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Crop, Fertilizer and Pesticide Recommender System using Machine Learning

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ABSTRACT:
Agriculture is a major sector of our country economy. The main problem facing farmers in real life is that they do notthe right crop according to their soil requirements. Because of this, they face low yields. This kind of problem affecting farmers is solved with the help of precision farming methods..In this project, we build an intelligent system that helps Indian farmers make informed decisions about which crops to grow based on soil pH values using machine learning algorithms.This project aims to predict the best crops based on soil pH valuessuch as weather, nitrogen, phosphorus, potassium, temperature, rainfall and moisture. It also predicts insecticides by the amount and type of pesticides to be used.Reasons include climatic conditions, debt, family problems, and requent changes in soil pH values.Our project mainly focuses on testing soil fertility to determinesuitable crops for growing based on soil type and recommending appropriate fertilizers and pest control products to maximize production.

I. INTRODUCTION

Agriculture is one of the most important occupation to many people inIndia.For india the largest economic sector and plays a vital roleinoverall development of the country.About 60 % of the land in the country is used for agriculture inorder to sufficent the needs of 1.2 billion people.In present times modernization techniques of agriculture is very important andthus will lead the farmers of our country towards profit.The boundaries ofagribusiness resources vary from site to site and from rancherto rancher. Placing such information in a large space can be atedious task. However, in the Republic of India the natural statedata collected for every square meter of the different regions ofthe region is codified by the Department of Motor Vehicles of India.This huge set of information can be used to predict the impact onsignificant yields of a particular area or point. It has acompletely unique forecasting procedure created and evaluatedby experts around the world in agriculture or related sciences.

II. LITERATURE REVIEW

[1] VIRENDRA PANPATIL ET :

It had accomplished enormous work for Indian ranchers by making productiveyield proposal framework. They created framework utilizingclassifier models. The proposed framework can be utilizedto figure out best season of farming, development of crop and crop reaping. They utilized distinctive classifier foraccomplishing better exactness for instance: Decision treeshows less precision value. The best favorable position of framework that it canwithout much of a stretch versatile all things considered and utilized to test on various yields.

[2] MAYANK ET :

User Interface, increment the precision value of crop yield forecast, investigate distinctive climatic boundaries, for example, overcast cover, precipitation, temperature, and so on In the proposed framework they zeroed in on maharastra State for implantation,information gathering they utilized government web site. For crop yield forecast they utilized calculations, for instance, Random Forest Algorithm and for convenience they created website page so it will be easy to use for every person.

III. PROBLEM STATEMENT

Machine Learning based on prior crop prediction, soil quality analysis to achieve high crop yield through out technology solution. The main problem is that farmers are unable to get good

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result by using traditional and unscientific methods to select the best crop for their land. With available resources, we proposed a system that can focus on this problem by providing predictive crop advice information based on machine learning algorithms trained on important environmental factors and elements present in the soil. The main objectives of this project is to predict crop yield which can be extremely useful to farmers in planning for harvest and sale of grains. Implement a machine learning algorithm to predict more than crops suitable for that region and crop seasons in our country. The project aims to predict crop yields based on location and weather data. The purpose of this study is to study predictions of crops that will provide high yields at given locations, taking into account climatic and soil parameters.

IV. EXISTING SYSTEM

Various experiments are planned to address the question of culturalrecommendation system development using different approaches.Our project mainly include different machine learning algorithms like KNN, SVM, ANN, RandomForest, Naive bayes, etc.

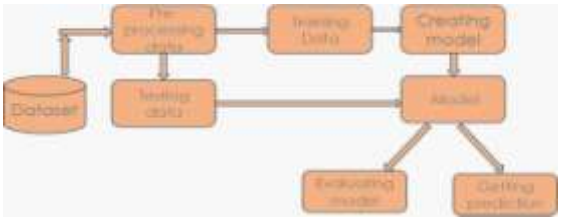
ADVANTAGES :

A supervised classifier can perform tasks which linear program cannot. It works even in the presence of noise with good quality output.

DISADVANTAGES :

Based on the assumption that features have the same statistical significance. Time taken for the process is larger.

V. SYSTEM ARCHITECTURE:



VI. METHODOLOGIES:

Give the value of nitrogen, phosphorus, potassium and pH value. We already trained the dataset. Our value compared to dataset and finally result will displayed what crop we cultivated that particular place

1) Collection of datasets
2) Pre-processing
3)Creating Model
4)Evaluation of Model
5) Crop Recommendation

1) Collection of datasets:

The dataset that is collected consists of variousparameters that includes Nitrogen,Phosphorous,Pottasium,PH value of soil, Humidity, Temperature and Rainfall. Thedatasets we have picked from the Kaggle website.The data set having more than 2200 cases or dataextracted from historical data. This dataset include different crops suchas rice, maize,beans,chickpeas,black beans, lentils,

And fruits like pomegranates,bananas, mangoes, grapes, watermelons, cantaloupe, apples, oranges, papayas etc.

2) **Pre-processing**:

Pre-processing is process of removal of unwanted noisy data from the collected datasets.Pre-processing is required for any successfull application.Thedata having inconsistent,redundant and incomplete data. Therefore in this step such redundant datashould be filtered and normalized.

Dataset Description

This is the sample data set used in this project. The data in Table I is data used to predict crop yield based on 8 factors. These 8 factors are Coffee, Jute, Orange, Cotton, Coconut, Rice, Papaya, Apple. By creating machine learning models, train models, and predict production. and from Table II we can predict the amount of fertilizer should be used to get the proper yield the input parameters are the quantity of nitrogen, phosphorus,Pottasium in soil and the output is the amount of the respective fertilizer should be used. Hear in the input parameters 1, 2, 3, 4, 5, 6,7,8 represents the present in the soil respectively. The data in Table III used to pesticide prediction along with quantity.

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Table-1

N	P	K	temperatu	humidity	ph	rainfall	label
90	42	43	20.87974	82.00274	6.502985	202.9355	rice
85	58	41	21.77046	80.31964	7.038096	226.6555	rice
60	55	44	23.00446	82.32076	7.840207	263.9642	rice
74	35	40	26.4911	80.15836	6.980401	242.864	rice
78	42	42	20.13017	81.60487	7.628473	262.7173	rice
69	37	42	23.05805	83.37012	7.073454	251.055	rice
69	55	38	22.70884	82.63941	5.700806	271.3249	rice
94	53	40	20.27774	82.89409	5.718627	241.9742	rice
89	54	38	24.51588	83.53522	6.685346	230.4462	rice
68	58	38	23.22397	83.03323	6.336254	221.2092	rice
91	53	40	26.52724	81.41754	5.386168	264.6149	rice
90	46	42	23.97898	81.45062	7.502834	250.0832	rice
78	58	44	26.8008	80.88685	5.108682	284.4365	rice
93	56	36	24.01498	82.05687	6.984354	185.2773	rice
94	50	37	25.66585	80.66385	6.94802	209.587	rice

Crop	N	P	K
apple	20	125	200
banana	100	75	50
blackgram	40	60	20
chickpea	20	50	20
coconut	20	10	30
coffee	100	20	30
cotton	115.7	30.9	7
grapes	20	125	200
groundnut	35.3	53.8	28.9
jute	55.9	22.4	10.2
kidneybea	20	60	20
lentil	20	40	40
maize	120	60	50
mango	20	20	30
mothbean	20	40	20
munabean	20	40	20

Table-2

Table-3

Model Creation:

We create datas into two models:

A) Training model

B) Testing model

The division of the test and train is done in 0.15 and 0.85 that is 15 and 85 percent respectively.

Support Vector Machine(SVM):

Support Vector Machine (SVM) is a supervised machine learning algorithm which isutilized for classification and for regression problems.Inour project for SVM algorithm we used values of degree as degree=1,2,3,4,5 andkernel=poly to generate a model.

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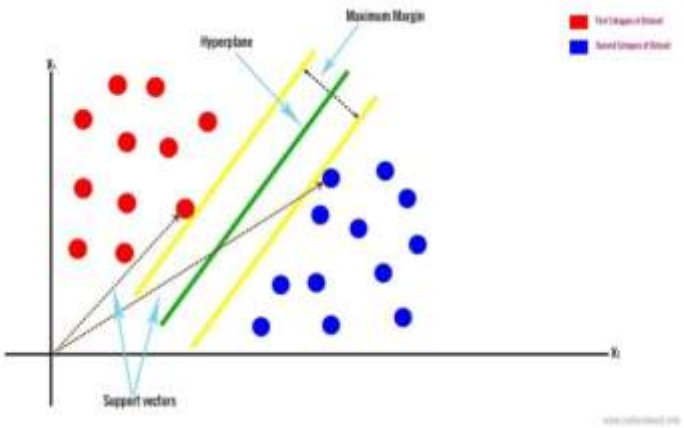
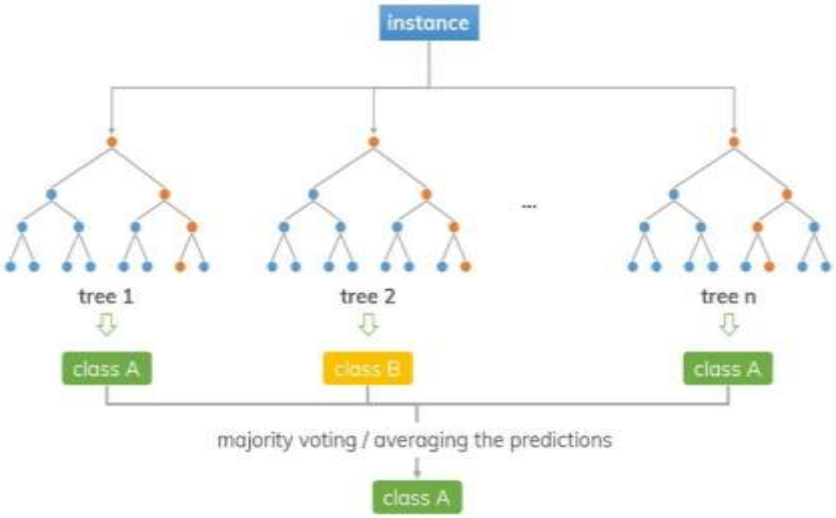


Random Forest:

Random forest is a type of Machine Learning(ML) algorithm. The output will be dividebased on the number of classes of classification and prediction of classes i.e regression. Theparmeters include humidity,temperature and rainfall. In our project for random forest algorithm we used 21 estimators thatis nothing but a decision trees to generate a model



K-Nearest Neighbours(KNN):

KNN is simplest machine learning technique. This algorithm is based on supervised machinelearning technique. It is most commonly used for classification problems and sometimes forregression. KNN algorithm is also called as lazy learning algorithm because it doesn't containspecialized training phase. In our project for knn algorithm we used values of n as n=1,3,5,7,9 togenerate a model

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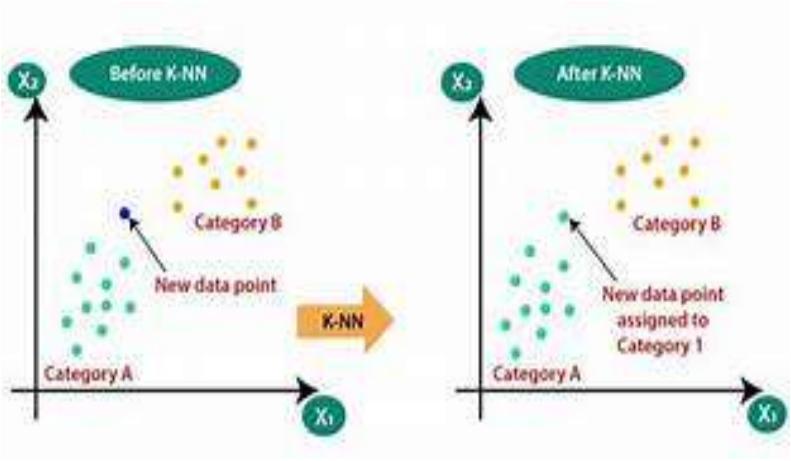
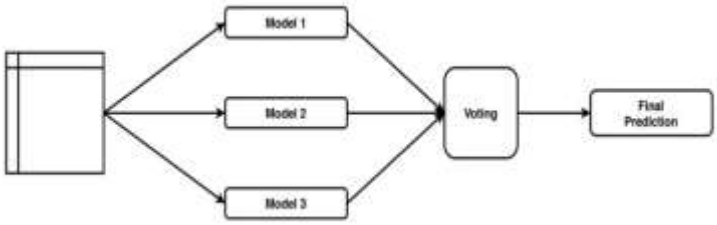


4. Voting Classifier:

A voting classifier is a Machine learning technique that trains on numerous models and predicts theoutput based on the highest probability. All the models that are obtained from abovethree classifiers Random forest,KNN and SVM are given to voting classifier. In our project we used soft type voting that means here the output class ispredicted based on the average of probability given to that class.



VII. RESULT AND DISCUSSION

This section discusses about the result of the model. In this work we tested the data using voting classifier model which gave an accuracy of 96% .

VIII. CONCLUSION

In today's environment where space is tight and agricultural knowledge is scarce, every factor is considered from farmer and crop point of view, and the farmer guides them appropriately before harvesting. Before choosing crops to grow, it is important to know and understand the factors that affect growth and how to maintain or control them. In this system, these factors are processed automatically and the type of crop to be grown is selected. The proposed task is an efficient crop yield proposal structure using a classifier model. This framework is versatile as it can be used for testing on a variety of crops. The yield chart also shows you the best season and harvest forecasts for sowing, plant development and harvesting. Proposal system using machine learning.Selection trees perform well when the data set is more diverse and provides the best results for the data set.In this way, the system will help reduce the problems that ranchers face and prevent suicide attempts.

IX. FUTURE WORK

It can do a lot of additional features to the system. Currently, it takes necessary environmental factors as inputs and suggests a very suitable crop to be cultivated.And to suggest more than one crop with more accuracy.In our project we found that the accurate prediction of different specified crop yields across different districts will help to farmer. From this farmers will plant different crops in different districts.In the near future, geospatial analysis will be added to data processing models to increase accuracy and better integrate geospatial data.

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