Farming Futures: Predicting Crop Yields With AIML & IoT

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Abstract- *"Farming Futures" carefully crafts the soundtrack to the new agriculture, using the power of the Internet of Things and intelligence to transform plants. The interface converts soil data into predictions by integrating pH, nutrient, moisture, temperature and EC sensors. The PH sensor measures the soil, the soil nutrient balance, the moisture sensor controls water, the temperature sensor measures temperature, and the EC sensor measures the heartbeat of the soil. From this perspective, the system not only predicts the right seed selection but also provides information on crop management, water needs and fertilizer quality. Water sensors can also detect water needs. The future of agriculture is a vision of agriculture combining with technology to produce high-quality crops.*

Keywords- pH sensor, nutrient sensor, moisture sensor, temperature sensor, crop yields, water requirements & precise fertilizer maintenance

I. INTRODUCTION

Agriculture is the backbone of the Indian economy, comprising 10% of India's GDP. It accounts for 18% of total revenue. India's GDP and half of the country's workforce are employed. Agriculture has transformed from traditional to modern methods, facing problems such as technology, unpredictable weather conditions, water scarcity and rapid development. These events cause its contribution to the economy to decrease. To solve these problems, the application system uses data analysis techniques to reveal hidden insights and help farmers make decisions. The integration of modern technologies such as artificial intelligence (AI), machine learning (ML) and Internet of Things (IoT) is expected to transform agriculture. Artificial Intelligence/Machine Learning and IoT technologies provide a way to change the farming process by predicting yield. Historically, farmers have relied on weather models and experience, but due to the complexity of today's agriculture, these models and experiences are often not accurate to reality. IoT devices like sensors enable AI algorithms to work by capturing real-time data on humidity, temperature, and crop health. The technology not only predicts yield but also provides information on optimum planting time, crop diversity and control of diseases and pests, allowing farmers to decide what they want to know. AI/machine learning and the Internet of Things can help inform agricultural policy and sustainable practices by collecting data from agricultural practices across regions and countries, beyond a single farm. More importantly, the integration of these technologies provides Indian agriculture with opportunities to increase productivity, reduce risk, and improve food security.

II. LITERATURE REVIEW

A. Crop planning making smarter agriculture with climate data

Data Analytics uses weather data for crop planning to improve the Smart Agriculture SARWARNANEESBEER 2017 report and provide better results for agriculture. He emphasized the use of current weather data in making crop planning decisions, which is an important factor in today's climate. Farmers can better understand resource allocation and mitigation by assimilating weather data to begin planning. The approach encourages continuous processes and recognizes the nature of agriculture. This approach, based on today's agricultural technology and an understanding of data on production and sustainability in climate change, undoubtedly gives the message that it is important for strong and profitable agriculture.

B. Prediction of major crop yields of Tamilnadu using K-means and Modified KNN

Estimation of major crops in Tamil Nadu using K-means and improved KNN In the agricultural area of Tamil Nadu [2], the agricultural area provides more than 40% of the population and estimation of crop size is important. While the world population is expected to increase, the demand for plant production is expected to increase by 60%. To overcome this challenge, accurate forecasting techniques are crucial. This method introduces a new method using K-means clustering and improved K-nearest neighbor (KNN) classification. It uses MATLAB and WEKA to identify patterns in agricultural data and predict where and when crops will grow. The results are better than traditional methods and give farmers the tools to work. The model is expected to improve agricultural and industrial production in Tamil Nadu in the face of increasing demand.

C. Classification of soil into low, medium, and high categories is done

In 2015, Monali Paul conducted a famous study using data mining to classify soil into low, medium, and high groups; This method provides a good way to understand soil in order to make good decisions about agriculture and land use. Land allocation can help remove barriers for farmers and land planners, improve resource allocation, and promote sustainable practices. This classification supports informed decisions regarding soil management that meet soil characteristics and contribute to long-term sustainability. Paul's research has greatly benefited education; and has helped stakeholders solve today's agricultural challenges and improve environmental stewardship through data insight.

D. Presents the receives on use of such ml technology for Indian rice cropping areas

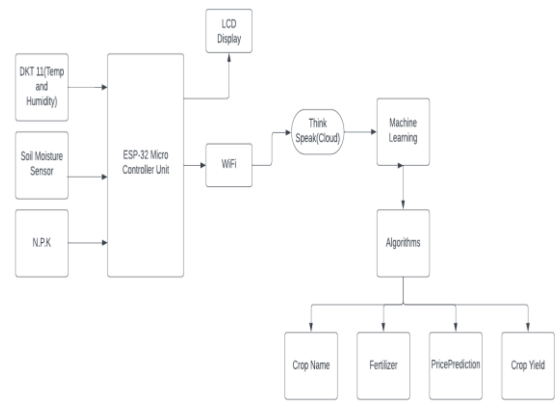
Prediction of crop yield plays an important role in agricultural sustainability and productivity, especially in a food-deficient country like India, mostly wheat, rice, and various legumes. Soil capacity is closely linked to climatic conditions and is therefore adversely affected by seasonal changes in climate, such as drought conditions, which can result in reduced low-key crops. Addressing these issues requires the development of technology to predict crop productivity in different climates, allowing farmers and stakeholders to make agricultural decisions and crops. This article takes an in-depth look at how machine learning techniques can be used to predict crop yields in India's growing regions, focusing on the state of Maharashtra.

III. EXISTING SYSTEM

Once a sample is taken from a soil testing facility, data must be analyzed immediately. If the person performing the soil test performs the test, he collects the samples himself. You will receive enough letter after letter. An ambiguous example should be discarded. Sample dryness: Samples collected from the laboratory will be wet. These precautions should be taken to check the identity of each sample at every stage of preparation. Post-drying care: After drying, the samples are taken from the main laboratory to a separate preparation room. Air-dried samples were ground with a wooden pestle and mortar to break up soil aggregates but not disturb the soil.

IV. PROPOSED SYSTEM

The program uses a good method to predict crop yield and uses the Naive Bayes algorithm to recommend how much fertilizer should be used to get the right crop. Data mining techniques based on historical weather and crop data have produced predictions that will increase crop yields. Farmers need a decision-making process to determine the land and crops they will grow.



Merits

- Factors like climate and location of market and planting area are taken into consideration
- The market price of the cultivated crops after harvesting is considered.

Objectives of the Proposed System

- Provide the farmer with the yield of a crop based on land area, rainfall, temperature, and district using machine learning.
- Predict the future market price of crops by taking previous crop price and predicted yield data into consideration.

V. METHODOLOGY

1. **The Data collection:** They collected data on growing season, area, and yield (in hectares) and analyzed them at WEK using various algorithms. The characteristics of the grown products are also taken into account. - prize. The goal of the program is to use machine learning to provide farmers with crops based on soil, rainfall, and temperature. To predict future crop market value by taking into account historical crop prices and yield forecast data.
2. **Method and data collection:** Materials: Nitrogen, phosphorus, and potassium values, moisture, temperature,

and moisture content of the soil. Equipment: Use sensors to measure these parameters.

3. **Controller:** ESP32 microcontroller used to interact with sensors and collect data. Data transmission: Communication: ESP32 is responsible for sending data back. Display: It even uses an LCD screen to display prices. Cloud integration: Data is sent to the cloud for storage and analysis.
4. **Cloud storage: Platform:** Use a cloud platform to store information (I want to talk about this). Database: Store information in a structured format for easy access and analysis. AIML algorithm: Input processing:
5. **AIML algorithm processes** data input from the cloud. Training: Train the algorithm based on the dataset, the learning model, and the relationship between the input and the desired outcome. Prediction: Algorithms predict outcomes or provide insights based on learned patterns.
6. **Advertising and Marketing: Decision:** The system makes decisions or recommendations based on the results of the AIML algorithm.
7. **Automation:** Depending on the application, the system can perform tasks such as cleaning water, food or sending alarms.

VI. REQUIREMENT SPECIFICATION

A. Hardware Requirements:

- Arduino - ATmega328 Microcontroller
- Moisture Senser SA SM01
- Temperature & Humidity sensor
- NPK sensor

B. Software Requirements

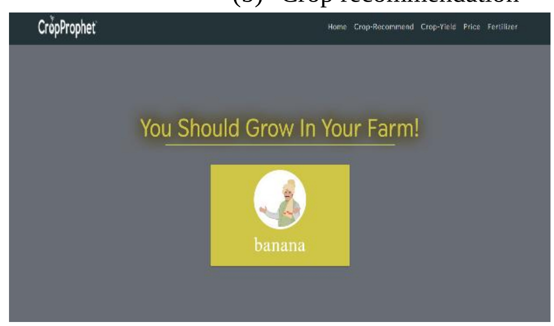
- Thinkspeak
- Python – Anaconda Jupyter

VII. RESULTS

a) ThingSpeak cloud storage

(a) Home page

(b) Crop recommendation



(c) Result for crop-recommended

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