GITAM (Deemed to be University) Bengaluru Campus
Department of AI & DS

Predictive Analytics For Crop Yield Optimization

Abstract

- This project focuses on using predictive analytics to optimize the yield of groundnut (Arachis hypogaea), a vital oilseed crop grown in many regions.
- By leveraging machine learning models, this study aims to predict the potential yield of groundnuts based on various factors, including climate conditions (temperature, rainfall), and farm management practices(fertilizer use and pesticides used).

Introduction

- Groundnut is a crucial crop for both oil production and as a food source, but its yield is heavily influenced by factors like weather, and farming methods, making it difficult for farmers to consistently achieve high productivity.
- This project applies predictive analytics and machine learning models (Random Forest & ANN) to analyze historical data and provide data-driven insights, helping farmers optimize productivity, resources, and sustainability.

Objectives

- The primary objective of this project is to forecast the crop yield by using predictive analytics based on several factors, such as weather conditions, crop type, fertilizer use, and pesticide use.
- This project aims to improve farming decisions by using data and technology to predict how well crops will grow.

Tools / Algorithms/ Techniques

- **Tools**: Python, Pandas, NumPy, Matplotlib, Seaborn, Scikit-learn, TensorFlow/Keras.
- **Techniques & Algorithms**: Random Forest, ANN(Artificial Neural Networks).

Design Strategy

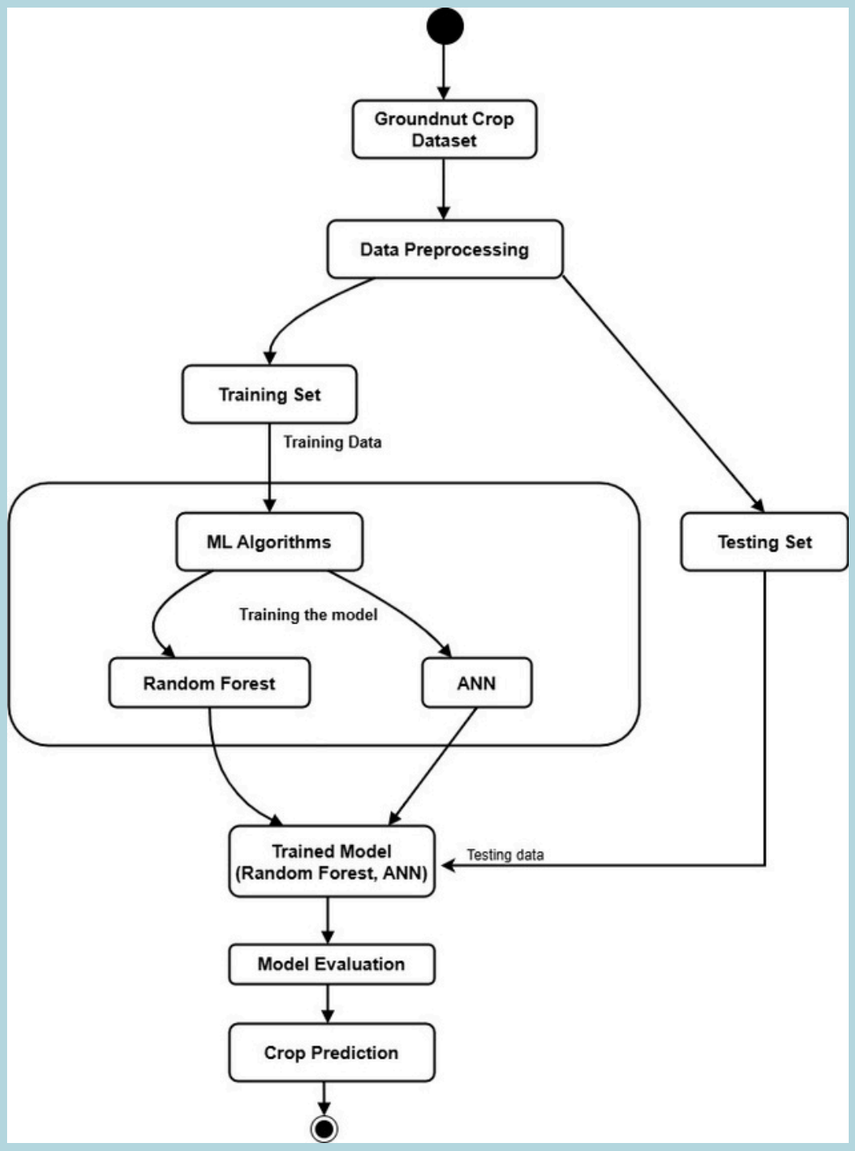

Fig-1: Models Used for Crop Forecasting

Result

The Random Forest model achieved an Accuracy of 82.61%, indicating strong predictive performance. The Mean Squared Error (MSE) of 0.01987 and Root Mean Squared Error (RMSE) of 0.14095 show minimal deviation in predictions.

Conclusion

- Machine learning and AI have revolutionized crop yield prediction, with methods like ANN, and Random Forest models offering substantial improvements in accuracy.
- Overcoming challenges like overfitting and scaling models for datasets is crucial to build the reliable tools that help farmers make informed decisions and improve crop productivity.

Presented by:
G.Sri Charan
Moise Qureshi
T. Bhanu Sai
M. Pushkar Sai

Guided by:
Dr. Devikanniga Devarajan
Associate Professor
Department of CSE