

## CROP RECOMMENDATION SYSTEM USING MACHINE LEARNING

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### ABSTRACT

Crop Recommendation System for agriculture is based on various input parameters. This proposes a hybrid model for recommending crops to south Indian states by considering various attributes such as soil type, Rainfall, Groundwater level, Temperature, Fertilizers, Pesticides and season. The recommender model is built as a hybrid model using the classifier machine learning algorithm. Based on the appropriate parameters, the system will recommend the crop.

Technology based crop recommendation system for agriculture helps the farmers to increase the crop yield by recommending a suitable crop for their land with the help of geographic and the climatic parameters.

The proposed hybrid recommender model is found to be effective in recommending a suitable crop. Crop yield production value updating has a positive practical significance for guiding agricultural production and for notifying the change in market rate of crop to the farmer. The concept of this paper is to implement the crop selection method so that this method helps in solving many agriculture and farmers problems. This improves our Indian economy by maximizing the yield rate of crop production. Different types of land condition. So, the quality of the crops is identified using ranking process. By this process the rate of the low quality and high-quality crop is also notified.

The usage of ensemble of classifiers paves a path way to make a better decision on predictions due to the usage of multiple classifiers. Further, a ranking process is applied for decision making in order to select the classifiers results. This system is used to predict the cost of crop which is yielded for further.

## 1 INTRODUCTION

### 1.1 OVERVIEW

Agriculture is one of the most important occupations practiced in our country. It is the broadest economic sector and plays an important role in overall development of the country. About 60 % of the land in the country is used for agriculture in order to suffice the needs of 1.2 billion people. Thus, modernization of agriculture is very important and thus will lead the farmers of our country towards profit. Data analytic (DA) is the process of examining data sets in order to draw conclusions about the information they contain, increasingly with the aid of specialized systems and software. Earlier yield prediction was performed by considering the farmer's experience on a particular field and crop. However, as the conditions change day by day very rapidly, farmers are forced to cultivate more and more crops. Being this as the current situation, many of them don't have enough knowledge about the new crops and are not completely aware of the benefits they get while farming them. Also, the farm productivity can be increased by understanding and forecasting crop performance in a variety of environmental conditions. Thus, the proposed system takes the data regarding the quality of soil and the weather related information as an input. The quality of the soil such as Nitrogen, Phosphorous, Potassium and Ph value. Weather related information like Rainfall, Temperature and Humidity. In our project we are taking the datasets from Kaggle website.

### 1.2 IDENTIFICATION/NEED

A crop prediction is a widespread problem that occurs. During the rising season, a farmer had curiosity in knowing how much yield he is about to expect. In the earlier period, this yield prediction become a matter of fact relied on Farmer's long-term experience for specific yield, crops and climatic conditions. Farmer directly goes for yield prediction rather than concerning on crop prediction with the existing system. Unless the correct crop is predicted how the yield will be better and additionally with

existing systems pesticides, environmental and meteorological parameter related to crop is not considered. Promoting and soothing the agricultural production at a more rapidly pace is one of the essential situation for agricultural improvement. Any crop's production show the way either by interest of domain or enhancement in yield or both. In India, the prospect of widening the district under any crop does not exist except by re-establishing to increase cropping strength or crop replacement. So, variations in crop productivity continue to trouble the area and generate rigorous distress. So, there is need to attempt good technique for crop prediction in order to overcome existing problem.

## **2. LITERATURE SURVEY AND RELATED WORK**

### **2.1 VIRENDRA PANPATIL ET :**

It had accomplished gigantic work for Indian ranchers by making productive yield proposal framework. They created framework utilizing classifier models, for example, Decision Tree Classifier, KNN, and Naive Bayes Classifier. The proposed framework can be utilized to figure out best season of planting, development of plant and Plant reaping. They utilized distinctive classifier for accomplishing better exactness for instance: Decision tree shows less precision when dataset is having more varieties yet Naïve Bayes gives preferable exactness over choice tree for such datasets. The best favorable position of framework that it can without much of a stretch versatile all things considered/be utilized to test on various yields.

### **2.2 MAYANK ET :**

It have presumed that this paper fabricate extemporized framework for crop yield utilizing administered AI calculations and with objective to give simple to utilize User Interface, increment the precision 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 MAHARASHTRA State for implantation and for information gathering they utilized govt. site, for example, [www.data.gov.in](http://www.data.gov.in). For crop yield forecast they utilized calculations, for example, Random Forest Algorithm and for convenience they created website page so it will be not difficult to use for all. The primary favourable position of proposed framework is precision rate is more than 75 percent on the whole the yields and areas chose in the examination.

### **2.3 SHWETA ET :**

It have inferred that this paper will survey that different utilizations of AI in the cultivating areas. And furthermore, helps in can be select appropriate crop select land and select season settled utilizing these procedures. The calculations use are Naive Bayes and K-Nearest Neighbor. The calculations are utilizes precision of execution.

### **2.4 AMIT KUMAR ET :**

It have presumed that this paper helps in foreseeing crop arrangements and augmenting yield rates and making advantages to the ranchers. Additionally, Using Machine learning applications with farming in foreseeing crop sicknesses, examining crop copies, diverse water system designs. The calculations utilized are fake neural organizations. The serious issue with neural organization is that the proper organization which suits best for the arrangement is difficult to accomplish and it incorporates experimentation. The second issue with neural organization is the equipment reliance as the calculation incorporates more calculations in reverse and forward the preparing needs more. Assurance of appropriate organization structure requires insight and time. The proposed framework likewise centers around crop determination utilizing natural just as financial variables. The framework likewise utilizes the monetary factor that is the cost of the crop which assumes a significant part on the off chance that if the yields with same yield yet unique yield cost. The framework additionally utilizes

other strategy which is crop sequencing which gives a full arrangement of yield which can be developed all through the season. The proposed framework likewise centers around crop choice utilizing ecological just as financial variables. The framework likewise utilizes the monetary factor that is the cost of the crop which assumes a significant part on the off chance that if the crops with same yield yet unique yield cost. The framework additionally utilizes other technique which is crop sequencing which gives a full arrangement of yield which can be developed all through the season.

#### **2.5 MANJULA ET :**

It has have presumed that this paper helps in improving the yield pace of crops by utilizing rule based mining. The paper utilizes affiliation rule mining to foresee the yield of the crop. The calculations utilized are k-Means Algorithm, bunching strategy and deduced affiliation rule mining. The significant impediment is that the paper utilizes affiliation rule digging for expectation of crop yield. The issue with affiliation decide mining is that it creates an excessive number of rules sometimes and the exactness of the expectation decreases. Likewise the principles will in general fluctuate according to dataset and the outcomes additionally enormously. The proposed framework mostly centers around the issue of yield expectation of crop which assumes vital part in yield choice as rancher can choose crop with greatest yield. The frameworks utilizes affiliation rule mining to discover rules and crops with greatest yield. This framework centers around formation of an expectation model which might be utilized to future forecast of crop yield.

#### **2.6 RAKESH KUMAR ET :**

It has have presumed that this paper helps in improving the yield pace of crops by applying order techniques and looking at the boundaries. The paper clarifies the utilization of various calculations to accomplish the equivalent. The calculations proposed are Bayesian calculation, K-implies Algorithm, Clustering Algorithm, Support Vector Machine. The hindrance is that there could be no appropriate precision and execution referenced in the paper according to usage of the proposed calculations. The paper is a study paper and just recommends the utilization of the calculations yet there is no usage proof gave in the paper. The technique applied on this paper for crop decision centers uniquely around the plants which might be developed as indicated by season. The proposed approach settle decision of crop (s) principally dependent on forecast yield cost supported by boundaries (for example Environment, soil kind, water thickness, crop kind). It takes crop, their planting time, estate days and foreseen yield charge for the season as information and finds a succession of vegetation whose creation with regards to day are greatest over season.

#### **2.7 RAJSHEKHAR ET :**

The depicts and gave the subtleties us for rundown of utilized techniques, In India there are divergent Agriculture crops creation and those crops relies upon the few sort of elements, for example, natural science, economy and furthermore the geological variables covering such procedures and strategies on memorable yield of disparate yields, it is conceivable to get information or information which can be steady to ranchers and government associations for creation well choices and for improve rules which help to expanded creation. In this article, our work is on utilization of information mining strategies which is use to separate data from the horticultural records to assess better crop yield for primary yields in principle regions of India. In our task we found that the exact expectation of disparate indicated crop yields across various locale will help to ranchers of India. From this Indian ranchers will plant various crops in various district.

#### **2.8 VISHNUVARDHAN ET :**

They examined a few development in India is dealing with thorough issue to benefit as much as possible from the crop efficiency. More than 60 out of a hundred the crop actually relies upon rainstorm precipitation. Momentum developments in

Information Technology for Agriculture field have built up an intriguing exploration zone to conjecture the crop yield. The risky of yield expectation is a significant issue that stays to be addressed dependent on available information. Information mining techniques are the better determinations for this reason. Distinctive Data Mining strategies are utilized and assessed in agribusiness for approximating the impending year's crop creation. This paper presents a concise investigation of crop yield forecast utilizing Multiple Linear Regression (MLR) strategy and Density based grouping procedure for the specific district for example East Godavari region of Andhra Pradesh in India. In this paper an exertion is made in order to know the locale exact crop yield examination and it is prepared by applying both Multiple Linear Regression technique and Density-based bunching strategy. These models were tested in regard of the multitude of areas of Andhra Pradesh, at that point the strategy of assessment is dropped with just East Godavari region of Andhra Pradesh in India.

### 3 EXISTING SYSTEM

Niketa et al in 2016 have indicated that the yield of the crop depends on the seasonal climate. In India, climate conditions vary unconditionally. In the time of drought, farmers face serious problems. So this taken into consideration they used some machine learning algorithms to help the farmers to suggest the crop for the better yield. They take various data from the previous years to estimate future data. They used SMO classifiers in WEKA to classify the results. The main factors that take into consideration are minimum temperature, maximum temperature, average temperature, and previous year's crop information and yield information. Using SMO tool they classified the previous data into two classes that are high yield and low yield.

Eswari et al in 2018 have indicated that yield of the crop depends on the perception, average, minimum and maximum temperature. Apart, from that, they have taken one more attribute named crop evapotranspiration. The crop evapotranspiration is a function of both the weather and growth stage of the plant. This attribute is taken into consideration to get a good decision on the yield of the groups. They all collected the dataset with these attributes and send as input to the Bayesian network and classify into the two classes named true and false classes and compared with the observed classifications in the model with a confusion matrix and bring the accuracy. Finally, they concluded that crop yield prediction with Naïve Bayes and Bayesian network give high accuracy when compared to SMO classifier and forecasting the crop yield prediction in different climate and cropping scenarios will be beneficial.

#### DISADVANTAGES OF EXISTING SYSTEM:

The obtained result for the crop yield prediction using SMO classifier gives less accuracy when compared to naïve Bayes, multilayer perceptron and Bayesian network.

Previously yield is predicted on the bases of the farmers prior experience but now weather conditions may change drastically so they cannot guess the yield.

### 4 PROPOSED WORK AND ALGORITHM

In the proposed system, we develop Prediction of the crop using the efficient algorithm.

The challenge in it is to build the efficient model to predict the better crop

Here in these project we use machine learning algorithms like Voting classifier which is nothing but hybrid classification/ensemble of models. In our project the Voting classifier is an ensemble of models that are obtained from svm, randomforest and KNN. Which can enhance the accuracy and it can give a better prediction system.

#### ADVANTAGES OF PROPOSED SYSTEM

- Predicting the better crop is the ultimate Aim of the project.
- Early detection of problems and management of that problems can help the farmers for better crop yield.
- For the better understanding of the crop yield, we need to study of the huge data with the help of machine learning

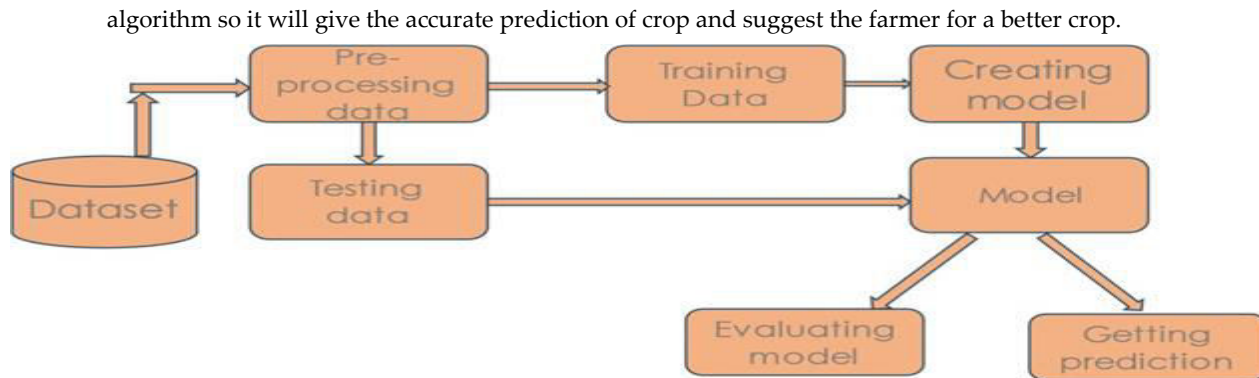


Fig1:- System Architecture

## METHODOLOGIES

### MODULES

#### DATA PRE-PROCESSING

We create datas into two models:

- A) Training model
- B) Testing model

The division of the test and train is done in 0.2 and 0.8 that is 20 and 80 percent respectively.

#### Model evaluation:

We apply the machine learning algorithm for testing part and get the accuracy of this model.

#### Prediction:

This module based on GUI part. we create a web page using bootstrap. The web page like(Nitrogen,Phosphorous,Pottasium,PH value,Humidity,Rainfall,Temperature).now we get the data's from user to compare the dataset values .finally it will predict for the Crop and soil to be planted.

Give the value of nitrogen, phosphorus, potassium, PH value,rainfall,humidity and temperature. We already trained the dataset. Our value compared to dataset and finally result will displayed what seed we cultivated that particular place.

#### Data Set 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 7 factors. These 7 factors are Nitrogen,Phosphorous,Pottasium,PH value,Rainfall,Humidity,Temperature. We can create a machine learning model and train the model and we can predict the crop and from Table II we can predict the fertilizer should be used to get the proper yield the input parameters are the quantity of nitrogen, phosphorus,Pottasium and the output is the respective fertilizer should be used. Hear in the input parameters 1, 2, 3, 4, 5, 6,7 represents the soil quality respectively.

Necessary Packages:

1. Numpy
2. Pandas
3. Matplotlib
4. pyplot
5. Scikit-learn

6. Tensorflow
7. Jupyter

## 6. CONCLUSION AND FUTURE SCOPE

### CONCLUSION

The proposed work presents a crop prediction framework utilizing Voting classifier which is nothing but an ensemble of models. Here in our project voting classifier ensembles the models obtained from svm, random forest and knn. Our project predicts the crop with more accuracy. In this way the framework will help decrease the challenges looked by the farmers and prevent them from endeavoring suicides. It will go about as a medium to give the farmers effective data needed to get high return and consequently augment benefits which thus will diminish the self-destruction rates and reduce his challenges.

### FUTURE WORK

It's lead to increasing the Countries' overall profit. 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 can be added to improve accuracy and also implement a better geographical data.

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