📄 Project Report

Title:

AI-Powered Yield Prediction for Maize to Support SDG 2: Zero Hunger

SDG Focus:

SDG 2 – Zero Hunger
This project aims to reduce food insecurity by helping farmers and policymakers forecast **maize crop yields** using climate and agricultural input data.

Problem Statement:

Maize is a staple food crop in many regions, especially in Sub-Saharan Africa. However, its yield is often unstable due to unpredictable weather patterns and inefficient farming practices. By using machine learning, we can forecast yields and enable data-driven decisions that improve food security and reduce hunger.

ML Approach:

- **Type**: Supervised Learning (Regression)
- **Algorithm**: Random Forest Regressor
- **Target**: `hg/ha_yield` - maize yield in hectograms per hectare
- **Features Used**:
    - Average annual rainfall (mm)
    - Pesticide use (tonnes)
    - Average temperature (°C)

Dataset:

Data sourced from Kaggle, filtered to include only records related to maize, spanning multiple countries and years (28,000+ entries originally).

Results

- **MAE (Mean Absolute Error)**: ~ 4194.30 hg/ha
- **RMSE (Root Mean Square Error)**: ~ 8015.10 hg/ha
- **R^2 Score**: ~ 0.91
- **Top Influencing Features**:
    - Rainfall and pesticide use were the strongest predictors of maize yield.

Note: 10,000 hg/ha = 1 ton/ha.

Ethical Considerations:

- **Bias**: The model may perform poorly in underrepresented regions if local data is missing.
- **Fairness**: Model predictions must be interpreted alongside local knowledge to avoid misleading smallholder farmers.
- **Sustainability**: Promotes better planning, more efficient resource use, and proactive farming decisions, especially in climate-vulnerable areas.

Conclusion:

This project shows that machine learning can accurately predict maize yields using climate data, providing a valuable decision-support tool to fight hunger and support sustainable agriculture in line with SDG 2.

This report and project have been prepared by group Einstein.

Members

1. Mercylyne Jepleting
2. Terry Kamau