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CROP CULTIVATION FORECASTING USING MACHINE LEARNING

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ABSTRACT - The primary sources of income in rural India are unquestionably agriculture and its linked sectors. Another important contribution to the nation's Gross Domestic Product (GDP) is the agricultural industry. The enormous scale of the agriculture industry is a blessing for the nation. In contrast to worldwide norms, the crop output per acre is unsatisfactory. This is one of the likely reasons why India's marginal farmers commit suicide at a higher rate than other farmers. This initiative offers farmers a practical and approachable yield prediction method. Through a web application, the suggested system connects farmers. The area, the type of soil, and a few environmental characteristics are supplied by the user. The Random Forest provided the most accurate results.

1.INTRODUCTION

Most emerging nations relied heavily on agriculture as a source of income. The field of modern agriculture is constantly expanding in terms of farming methods and agricultural advancements. Farmers find it difficult to meet the changing needs of the earth as well as those of businesses, consumers, etc. Farmers must deal with issues like

(i) climate changes brought on by soil degradation and industry pollution.

(ii) Reduced crop growth can be brought on by nutrient deficiencies in the soil, which is brought on by a lack of essential minerals including potassium, nitrogen, and phosphorus.

(iii) Farmers makes a mistake when they consistently grow the same crops without attempting new varieties. The research aims to find the best crop prediction model that can assist farmers in selecting the right crop to grow based on climate factors and soil nutrient levels. This project makes use of the well-liked and accurate Random Forest Classifier algorithm. The project's overarching goal is to use the most accessible technology, including the web, to provide direct advising services to even the tiniest farmer at the level of his or her smallest plot of crop.

This project was created for the situation in Tamil Nadu State, where average holding sizes are far less than those in the rest of India. Therefore, this model can only be used elsewhere in India with some adjustments.

The term "Random Forest algorithm" may be used to refer to an ensemble of call trees. Every tree offers a category selection to categorise a replacement object's supported attributes, and we say the tree votes for that class. The major goal of this project is to assist farmers in improving agricultural output, preventing soil erosion on cultivated land, reducing the use of chemicals in crop production, and making optimal use of water resources.

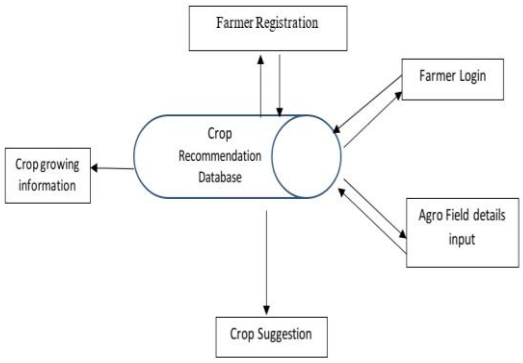

fig: Flow Diagram

2.EXISTING SYSTEM

Increasing farm output and providing it to consumers at the best price and quality is the largest issue in agriculture. A few Machine Learning algorithms have been used in the agriculture sector of the current system to advise crop cultivation. Using the support vector machine (SVM), K-nearest neighbour (KNN), and naive bayes (NB) algorithms,

2.1 Drawbacks of Existing System

crop plantation suggestions were made for the current system. All of these previous studies had the flaw of focusing on just one factor either the weather or the soil to determine whether crops would grow well. Despite

numerous new solutions being put out, there are still unresolved issues with regards to developing a user-friendly application for crop recommendation.

3.PROPOSED SYSTEM

The major goal is to increase the range of crops that can be cultivated throughout the season. The proposed system will reduce the challenges farmers experience when deciding which crop to cultivate. In this project, we put up a model that fixes the problems that are now present. The new aspect of the suggested approach is that it gives farmers instructions on how to increase crop yield while also recommending the most lucrative crop for a given area.

The suggested approach allows for crop selection based on environmental factors, with the goal of maximising crop production in order to fulfil the nation's rising food demand. The suggested Random Forest method forecasts the suggested crop plantation by looking at variables like rainfall, temperature, area, season, soil type, etc. The technique aids in choosing the ideal time to apply fertilisers.

The user enters the type of soil and the area that is being farmed. The model makes a prediction about the crop production for a particular crop based on the demand. The algorithm also proposes the most lucrative crop to grow and the ideal fertiliser application window.

3.1 ADVANTAGES OF PROPOSED SYSTEM

The suggested model suggests crop plantations based on the data sets from the specified area. By raising yields and maximizing the use of available resources, integrating agriculture and ML will help the agriculture sector go further.

The most important factors in predicting present performance are historical data. The approaches in the suggested system include boosting agricultural yield, real-time crop analysis, choosing effective parameters, making wiser judgements, and improving yield.

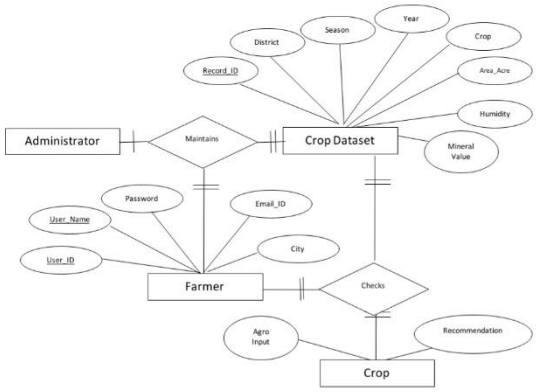

Fig: ER Diagram

4. REPORTS

This report it shows the correct crop for plantation on perfect soil according to the farmers information and that are followed by the data set which admin has collect and uploaded in database. Which are maintained frequently on user's demand.

4.1 Data Collection

In this model, the administrator will log in to this module to update the necessary information about crop cultivation. The Kaggle website has provided the datasets. 2000+ instances of data or data that were extracted from historical data are included in the data collection. The dataset includes variables including soil PH, humidity, temperature, rainfall, and several elements like nitrogen (N), phosphorus (P), and potassium (K). This dataset contains data on more than 80 distinct crops in the Comma Separated Value (CSV) format, including Bitter Gourd, Radish, Plums, Garlic, Turmeric, Mango, Small millets, Ash Gourd, Samai, Cashewnut, Potato, Other Kharif pulses, Onion, Ragi, Pear, Water Melon, Lab-Lab, Soybean, Cardamom, Yam, etc. The dataset files have been submitted to the database server by the project's administrator.

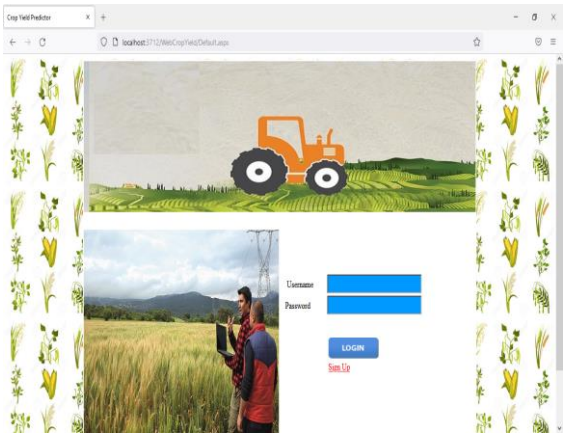

Fig: login page

4.2 Pre-Processing (Null Removal)

Pre-processing is necessary for the application to run successfully. The information obtained from many sources is occasionally in raw form. It might include some conflicting, redundant, or incomplete data. As a result, such missing value data needs to be filtered in this step. This method can be used on a feature that contains numerical data by substituting Mean. We can compute the feature's mean and substitute the missing values for it.

4.3 Farmer Registration & Login

Farmers will register and log in to this web application in this module. To receive the crop recommendation, registered farmers must enter the characteristics of their agricultural field.

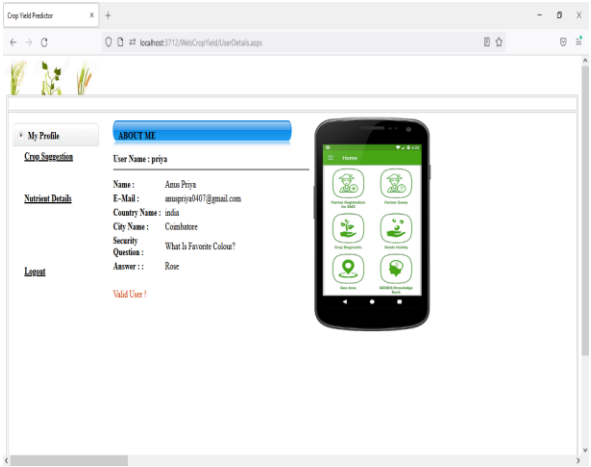

Fig: farmers registration page

4.4 Crop Forecasting using Random Forest (RF) algorithm.

An algorithm for machine learning is called Random Forest. Numerous decision trees are created during the training phase, and the output is then separated into classification and prediction categories depending on the number of classes.

The accuracy of the forecast is inversely correlated with the number of trees. The dataset covers elements like precipitation, perception, temperature, and production. These dataset factors are used for training. We used Random Forest in our model to import data, create random forest trees, and fit our data for crop recommendation.

4.5 Farmer Helpdesk

In this module, the administrator will provide links to numerous websites that will assist farmers with right crop cultivation. Once the user fills the data in the form box it suggested the Farmer that what crop the farmer can grow in his land according to the dataset in machine learning.

Fig: option field

5.RESULTS

Result.1: Crop recommendation without categorical attributes

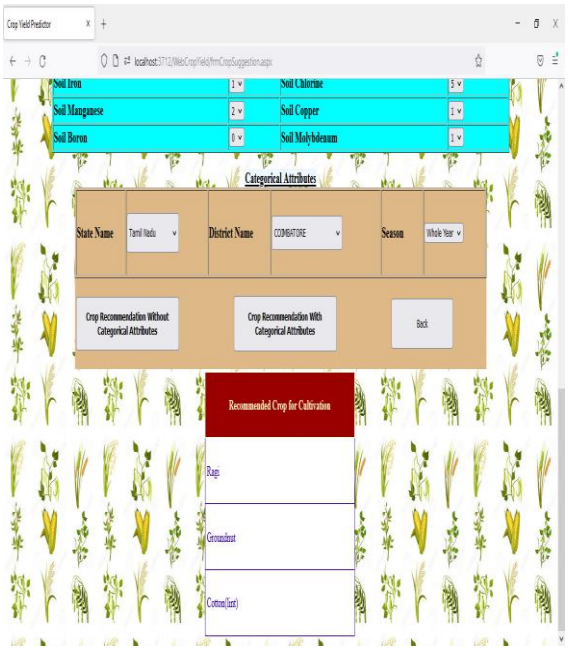

Fig: result 1

Result.2: Crop recommendation with categorical attributes

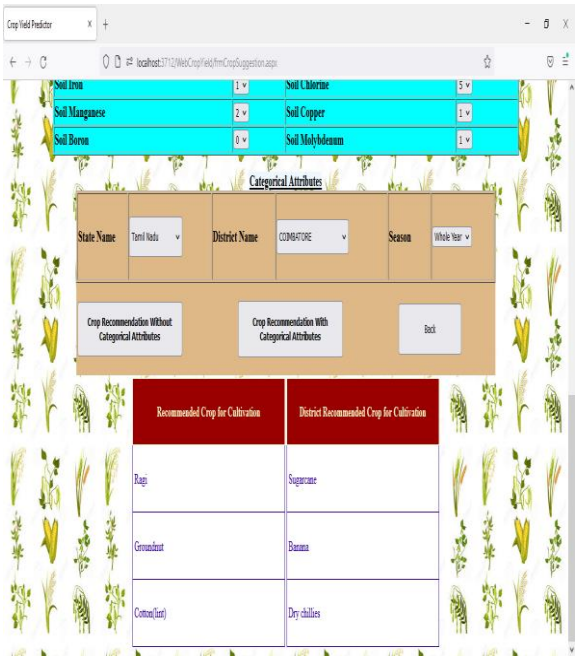

Fig: It shows what crop farmers can grow in his land.

6.CONCLUSIONS

A smooth transition from the old system to the new system was typically offered by new systems, and they also helped users deal with common startup issues. Thus, the "Crop plantation suggestion" is put into practise during the implementation phase. The operational system that will move into the life cycle's operation and support stage is what the implementation phase delivers.

In this project, we created a web site for farmers that would assist them in receiving advice on crop cultivation techniques, particularly for the services of recommendation and knowledge of crop yields obtained using the Random Forest Algorithm. In this project, we successfully proposed and implemented a system that recommends intelligent crops to farmers across Tamil Nadu. This system will assist farmers in making informed decisions about which crop to grow based on parameters such as Season, Crop, Area-In-Acre, Production, Temperature, Moisture, Rain Fall, and minerals such as Carbon, Oxygen, Hydrogen, Nitrogen, Phosphorus, Potassium, Calcium, Sulphur, Magnesium, Iron, Chlorine, Copper, and so on. Farmers can boost productivity in the country and profit from this strategy by using this programme. Farmers can then plant the appropriate crop, enhancing their production and the country's overall profitability. the periodically updating the datasets in order to create reliable predictions, and the processes can be automated. Another feature that will be developed is the provision of the appropriate fertiliser for the crop and area. To put this into action, a full analysis of available fertilisers and their relationships with soil and climate is required. It is necessary to do an examination of the available statistical data.

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