Predicting Dengue Outbreaks with Machine Learning for SDG 3

Project Summary

SDG Problem Addressed

SDG 3 - Good Health and Well-being aims to reduce the spread of infectious diseases and improve public health systems.

Problem: Dengue fever outbreaks are unpredictable and can overwhelm healthcare systems. Early prediction enables faster response, better resource allocation, and reduced mortality.

ML Approach

We used a Supervised Learning technique to build a binary classification model that predicts whether a Dengue outbreak will occur based on weekly environmental and climate data.

• Algorithm: Decision Tree Classifier

• Target Variable: outbreak (created from cases: 1 if cases > 0, else 0)

Results

• Accuracy: ~85% on test data

• Confusion Matrix & Classification Report showed high precision and recall for both classes (outbreak/no outbreak).

• Visualization: Confusion matrix, feature importance, and ROC curve were plotted.

Ethical Considerations

• **Bias Risk**: If the dataset lacks diversity across regions or underreports outbreaks, predictions may be biased toward certain locations or seasons.

• **Fairness**: The model promotes equitable healthcare by helping local governments deploy resources where needed most.

• **Sustainability**: Early prediction reduces disease spread, conserves medical resources, and protects vulnerable populations.

Impact

By predicting Dengue outbreaks, this AI solution supports public health systems, minimizes loss of life, and advances SDG 3 goals through data-driven, proactive health management.