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RECOMMENDATION FOR AGRICULTURAL CROP BASED ON SOIL USING IOT AND ML

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Abstract: Many nations' economies are based on agriculture, and soil is its most crucial component. There are various types of soil, and each type has various characteristics for various crops. Today, several techniques and models are utilized in this industry to boost the yield of the crops. Therefore, the main goal of this system is to develop a model that aids farmers in determining which crop to plant in a specific type of soil. We are utilizing machine learning techniques in this system to suggest crops based on soil categorization or soil series. The model merely recommends soil types, and depending on those types, it can recommend appropriate crops. Various classifiers are employed in this, and as a result.

Keywords: Machine Learning; Agriculture; Soil types; recommend appropriate crops

I. INTRODUCTION

A fundamental process needed for farming is soil monitoring. Land covers 26% of the surface of the Earth. Every human being resides on the sturdy, earthbound Earth. Natural matter and inorganic mineral particles of varying sizes and arrangements make up soil. About half of the dirt's volume is made up of the particles. The remaining volume is made up of pores that contain both air and water. Temperature, moisture, mugginess, and light are important factors that should have been measured in the dirt. The agriculturalists used to see the soil and develop the necessary harvest in long-gone times; therefore, they do not precisely know the conditions for testing the soil. After the soil testing labs at that point.

II. RELATED WORK

[1]2020 Crop Prediction Based on Machine Learning with Classifier Assembling for Soil Classification Many nations' economies are based on agriculture, and soil is its most crucial component. There are various types of soil, and each type offers unique characteristics for various crops. Modern techniques and models are utilized in this industry to boost the yield of the crops. Therefore, the main goal of this system is to develop a model that aids farmers in determining which crop to plant in a specific type of soil. We are utilizing machine learning techniques in this system to suggest crops based on soil categorization or soil series. The model just recommends soil types, and depending on the type of soil, it can recommend compatible crops. Various classifiers are utilized in this, and the model is based on them. This method has been developed to suggest crops based on soil categorization and assembling classifiers. Bagged trees, naive artificial neural networks, and The Bayes, Adaboost, and Support Vector Machine (SVM) algorithms are integrated to enhance the system's accuracy in providing a list of suitable crops based on the soil type. The system is not advised because the accuracy offered by the combination of all the machine learning techniques utilized here is rather low.

[2] Machine Learning for Smart Crop Prediction, 2021- A significant economic engine is agriculture. It is essential for a robust biosphere. In practically every facet of life, agricultural products are used. Farmers must adapt to climatic change while supplying more food with improved nutritional value. The farmer must be aware of the climatic conditions in order to increase crop output and growth, which will help it choose the best crop to grow in those conditions. IoT-based smart farming enhances the overall agricultural system by continuously monitoring the field. It provides a crystal-clear real-time observation while controlling numerous parameters including humidity, temperature, soil, etc. In the agricultural industry, machine learning is utilised to increase crop quality and productivity. Utilizing suitable examples. The use of algorithms on sensed data can aid in crop recommendation. The lack of usage of sensors for soil moisture, the climate, or pH may have increased the accuracy of crop prediction.

[3] Crop Prediction Using Machine Learning and Soil Properties for Smart Farming, 2022 The primary challenge facing farming in our nation is that the proper perception of the health of the farm and schedule showers. The goal of this concept is to compare the ability of IoT processes to poverty in these regions, in addition to the requirements recognised for these items and with a focus on agriculture. In order to increase the supply of the commodities in the region, this study

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deconstructs examples of IoT. Our article seeks to offer advice on regression and machine learning models, a summary of concerns regarding determining a model's accuracy, and suggestions for how to explain a model's findings. Based on the qualities of the soil, this article makes a crop prediction. Implementation provides the expected crop as well as accuracy and error rates for several regression models on the provided dataset. Both decision tree and random forest produce impressive results for crop prediction. This suggested work displays the graphical representation accuracy, MAE, MSE, and RMSE based on temperature values, soil moisture levels, and pH readings as per the provided dataset. Classifications like "strongly acidic," "moderately acidic," "slightly acidic," and "alkaline" did not predict crops with more classifications like "strongly acidic," "moderately acidic," and "alkaline."

[4] The most significant component of India's GDP is agriculture, which provides the primary source of income for over 58 percent of the country's population. Digital Agriculture System for Crop Prediction Based on Machine Learning, 2022 Indian agriculture is entirely based on the financial benefits from crop yields, however today's agricultural generation has failed to verify adequate crop choosing methods and to boom crop yield across the entire country of India. Therefore, a decrease in crop yield will make farmer's financial health more problematic. As a result, it will become our agricultural region's most pressing problem to develop such a noble method to promote the most suitable crop for a given place. We have utilised a device learning method to reap high-quality acceptable crop demand for regions based on factors like soil characteristics, rainfall, and weather.

Lack of knowledge or lack of guidance while farming is a secondary problem. Indian farmers may employ ineffective traditional farming methods or wrong ones due to a lack of direction. Because the majority of farmers lack education and have non-technical backgrounds, they will rely on traditional crop selection and agricultural practises, which results in a justifiable loss. We forecast crop disease and recommend taking precautions against specific illnesses with the help of a disorder evaluation tool. The final and most significant issue is the lack of a proper market evaluation concurrent with the development of any particular crop, which can also contribute to a cheap shortage of farmers. Creates a support vector machine technique for categorising environmental characteristics such as soil types with NPK values, a dataset of rainfall over the past ten years, and a dataset of temperature. Based on information about rainfall, soil types, and temperature, the trained model is built. We get the most suitable crop selection from the trained model. lacks the use of cutting- edge technology like the Internet of Things and supervised machine learning algorithms, which makes it unable to offer accurate and quick results.

III. PROPOSED ALGORITHM

A. Design Considerations:

- The color sensor is used as a nutrition monitor. A detecting sensor with a light source of four LED sand a photodiode for detecting light. the LEDs' illumination falls to the ground, absorbs, and then is reflected back.
- The Eight-by-eight arrays are connected to the TCS3200 color sensor comprising four completely different photodiode filters. By choosing the photodiode filter readings appropriately, we will be able to identify each color's intensity in the spectrum.
- The food source absorbs the photodiode and LED's light source convert the remainder of the reflector's reflected light (example) current.
- The photodiode readings and findings are converted by the color sensor's current-to-frequency converter into a square waveform with a frequency that is directly related to the color of the signal, proportionate to how bright the color of choice is.
- The Arduino then reads this frequency. The data from the color sensor is finally transformed to digitally readable form using an Arduino microcontroller. The current approach contains an NPK kit that uses a liquid soil sample, but this research uses solid soil samples for detection because it is more practical.
- This will serve as a suggested remedy for the next-generation cropping system, which will increase crop production's economic viability. Initial battery energy (IBE) is 50Jules for each node.

B. Advantages of the Proposed Algorithm:

Propose soil monitoring system that easily identifies the measure soil nutrients and moisture.
To help farmers to know the cultivable land
To know which crop is suitable with given soil parameter
To make the soil testing easier and simpler

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IV. PSEUDO CODE

To check NPK value and soil moisture sensor

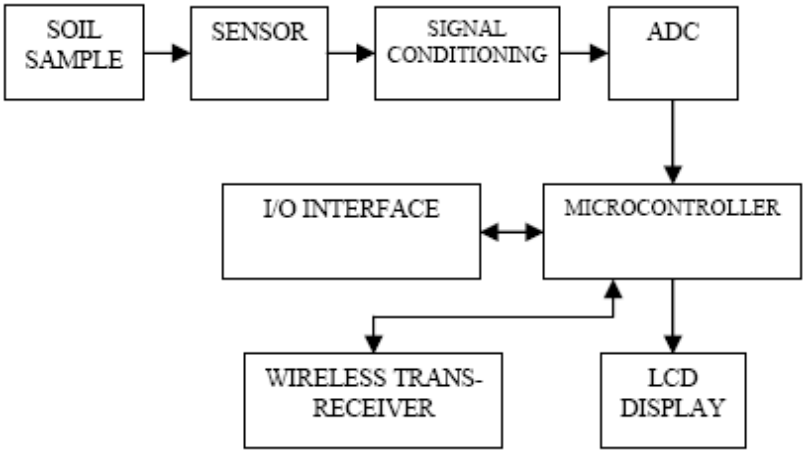
Step 1: dilute the soil and keep it near the color sensor
Step 2: check the NPK values of soil
Step 3: Keep the soil moisture sensor into the soil, to check the moisture in the soil
Step 4: if the soil is not moist then the water flows automatically into the soil else the is off

Software part to check the crop

Step 1: enter the NPK value that is read by the hardware
Step 2: select the crop to put in the field
Step 3: software displays the NPK value need for the crop according to the soil that user had checked
Step 4: message is sent to the user

V. SIMULATION RESULTS

The simulation studies involve designing the system which is useful for the agriculture. The nutrient sensor, analog moisture sensor, should be kept in the soil of two samples i.e., one with chemical pesticides and another with compost which has to be tested. Each sensor is separately connected to the Arduino transmit the information on about the parameters. This Arduino Module sends the information to the cloud then the user can see the soil parameter information on the mobile phone as well as laptop using web browser in the form of graph. On the basis of this soil parameter, we will get which crop is suitable with such soil parameter.



VI. CONCLUSION AND FUTURE WORK

We have integrated the IoT and machine learning-based agricultural crop recommendation system into this system. The method can forecast the optimal outcomes with great accuracy.an appropriate crop for the provided soil sample. The system's increased viability and decreased time requirements enable the farmers to anticipate consistently higher yield.

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