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Abstract—

Agriculture is undoubtedly one of the largest sectors of India and is considered as the backbone of India. The country's Gross Domestic Product is also Significantly influenced by the agriculture industry. This is one of the likely reasons why marginal farmers in India commit suicide at a higher rate. Two of the main reasons for the failure of achieving required yield are plant disease and lack of knowledge about the suitable crop. AgriSense is a recommendation system uses Machine Learning Algorithms which include the parameters such as rainfall, temperature, soil type and Nutrients like Nitrogen, Phosphorus and Potassium. This Model also uses the Google Translate API.

Keywords—

Machine Learning, Google Translate API, Crop Recommendation System, Fertilizer Recommendation System.

I. INTRODUCTION

Agriculture plays a vital role in India, where it cultivates different crops for the sustainability of living beings. India stands largest in the world in respect of area under cultivation. Mainly, it produces rice and wheat in higher quantities and not only that, it also produces many other crops like gram, Moong, Maize, cotton, coffee, barley and so on. India stands as the world's five largest producer of over 80 percent of agricultural produce items, like cash crops such as sugarcane, cotton, jute, oilseeds, and tobacco. When we see the Indian statistics of agriculture, the total food grain production in the country is estimated at for a record 3296.87 Lakh tons, which is higher by 140.71 Lakh tons than the production of food grains of 3156.16 Lakh tons achieved during 2021-22.

Even though we are the second largest in the world of cultivating rice and wheat crops we have some issues in producing enough food for more than 1 billion people. There are some queries raising on, why the food is not produced globally. Many other developing countries are prone to drought this is the main reason why the food is not produced globally and there are other factors like climatic changes, global warming, and population growth. So, to improve the production or quantity of the food we need to improve the soil quality and water resource management (WRM) i.e., rainwater harvesting system. These are some improvements that are manually done. In this era, we can see a faster development of technology. so the technology can be used in the development of agriculture sector.

In the existing scheme GPS was used to take the weather report to cultivate the crops. But there is an issue using GPS i.e., we cannot get accurate values due to some climatic changes like signal failures due to buildings, Extreme atmospheric conditions like geometric storms and battery failure.

So, in this paper an attempt is made to help the agriculture sector with the help of technology to predict the recommended crop name and recommended fertilizer based on the crop name depending on various factors by providing a data which gives us the accurate value the various factors consist of temperature, pH, rainfall soil color, nitrogen, phosphorus, potassium. All the models are integrated to a website. The model that we used in our website is machine learning model where it applies random forest algorithm. The model gives us the crop name to get the best yield. Also, by using Google



translator API our website provides 10 different languages such as Telugu, Tamil, Hindi and so on, so that this website reaches every corner of India and it can be easy to access the website easily.

II. LITERATURE SURVEY

Literature survey is an overview of the recent well-known projects which have similarity with the “Crop and Fertilizer prediction system”, which uses the most widely used technology, machine learning. The applications that are similar have used various domains such as machine learning, deep learning, artificial intelligence etc. for recommendation.

The paper [1] is “CRAP CSS-Crop Recommendation and Pest Control Suggestion System”. In this paper, a crop recommendation system is developed by taking inputs such as temperature, rainfall and humidity as input and using the Support Vector Machine algorithm for recommending the best crop. Also, the same algorithm is used for suggesting best pest control methodologies based on user requirements.

The goal of the study [2] Machine Learning Based Crop Recommendation System” was to use a Machine Learning approach for recommending the best crop which is suitable according to the given conditions. Scikit-learn is a library of Python which was used for training and testing of the model. Logistic Regression, Support Vector Machine and Random Forest Algorithm were used for classification purposes and a comparison of the results produced by the three algorithms was given in the paper.

Another important work checks the soil quality and predicts the crop yield along with a suitable recommendation of fertilizers [3]. The Ph value and the location from the user were inputs used in this model. An API was used to predict the weather, temperature for the current place. The system used both supervised as well as unsupervised ML algorithms and compares the results of the two.

In [4] predicts the crop yield for the specific year with the help of advanced regression techniques like Enet, Lasso and Kernel Ridge algorithms. The Stacking regression helped to enhance the accuracy of the algorithms.

Rainfall and temperature are two factors which influence the crop yield. Recurrent Neural Network (RNN) and Long Short-Term Memory (LSTM) algorithms applied on these time series data to enhance the accuracy [5].

The other system [6] of IoT and ML is enabled for soil testing using the sensors, is based on measuring and observing soil parameters. This system lowers the probability of soil degradation and helps maintain crop health. Different sensors such as soil temperature, soil moisture, pH, NPK, are used in this system for monitoring temperature, humidity, soil moisture, and soil pH along with NPK nutrients of the soil respectively.

Another paper [7] is a system where machine learning can be used in agriculture for the betterment of farmers. The aim of the project is adding more attributes to our system and ameliorate the results, which can improve the yields and we can recognize several patterns for predictions. This system will be useful to justify which crop can be grown in a particular region.

III. PROPOSED SYSTEM

Through the proposed model, we overcame the disadvantages of the existing model by using: Based on several factors, including nitrogen (N), phosphorus (P), potassium (K), and humidity, the system will advise the best crop for the given site. After analyzing various algorithms like KNN, Decision Tree, Random Forest, SVM etc. based on various accuracy levels the system showed better results with random forest algorithm implementation. The model allows to train upon large dataset and the performance of the recommendation system is measured using accuracy score. Finally, Using the trained model the system is going to predict suitable crop for land according to the given parameters. The proposed approach can be helpful for farmers, researchers, and policymakers in making informed decisions regarding crop management and planning.

DecisionTrees's Accuracy is: 85.43123543123544
 KNN's Accuracy is: 0.9079254079254079
 SVM's Accuracy is: 0.9708624708624709
 RF's Accuracy is: 0.9906759906759907

Fig 2 : Accuracy Of Different ML Algorithms

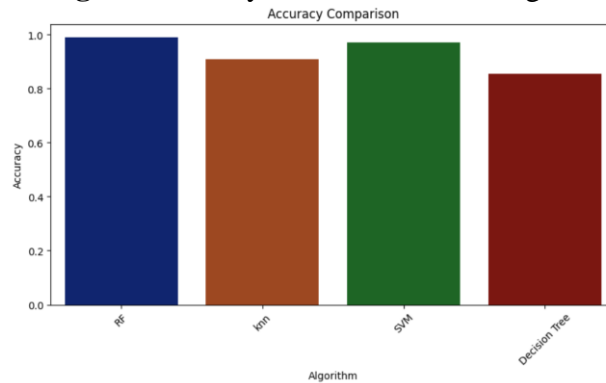


Fig 3 : Accuracy Vs Algorithm

The system takes several factors into account such as soil type, climate, rainfall, temperature, humidity, and pH levels to determine the most suitable crops for a given region. By analyzing historical data and using predictive models, the system provides personalized recommendations tailored to the specific conditions of a farm or agricultural area.

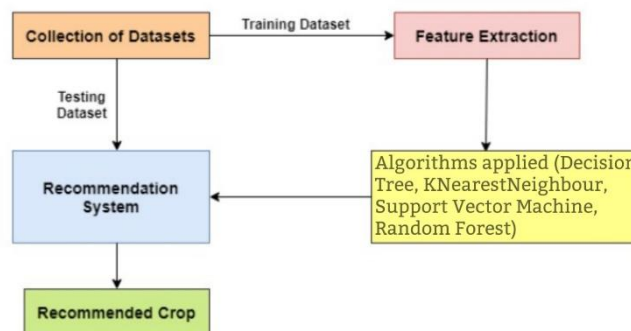


Fig 1 : Block Diagram of Overall Methodology of Proposed System

The above figure shows the overall methodology of how the proposed system collects, trains and uses the data in order to give the best recommended crop to the user.

The proposed models use the dataset which contains the parameters as Region, Rainfall, Temperature, PH, Nutrients like Nitrogen, Phosphorus, Potassium, Crop Name, Fertilizer Name and soil color. The dataset of the proposed model is as shown below:

	Soil_color	Nitrogen	Phosphoru	Potassium	pH	Rainfall	Temperatu	Crop	Fertilizer
1	Black	75	50	100	6.5	1000	20	Sugarcane	Urea
2	Black	80	50	100	6.5	1000	20	Sugarcane	Urea
3	Black	85	50	100	6.5	1000	20	Sugarcane	Urea
4	Black	90	50	100	6.5	1000	20	Sugarcane	Urea
5	Black	95	50	100	6.5	1000	20	Sugarcane	Urea
6	Black	100	50	100	6.5	1000	20	Sugarcane	Urea
7	Black	75	55	105	7	1100	25	Sugarcane	Urea
8	Black	80	55	105	7	1100	25	Sugarcane	Urea
9	Black	85	55	105	7	1100	25	Sugarcane	Urea
10	Black	90	55	105	7	1100	25	Sugarcane	Urea
11	Black	95	55	105	7	1100	25	Sugarcane	Urea
12	Black	100	55	105	7	1100	25	Sugarcane	Urea
13	Black	75	60	110	7.5	1200	30	Sugarcane	Urea
14	Black	80	60	110	7.5	1200	30	Sugarcane	Urea
15	Black	85	60	110	7.5	1200	30	Sugarcane	Urea
16	Black	90	60	110	7.5	1200	30	Sugarcane	Urea
17	Black	95	60	110	7.5	1200	30	Sugarcane	Urea
18	Black	100	60	110	7.5	1200	30	Sugarcane	Urea
19	Black	75	50	115	6.5	1300	35	Sugarcane	Urea
20	Black	80	50	115	6.5	1300	35	Sugarcane	Urea
21	Black	85	50	115	6.5	1300	35	Sugarcane	Urea
22	Black	90	50	115	6.5	1300	35	Sugarcane	Urea
23	Black	95	50	115	6.5	1300	35	Sugarcane	Urea
24	Black	100	50	115	6.5	1300	35	Sugarcane	Urea
25	Black	75	55	100	7	1400	20	Sugarcane	DAP
26	Black	80	55	100	7	1400	20	Sugarcane	DAP
27	Black	85	55	100	7	1400	20	Sugarcane	DAP
28	Black	90	55	100	7	1400	20	Sugarcane	DAP
29	Black	95	55	100	7	1400	20	Sugarcane	DAP
30	Black	100	55	100	7	1400	20	Sugarcane	DAP

IV.RESULT OF PROPOSED SYSREM

The Crop Recommendation System uses the Machine Learning Techniques to predict the accurate crop and fertilizers for the given parameters like Nitrogen, Phosphorus, Potassium, Rainfall, PH, Temperature and Soil color. The models are integrated to websites which developed in visual studio code using the Python programming language. This model is used to predict the crop and fertilizers based on many factors. The below figure shows the homepage of the website.

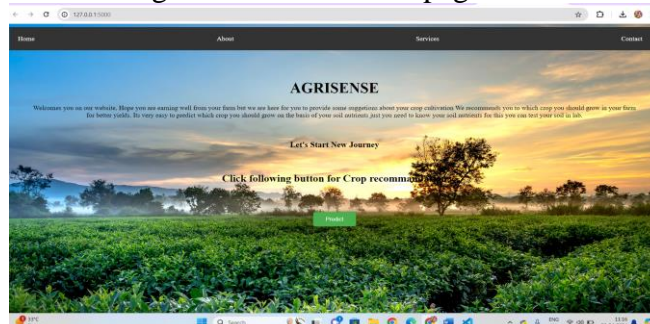


Fig 4 : Home Page of AgriSense

If the user chooses to get the crop recommendation, then it will be redirected to the below page. This page gives the crop that is suitable for the given parameters. The parameters include Nitrogen, Phosphorous, Potassium, Temperature, Soil color, pH and Rainfall which gives the suitable crop and fertilizer recommendation so that the user can easily get access the crop name that should be cultivated based on the given conditions.

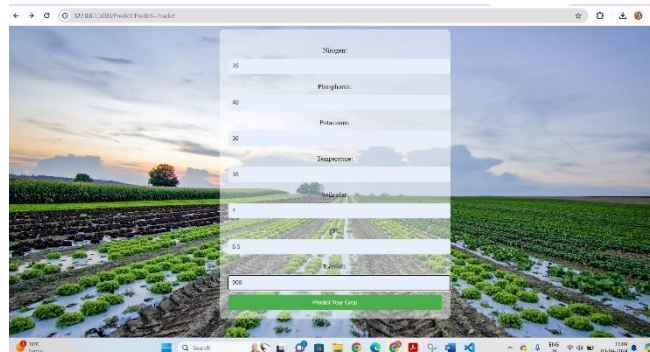


Fig 4 : Website for crop Prediction

After entering the values in the fields of crop prediction webpage it will be redirected to the results page. The result Page of the website will display the crop name along with the image of the crop. The

below figure is the output of the crop recommendation system.



Fig 5 : Output For Crop And Fertilizer Recommendation System..

V. CONCLUSION

This website was built to help the farmers in order to get the better crop yield. The website was built on two main features which are the best crop recommendation and the type of fertilizer usage to increase the crop yield. For getting the best crop and fertilizer recommendation a machine learning model was developed using the Random Forest Algorithm which is achieved an accuracy of more than 95 percent. These algorithms are integrated into a website using the Virtual Studio Code Environment. Also, with the help of Google Translator API the user is provided with an option to translate the webpage into ten different languages. This Model helps to reduce the suicide attempts of the farmers and increase the crop yield.

VI. REFERENCES

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