

## Crop Recommendation System Based on Productivity and Season Using Machine & Deep Learning

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**Abstract:** In Tamil Nadu, the coastal & Delta Farmers Faces Decrease in Production need for more Population but it can't be reached. In Past Farmers have certain crop for a period but now it cannot be used due to climatic factors. The Agri-facts is the data from insight about parameters and Agriculture factors. The agriculture also been developed like IT field. With the help of IT drives to collect Agri-Science to help the farmers for good agricultural information. The Improve agricultural field in current scenario is only done by applying intelligence in modern technologies. By the usage of Machine Learning Techniques, it helps in Prediction by the given data. We can solve some agricultural problems like Crop Prediction, Rotation of crops, Fertilizer usage, Requirement of water level and Production of crops. In modern days the climatic changes are frequently changing over the [period of time. The Crop Cultivation is Tricky so that to have Modern Techniques such as Machine Learning to solve the cultivation issues and help the farmers in management and production. It may help for Future Farmers and upcoming agriculturists. By the use of Data Mining can help the farmers on crop cultivation in crop recommendation. By Implementing data mining it helps to improve the quantity and recommendations crop on climatic changes. It recommends the crop on basis of climate and soil data.

**Keywords:** Crop recommendation, LightGBM, Machine Learning, Fertilizer, Disease, Production

### 1. Introduction

The State Tamil Nadu in India is a one of the major state in the Country. Over 8croce People lives there and it is 7th Largest State in terms of area. It is one of the leading producer of Agricultural Products. Farmers are most of the people in Tamil Nadu. The river Cauvery in main source of agriculture for the people in Tamil Nadu. The Cauvery Regions are commonly known as "Delta Region". In Tamil Nadu Rice is the major crop that has been produced. The other crops like Paddy, Sugarcane, Coconut, Banana, Cotton, Tea gountnut are grown frequently. The farmers made huge impact on country's economy. Now a day due to Climatic Changes the Agriculture is tough. It depends on Environment like Soil, Sunlight, Humility, Weather, Rainfall, Temperature, Fertilizer and Pesticides etc. The farmers need Right Knowledge on Harvesting a Right Crop on their region.

India's Seasons are

- April to June - Summer Season
- July to September - Monsoon Season
- October to November - Autumn Season

- December to March - Winter season

It may change from north to south and average rainfall also been changed. The Recommendation of suitable crop and expected crop yield for cultivation. Farmers faces more problems due to climatic changes. Now-a-days youngsters are interested in agri fields they can assist the farmers by helping in this field. The IT field can make huge impact on Agriculture and Real World Problems at a faster rate. With the help of Advance Technology, Internet, Collection of huge date in field of agriculture and Collecting useful information from spreading data. To get Insights from data to be learn.

### 2. Categorization and Description of Works

This paper [1] Published on 2023- Crop Recommendation System using Machine Learning by Ms Sarika Gambhir, Manish Sharma, Khushbor Agarwal, Keshav Kumar, Lakshya Kumar, Mayank Chaudary. This project will predict the right crop using parameters like Crop, District, Rainfall, Temprature. In this paper they use various techniques like Ridge

Regression and Classifier. They use different Datasets for Better Accuracy.

This Paper [2] Published on Crop Recommendation System Using Machine Learning Approach by Shilpa Mangesh pande, Prem Kumar Ramesh, Anmol Anmol, B.R Aishwarya, Karuna Podhilla, Kumar Shauriya.

In India Agriculture is a big business it provides largest Livelihood in rural India. However, the suicide rate of farmers is being High over the years, So This paper proposes a user-friendly approach for the farmers. The gives the Area and Soil type as Input. To predict the crop, they use Selected Machine Learning Algorithms like Support Vector Machine(SVM), Artificial Neural Network, Random Forest(RF), Multivariate Linear Regression(MLR), and K-Nearest Neighbour(KNN) is been Used. This paper [3] published on 2021- Crop and Fertilizer Recommendation System Using Machine Learning by Palaniraj A, Balamurugan A S,Durga Prasad R,Pradeep P

Data Mining is an emerging research field in crop yield analysis. Any farmer is interested in Knowledge how my yield he is about to expect. It contains percentage of Nutrients like Nitrogen(N), Phosphorus(P) and Potassium(K) Location is used along the Third Party Websites. It can also find Nutrients, soil,Rainfall etc. They train data in variable suitable Machine Learning for Creating model. This Paper [4] published on 2022-Artificial Intelligence Based Crop Recommendation and Plant Leaf Disease Detection System by Swati Shilaskar, Shripad Bhatla Wande, Saumitra Godbole, Dhanarnraj Joiode, Pradwaj Jadhav, Sameer Koroshi, Jhoti

Identification of plant disease and providing remedy to prevent from farm losses and increases agricultural yield. Every farmer faces this issue in their life. The disease in plant cannot been found in naked eye. This project suggest suitable crop based on Soil type, moisture, temperature, humidity etc. A Deep Learning Algorithm called Convolution Neural Network(CNN) is used by the authors to find disease in the crop. It gives 98% accuracy. This Paper [5] published on 2022-Crop Recommendation System to Maximize Crop Yield in Ramtek Region Using Machine Learning by Madake(2022) "Anantha Reddy Dasari, Bhagyashri Dadore, Aarthi Watekar(2019). The Indian economy and Employment is based on Agriculture is plays major role. From the given soil data, it gives suggest some crops to cultivation. It will increase the productivity. The method

gives like proposing a recommendation through the model using Random Tree, CHAID, K-Nearest Neighbour and Navie Bayes to recommend suitable soil on particular weather condition.

### **3 Performance Analysis of the Proposed Methodology in terms of Existing and proposed approach**

Machine Learning Algorithm like KNN is used in Existing model. It also contains Random forest, Support vector, Decision tree. In Existing model 20crops been trained. It gives about 90% accuracy.

Process of mining is extracting knowledge from the datasets. It gives most accurate output to farmers. It is one of the process in Knowledge discovery in Databases(KDD). Apart from KDD, Machine Learning is developed in IT field, It handle big volume of data with high performance. Application made by Machine Learning is developing now-a-days. Machine learning techniques are used in crop management, Water management & Soil management.

Most commonly used Machine Learning technique is Recommendation Algorithm. This algorithm is used to provide crops to sow. For suggestion to farmers Data Analytic were used in datasets.

The recommendation process gives more options to select. It will suggest the user of their interest. It will be practised in agricultural field too. Farmers have their own ideas for cultivation their ideas also been taken for cultivation process.

#### **3.1 Disadvantage**

- Low Performance
- Less Accuracy

Many Parameters in agriculture crop production been used. From the data of previous years proposed work been designed for crop recommendation for farmers. It helps the farmers in crop recommendation in future. The disease on crop makes less production. Water also major problem on crop production. The farmers must knowledge to maximize the production. The recommendation for farmers is given by season. About 1,20,000 datasets were collected all over the Tamil Nadu. The project contains Years, Crop name, Season, District, Area and Production. Except "Banana" none of the crops gives production for whole year. So that farmers can start with this crop. With this Knowledge

farmer decide which is been cultivated. The production been differing from Area to Area.

### 3.2 Advantages

- ✧ Accuracy is High
- ✧ Increase in Performance.

## 4. Methodology and Results

- It is a gradient boosting framework
- It increases the efficiency of the model
- It is based on Decision Trees
- Reduce memory usage

Gradient-based one side sampling(GOSS) and Exclusive feature bundling(EFB) are the Two novel techniques. It helps in completion the limitations of histogram-based algorithm that used primarily. It is used in all Gradient Boosting Decision Tree frameworks. The both Goss and EFB are characteristics of LightGBM Algorithm. The work together to make it effective. Gradient-Based One Side Sampling Technique for LightGBM: It is used in Data set in LightGBM for Sampling calculating the gain while weights data points with larger gradients higher. It is rarely used for training.

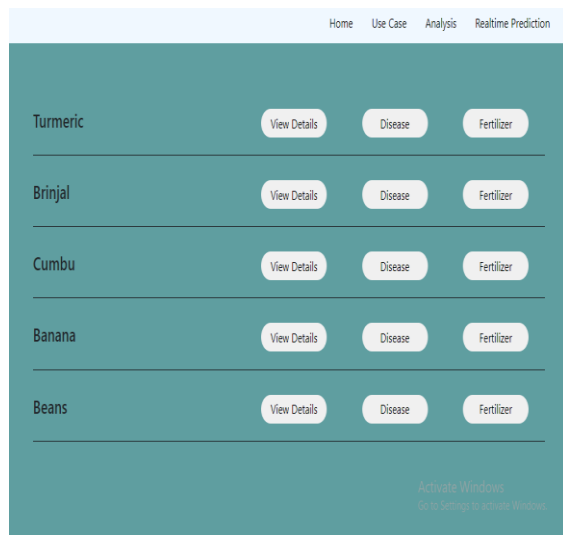


Fig 1. Intermediate Results

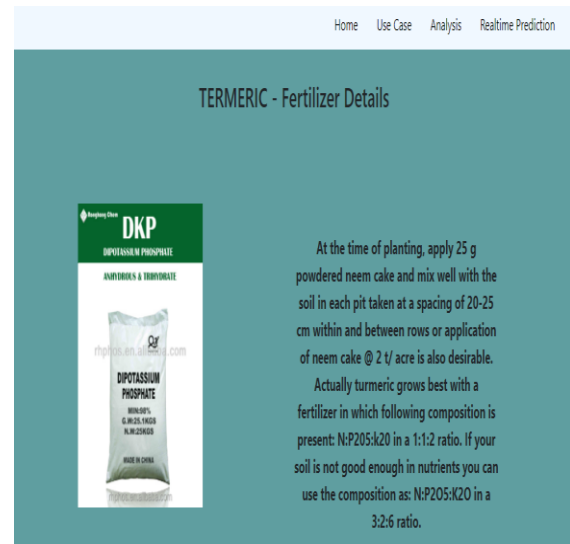


Fig 2. Output Results

## 5 Conclusion

In this paper, The Crop Production via Machine Learning Data is been studied vastly. The IT field can Assist the farmers for Recent Technology to Grow Crops been given. For Analysis Agriculture many Machine Learning and Data Mining Techniques been used. In this project the farmers can get knowledge and they receive Production, Season, Time and relevant crop recommendation and diseases, fertilizer to be used.

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