables, including soil, humidity, temperature, etc. Machine learning is used in agriculture to improve output and quality.

Key Words: Agriculture, Methane gas, Machine Learning, Farmers.

1.Introduction

The Indian economy is heavily reliant on the agricultural sector. Rural households depend on agriculture to a greater than 70% extent. Given that it accounts for 17% of the country's GDP overall and employs more than 60% of the workforce, agriculture is a significant sector of the Indian economy. Over the past few decades, Indian agriculture has experienced significant expansion. Muthukumaran Narayanaperumal and Ravi Rama raj (2014) advocated studying difficulties encountered during data packet communication in wireless sensor networks and examining factors including compression ratio, peak signal to noise ratio, mean square error, and bits per pixel in compressed images. [1]. R Kabilan, Ravi, Jenifer, Sherine, Rajakumar, and Mini Minar (2015) said that the compression performance (CP), peak signal to noise ratio, and subjective visual quality of the image are all measured, and it is discovered that they outperform the present approach. Imaging in medicine can be done using the provided method.[2].

According to S. Raja Ratna and R. Ravi (2015) the suggested method considerably identifies suspect routes with a higher detection rate and a reduced false positive probability; it also achieves higher throughput and less delay. [3]. R.Kabilan, R.Ravi, S. Suhirtha, M. Sankara Gomathi, and S. Sofia (2019) revealed that results indicated 98 percent tracked rate on real images, faultless tracking for the generated images, and no false item recognition in any of the photos analysed.[4]. According to B. Suvitha and R. Ravi (2021) Higher production rates and improved tile quality can be ensured by using an automated defect identification and classification approach. [5].

However, it is alarming how frequently Indian farmers commit suicide. Debt, the environment, low food prices, insufficient irrigation, increasing agricultural costs, use of chemical fertilizers, and crop failure were listed as significant reasons, in order of importance. The decision of what crop to grow is typically influenced by a farmer's intuition and other immaterial variables, such as the desire to make quick money, ignorance of market demand, exaggeration of a soil's ability to support a particular crop, and so forth. It is vital to develop a system that might provide Indian farmers with predicted information so they could make informed crop decisions. This calls for the use of methane gas in intelligent farming, which is essential.

The linked work is divided into two halves, with the first section focusing on weapon-related lit-erasure and the second segment focusing on sporadic article shape recognition, which illustrates approaches that could be helpful to the investigation. The goal of the writing audit is to assess the planned contemporary tests in this area's existing programming practises and techniques. To determine the gaps in the analysis and the major problems related to this area is a common goal. Climate change is expected to result in a fall in crop yields, with the majority of developing economies—including Southeast Asia (-5%) and India (-5%)—expecting the biggest drops. The disparity in on-farm losses between locations may be partially explained by a number of factors, including infrastructure and marketing challenges, poor harvest timing, unexpectedly harsh climatic conditions, and the inability to predict crops that would be suitable for farming in such environments.

Learning networks are trained to categorize the dataset into organic, inorganic, and real estate in order to forecast the kind of soil. The most accurate result is given to the user after it compares the accuracy attained using various network learning approaches. The system will evaluate the soil quality, forecast the crop yield in accordance, and make fertilizer recommendations as necessary based on the soil quality.

Utilizes modified support vector regression, a well-known machine learning technique, and four modules to determine real-time sampling of soil parameters. The modules include an AUI for assessing real-time sensor data, an agricultural cloud, a sensor attached to a methane gas device, and others. The first module (Node MCU) is a portable methane gas sensor that also includes PH and soil moisture sensors as well as other environmental sensors. The agro cloud module has storage. The real-time data analysis module includes processing of various crops and micro plants that is advised utilizing a modified support vector machine method. The Agri-user interface is a fundamental web interface. Farmers will thus be able to decide what kinds of crops and small plants can be grown on farms using the Modified Support Vector Machine algorithm and soil attributes.

For crops, the ARIMA model is used to predict temperature, moisture content, and PH. The values from the database are used as input by the model to project the value of that particular parameter one month from now. After the projected values are given to the K-means algorithm for categorization based on pH value, k groups of crops with comparable pH values are created. Top N eligible crops are predicted using the KNN algorithm and displayed to the user.

Based on the values obtained in real-time, the Machine Learning Algorithm (KNN) determines the parameter to advise the crop that is optimal to grow in the specific field. For the purpose of crop prediction, a standard dataset that contains the minimal needs for a specific crop is kept up to date. The field where the readings are required for calculation receives the sensors. The readings are transmitted in real time to the cloud server using the DHT11, MQ2, Soil Moisture Sensor, and Light Intensity Sensor.

PROPOSED SYSTEM

The system's objective is to help farmers make informed choices as they anticipate the crops. To increase accuracy, historical temperature and humidity information from a government website is also collected and saved in addition to the live data. In addition, collected and saved rainfall data is archived. that the discipline of natural language processing is relatively new. Deep learning research is still being conducted. In order to produce confident and precise crop predictions, the project examines the field's temperature and humidity using real-time data from a DHT-22 sensor as well as previous data from a government website and/or Google Weather API, the type of soil the farmer employs, and historical rainfall data. This can be accomplished using either supervised or unsupervised machine learning techniques. Learning networks are used to train a dataset. The accuracy obtained by several machine learning algorithms is compared in order to decide the result that will be delivered to the end user as being the most correct. We use the ensemble method in the K-NN algorithm to enhanced its performance

The approach not only recommends the ideal crop, but also the appropriate fertiliser. The farmer uses a responsive, multilingual website to engage with the system.

Hardware Components:

Digital temperature and humidity sensors, such as the DHT22, are chosen for real-time temperature and humidity monitoring. This sensor has been shown to be more accurate and precise. It measures the humidity in the air using a thermistor and a capacitive humidity sensor, and it outputs a digital signal to an Arduino Uno port pin on the data pin. The DHT22 has a temperature range of -40 to 80 degrees Celsius and a humidity range of 0 to 100% RH.

To gather the historical data of a given location, such as a field, location is utilized as an input. Utilizing official websites or non-governmental software such as weather and temperature APIs and rainfall data, historical data is gathered.

The Methane gas device is set up in the field to capture real-time data. The DHT 22 sensor for temperature and humidity, coupled with an ESP8266 Wi-Fi module, make up the methane gas device. Every hour, live data is gathered and saved on the Thing Speak Cloud platform.

Both current and past data are gathered. In order to forecast the rainfall, temperature, and humidity for the time when the farmer is scheduled to cultivate the crop, the VAR (Vector auto regression) model is used to the obtained data. In order to compare the combination of the aforementioned results with the predefined data set, or the actual requirements of the crops present in the crop data store, three different machine learning (ML) algorithms—Decision Tree, K-NN, and Support Vector Machine—are given the forecasted temperature, humidity, and rainfall along with the soil characteristic entered by the farmer. Finally, the user is supplied with the crop that is the most accurate outcome after comparing the accuracy attained by several machine learning algorithms. Farmers who use the website receive the best crop as a result. Additionally, the consumer is given complete details about the crop and the ideal fertilizer.

CONCLUSION

In this study, we provide a novel method for smart agriculture that integrates the Internet of Things and machine learning, two cutting-edge technologies.Additionally, comparing several ML algorithms improves the system's accuracy. The farmers' challenges will be lessened by this approach, which will also improve the amount and caliber of their labor.

REFERENCE

[1] R Kabilan, Ravi R, Jenniefer J, Sherine R, Rajakumar G and Mini Minar V. C, "An improved VLSI architecture using wavelet filter bank for blur image applications", ARPN Journal of Engineering and Applied Sciences, vol.10, no. 6, pp. 2608-2612, 2015.

[2] Muthukumaran Narayanaperumal and Ravi Ramraj, "Quad Tree Decomposition Based Analysis of Compressed Image Data Communication for Lossy and Lossless Using WSN", International Journal of Computer, Information, Systems and Control Engineering, vol. 8 no. 9, pp.1543-1549, 2014.

[3] S. Raja Ratna, and R. Ravi, "Trust Based Suspicious Route Categorization for Wireless Networks and its Applications to Physical Layer Attack" Seas transactions on computers, vol.14, pp. 502-512, 2015.

[4] R. Kabilan, R.Ravi, S.Suhirtha, M.Sankara Gomathi, and S.Sofia, "3D object recognition and detection using surf

mapping", International Journal of Emerging Technology and Innovative Engineering, vol. 5, no. 7, pp. 555-561, 2019.

[5] B.Suvitha, and R. Ravi, "A survey on various surface defect detection techniques", International Journal On Engineering Technology and Sciences, vol.8, no.9, pp. 25-28 2021.