



Crop Yield Prediction by Machine Learning

Project by Mainak Manna

Project Overview & Acknowledgement



Objective

Develop predictive model
for crop yield optimization



Gratitude

Thanks to my mentor
Partha Koley and Euphoria
Genx



Teamwork

Appreciation for teachers and friends' encouragement



Abstract & Introduction

Abstract

Machine learning forecasts crop yields using diverse data

Supports farmers in planting and resource decisions

Introduction

Accurate yield prediction aids sustainable farming

Uses historical data, weather, soil, and practices

Data Collection & Dataset

Sources

Government websites, Kaggle, private datasets

Crop Data

- Rice, maize, cotton, fruits, pulses, and more
- Data from 33 districts, 1997-2019

Parameters

Soil nutrients, weather, temperature, humidity, rainfall



Data Processing & Model Selection

Preprocessing

Cleaning, feature scaling, train-test split

Algorithms

- KNN
- Decision Tree
- Random Forest
- Logistic Regression
- Naive Bayes
- Linear SVM

Key Machine Learning Models



Decision Tree

Recursive partitioning, high accuracy, easy to interpret



Random Forest

Ensemble of trees, reduces overfitting, majority voting



SVM

Finds optimal hyperplane for classification



Logistic Regression

Predicts categorical outcomes with logistic function



Naive Bayes & Evaluation Metrics

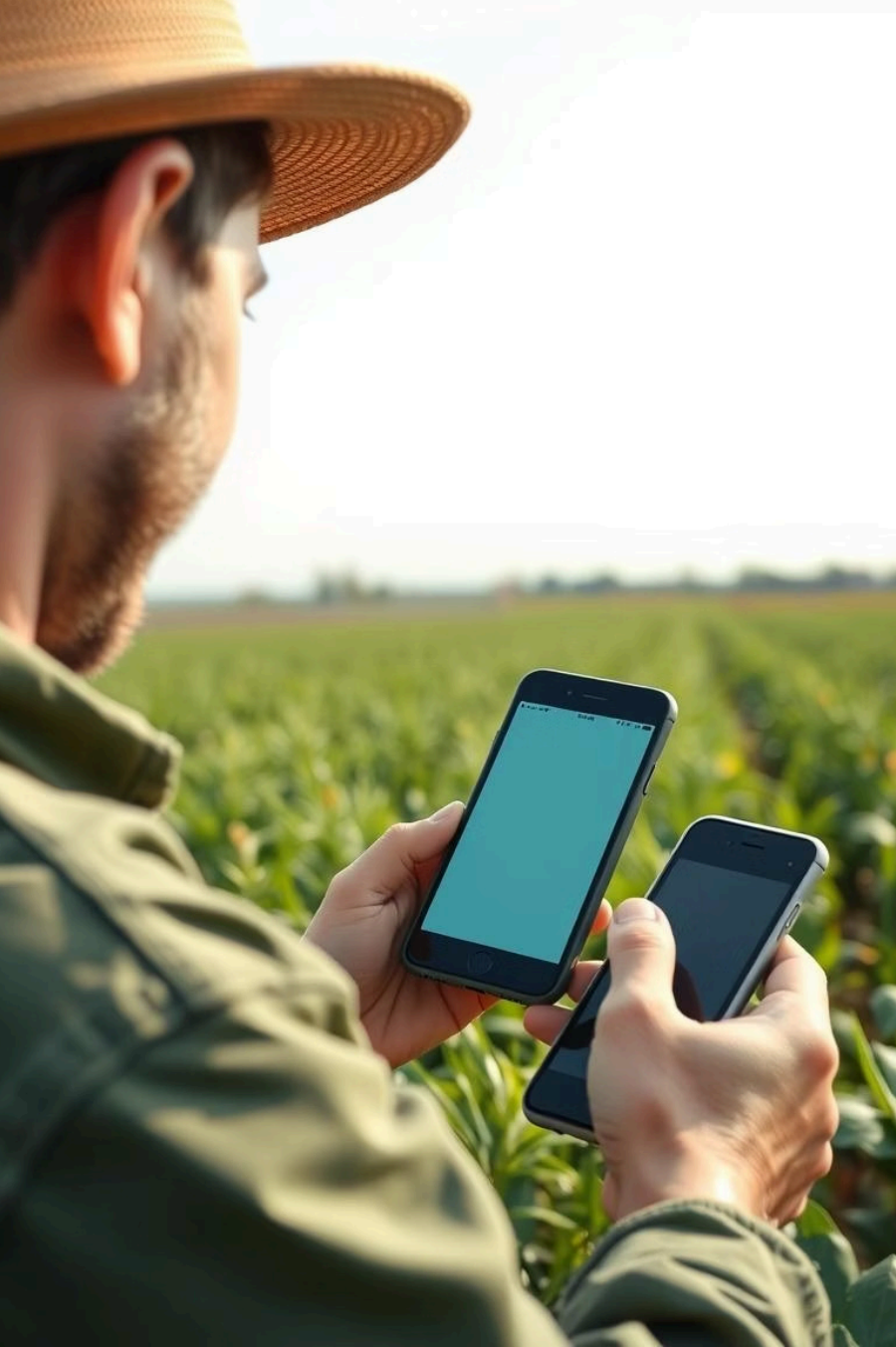
Naive Bayes

Probabilistic classifier using Bayes theorem

Effective for text classification and high-dimensional data

Evaluation Metrics

- Precision, Recall, F1-score
- Accuracy
- RMSE, MAE, R^2
- Confusion Matrix



Results & Discussion

Model Accuracy

Decision Tree showed highest prediction accuracy

Challenges

Data quality, model implementation, and precision improvement

Future Work

Integrate models into farm management systems

Conclusion & Impact



Impact

ML improves yield forecasts and farming decisions



Sustainability

Supports efficient resource use and food security



Advancement

Combines diverse data for precise crop yield prediction

