

# **Crop Recommendation System**

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## **1.Abstract**

Encouraged to enter generally, agriculture is the backbone of India and also plays a crucial role within the Indian economy by providing a particular percentage of domestic products to make sure food security. But nowadays, food production and prediction are getting depleted thanks to unnatural climatic changes, which can adversely affect the economy of farmers by getting a poor yield and also help the farmers to stay less familiar in forecasting the long run crops[6]. This research work helps beginner

farmers in such a way as to guide them in sowing reasonable crops by deploying machine learning, one of all the advanced technologies in crop prediction. Random Forest, a machine learning algorithm puts forth within the thanks to achieving it[11]. The seed data of the crops are collected here, with suitable parameters like temperature, humidity, and moisture content, which helps the crops to realize a successful growth. additionally, to the software, a web application is being developed. The users' parameters like temperature and their soil condition are going to be taken from the user

during this web application so as to begin the prediction process.

**Key words:-**Machine Learning, Random Forest Algorithm,Django

## 2.INTRODUCTION

Weather plays a vital role in agriculture production. For optimal productivity at a given condition crops must be such their weather requirement matches this weather system. So we want to plan them per the atmospheric condition and soil fertility[9]. this can be a prototype for a crop recommendation algorithm in Python using Machine Learning and Data Analytics. This work presents a system, within the style of an internet site. The business logic in Python uses Machine Learning techniques to predict the foremost profitable crop within the forecasted weather and soil conditions[4]. The proposed system will integrate the info obtained from the soil by applying the machine learning algorithm. This provides a farmer with a spread of options of crops that will be cultivated.

Crop prediction is one of the challenging problems in precision agriculture, and an abundance of models are proposed and validated to date.

This problem requires the utilization of several datasets since crop yield depends on many different factors like climate, weather[9], soil, use of fertilizer, etc. To develop a Crop prediction system [4].

Being a complete software solution, it doesn't allow maintenance factors to be considered much.

Also, the accuracy level of the model will be higher when compared to hardware-based solutions, because the components like soil

composition, rainfall value[3], pH value, and weather all get in the picture during the prediction process of the crop.

## 3.LITERATURE SURVEY

Fatin Farhan Haque, Ahmed Abdelgawad, Venkata Prasanth Yanambaka, and Kumar Yelamarthi stated that agriculture isn't solely an enormous side of the growing economy, however, it's essential for the United States of America to survive in their paper "Crop Yield Analysis mistreatment Machine Learning Algorithms". Predicting crop yield isn't a simple task, because it depends on several parameters like water, ultra-violet (UV), pesticides, fertilizer[1], and therefore the space of the land coated for that region. during this paper, 2 completely different Machine Learning (ML) algorithms area unit projected to investigate the crops' yield. These 2 algorithms, Support Vector Regression (SVR) and regression toward the mean (LR), area unit quite appropriate for validating the variable parameters within the predicting the continual variable estimation with one hundred forty knowledge points that were non-inheritable. The parameters mentioned higher than area unit key factors poignant the yield of crops. The error rate was measured with the assistance of Mean sq. Error (MSE) and constant of Determination ( $R^2$ ), wherever MSE gave out about zero.005 and  $R^2$  gave around zero.85. the constant dataset has been used for fast comparison between the algorithms' performances.

Prof. A. V. Deorankar highlights that within the previous couple of decades researchers have had an interest in land mapping and its classification thanks to numerous reasons in

their paper “associate Analytical Approach for Soil and Land arrangement mistreatment Image process”. the explanation for a rise within the focus of the analysis community area unit, is the increasing demand for agricultural land and soil health analysis, because the health of the soil, is crucial for the healthy production of crops. Image classification is one such approach for soil and land health analysis. it's a posh method having the results of assorted factors. This paper has projected the study of current research, the issues it addressed, and its prospects. the stress is targeted at the analytical study of assorted advanced and economical classification mechanisms and techniques.

Here, it's been tried to check the factors these approaches have addressed to enhance the accuracy of the classification. correct utilization of the number of options of remotely detected knowledge and choosing the most effective appropriate classifier area unit most significant for rising the accuracy of the classification. The data primarily based on classification or Non-parametric classifiers like call tree classifiers or neural networks have gained additional quality for multisource knowledge classification in recent times[10]. However, there's still the scope of any analysis, to scale back uncertainties within the improvement of accuracy of the Image classification mechanisms.

## 4.MATERIALS AND METHODOLOGY

A.Dataset:- we are using the Crop Recommendation Dataset from Kaggel. It contains around 2.5k total summaries.

**Table1: Data Attributes**

NITROGEN	PHOSPHORUS	POTASSIUM	TEMPERATURE	HUMIDITY	PH	RAINFALL	CROP
90	42	43	21	82	6.5	203	rice
71	54	16	23	64	5.7	88	maize
40	72	77	17	17	7.5	89	chickpea
13	60	25	17	21	5.7	128	kidneybeans
2	24	38	25	92	5.9	112	pomegranate
91	94	46	29	76	6.1	93	banana

As shown in Table1 , Dataset contains 7 entities:

## Data Attributes

- N - the ratio of Nitrogen content in the soil
- P - the ratio of Phosphorus content in the soil
- K - the ratio of Potassium content in the soil
- temperature - temperature in degree Celsius
- humidity - relative humidity in %
- ph - ph value of the soil
- rainfall - rainfall in mm

## 5.IMPLEMENTATION DETAILS OF MODULES.

### A.MODULES AND SYSTEM ARCHITECTURE:-

#### Module 1: Preprocessing of Data

-Clean dataset

Here we have taken the raw dataset and then using pandas duplicate values and null values are removed for optimal accuracy of the algorithm.

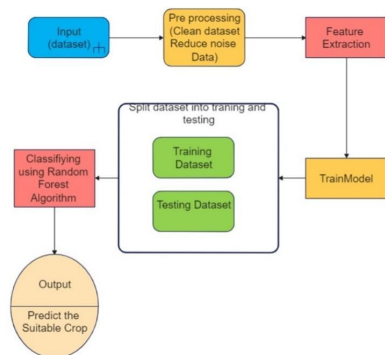
## Module 2: Train Model

-Feature Extraction(Similar features are extracted from the dataset for Training Model)

-Training Model and splitting it into Training Dataset and Testing Dataset.

## Module 3: Suggestion of Crop

-Classifying model using Random Forest Algorithm and Predicting the suitable crop.



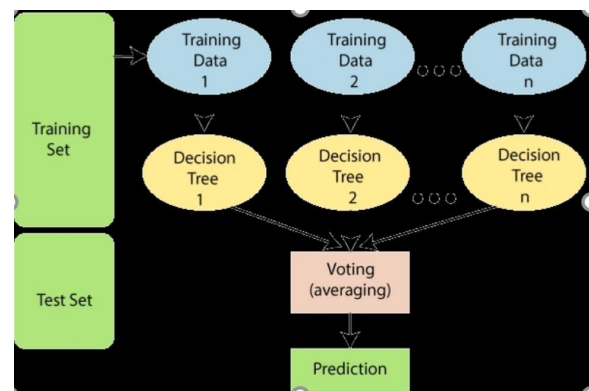
fig(1):System Architecture

Here to recommend a suitable crop we have used Random Forest Algorithm. It could be a popular machine learning algorithm that belongs to the supervised learning technique. It may be used for both Classification and Regression problems in ML.

Random Forest could be a classifier that contains a variety of decision trees on various subsets of the given dataset and takes the typical to boost the predictive accuracy of that dataset.

Instead of looking forward to one decision tree, the random forest takes the prediction from each tree and supported the bulk votes of predictions, it predicts the ultimate output.

Using this algorithm we got an accuracy up to more than 95%.

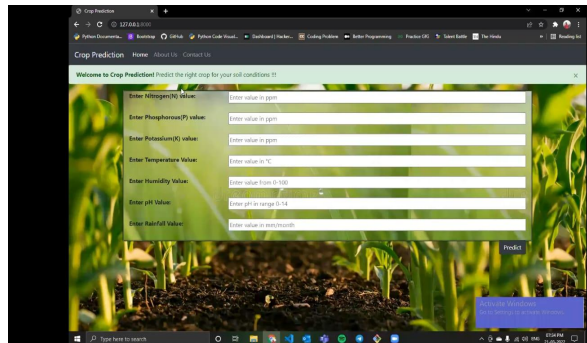


fig(2): Working of Algorithm

1.Input values:- fig(1) shows the webpage for taking input values from users. Total seven

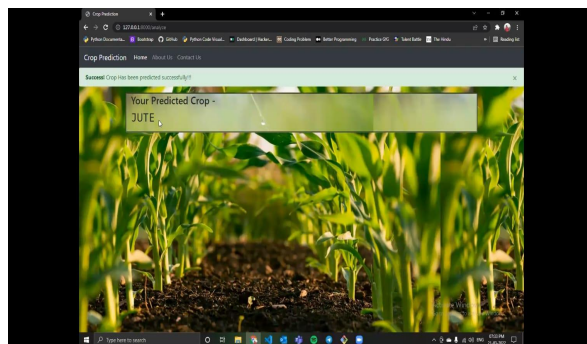
**B.ALGORITHM:-**

values of entities must be needed for prediction of crop .



**fig(3):Taking Input from User**

2. Prediction:- fig(2) shows the predicted crop according to given input data.



**fig(4):Prediction of Crop**

## D.CONCLUSION AND FUTURE SCOPE

A model is proposed for predicting soil series and providing suitable crop yield suggestions for that specific soil and weather. The model has been tested by applying different styles of algorithms. Random Forest shows highest accuracy in soil classification and suggests crops with less time. It gives us more accuracy as

compared to existing systems and offers more benefit to farmers.

In relation to rainfall can depict whether extra water availability is required or not. This research work is enhanced to the next level by availing it to the entire India.

Our future goal is to increase and improve data set with more attributes.

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