

Report Summary

Project: Crop Yield Prediction for UN SDG 2 – Zero Hunger

SDG Problem Addressed

The project tackles **Zero Hunger (SDG 2)** by predicting crop yields to improve agricultural productivity and food security. Crop yields depend heavily on weather patterns and environmental factors, which can be leveraged using machine learning to forecast productivity and aid decision-making for farmers and policymakers.

ML Approach Used

Supervised learning regression models were applied to historical crop yield and weather data, including:

- **Linear Regression**
- **Random Forest Regressor**
- **Gradient Boosting Regressor**

The models were trained on features such as temperature, rainfall, humidity, wind speed, and pressure. Real-time weather data integration via OpenWeatherMap API allows dynamic, location-based predictions.

Results

- Random Forest and Gradient Boosting showed superior accuracy compared to Linear Regression, with lower Mean Absolute Error (MAE) and higher R^2 scores.
- Visualizations in the Streamlit app demonstrate predicted vs. actual yields and performance metrics, enabling transparent evaluation.
- Real-time data integration enriches the model input and adapts predictions to current weather conditions.

Ethical Considerations

- The data used may suffer from biases due to incomplete weather station coverage and historical agricultural practices.
- Model predictions may not fully capture socioeconomic factors affecting crop yield.
- By using multiple models and transparent metrics, the project aims to promote fairness and reliable insights.
- The tool encourages sustainable agricultural planning, directly contributing to SDG goals.