



CROP AND FERTILIZER RECOMMENDATION SYSTEM





MEET THE MEMBERS

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INTRODUCTION

The need of the hour is to design a system that could provide predictive insights to the Indian farmers, thereby helping them make an informed decision about which crop to grow. With this in mind, we propose a system, that would consider environmental parameters and soil characteristics before recommending the most suitable crop to the user. With the help of machine learning algorithms we will be predicting suitable crop and fertilizers for the farmers.

Data Collection

We have collected 4 data sets

First dataset contains values like like N, P, K, Temperature, Humidity, PH, rainfall, Label



In second data set Fertilizer prediction we have features like Temperature, Humidity, Moisture, Soil type, Crop Type, Nitrogen, Phosphorus, Potassium and Fertilizer name depending on the variables.



In third data set we have features like State Name, District Name, CROP Year, Season, Crop Area, Production



In the fourth crop production data set we have features like cost of production, cost of cultivation, yield , area.



DATA PREPROCESSING

Data Preprocessing is a process of preparing the raw data and making it suitable for machine learning models.

The following tasks are performed in Data Preprocessing:

- Data loading**
- Data Cleaning**
- Data Transformation**
- Input-Output split**
- Train-Test split**
- Data Visualization**



IMPORTING LIBRARIES

```
import pandas as pd
import numpy as np
from sklearn.preprocessing import LabelEncoder, StandardScaler
from sklearn import model_selection
from sklearn.model_selection import train_test_split
import seaborn as sns
import matplotlib.pyplot as plt
from sklearn.tree import DecisionTreeClassifier
from sklearn.tree import export_graphviz
from sklearn.metrics import confusion_matrix
import pydotplus
from sklearn.metrics import accuracy_score
from sklearn.ensemble import RandomForestClassifier
from sklearn.linear_model import LinearRegression
from sklearn.naive_bayes import GaussianNB
from sklearn.svm import SVC
import xgboost as xgb
from sklearn.model_selection import GridSearchCV
from sklearn.neighbors import KNeighborsClassifier
import tensorflow as tf
from tensorflow import keras
from tensorflow.keras import layers
```

LOADING OF DATA

```
dataset1 = pd.read_csv("Crop_recommendation.csv")
dataset2 = pd.read_csv("Fertilizer Prediction.csv")
dataset3 = pd.read_csv("crop_production.csv")
dataset4 = pd.read_csv("state_wise_crop_production.csv")
```



Model Training

Tree Based Model

Decision Tree

Random Forest

XgBoost

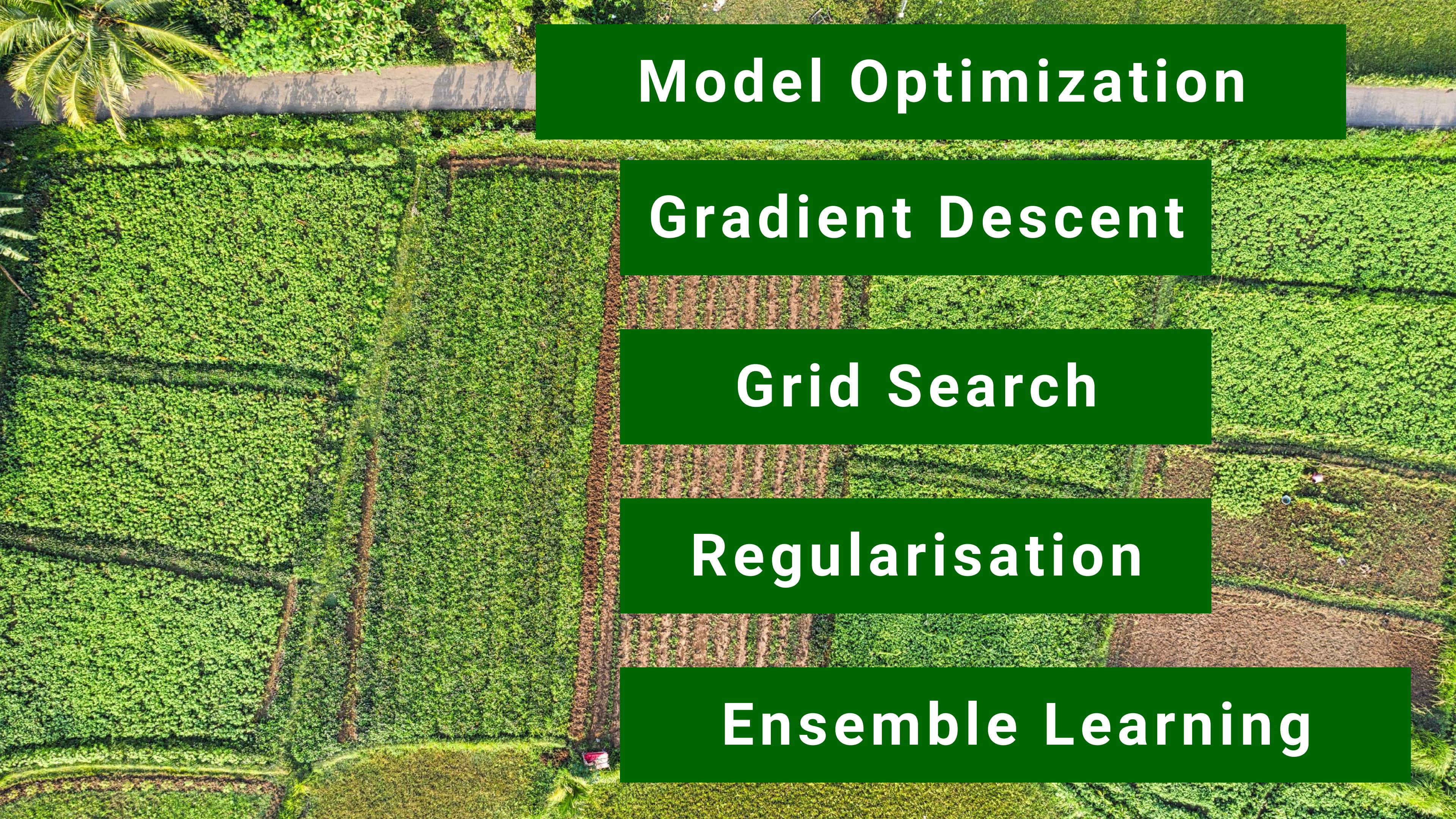
Probability Based

Naive Bayes

Distance Based

KNN

Support Vector Machine

The background of the image is an aerial photograph of a lush green agricultural landscape. The fields are organized into a grid pattern, with dark brown paths separating the plots. In the top left corner, there's a cluster of tropical trees, including palm trees. The overall scene is bright and sunny.

Model Optimization

Gradient Descent

Grid Search

Regularisation

Ensemble Learning



RESULT ANALYSIS

XGBoost and Random Forest have shown the best accuracy among other models.

Accuracy of XGBoost on test data for dataset 1: 0.780303

Accuracy of Random Forest on test data for dataset 1: 0.80303

Accuracy of XGBoost on test data for dataset 2: 0.96666

Accuracy of Random Forest on test data for dataset 2: 1.0



Accuracy of XGBoost on test data for dataset 3 :0.0297691

Accuracy of Random Forest on test data for dataset 3 :0.0288573

Accuracy of XGBoost on test data for dataset 4 : 0.53333

Accuracy of Random Forest on test data for dataset 4 :0.46666

F1 Score, Precision Score, Recall Score, Jaccard Score and Confusion Matrix have been calculated for analyzing the accuracy of the ensemble models.



CONCLUSION

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Using this project, farmers will be able to know the best suited crop for them and sow the right one. Projects such as these are necessary to boost the income of the poor farmers especially after the farm laws and the farmers' protest. The current situation of the farmers demands changes and with this project we want to take a step in the right direction.



THANK YOU

