Title: Carbon Forecast: AI for SDG 13 (Climate Action)

Problem:

Rising global CO_2 emissions remain a central challenge to climate action. Policymakers need reliable forecasts to plan interventions, evaluate emission reduction targets, and guide sustainable investments. This project applies machine learning to predict national CO_2 emissions using open data.

Dataset:

Data sourced from=ur World in Data (OWID), containing variables such as GDP, population, energy per capita, and primary energy consumption for over 200 countries from 1960–2022. The dataset is cleaned and filtered to remove missing values.

Machine Learning Approach:

Supervised regression using a Random Forest Regressor. The dataset was split 80/20 for training and testing. Features used: GDP, energy per capita, population, and primary energy consumption. Target variable: CO_2 emissions.

Results:

- Mean Absolute Error (MAE): ~10.98 metric tons
- Root Mean Square Error (RMSE): ~56.85
- R^2 Score: 0.99

Predicted vs Actual CO_2 emissions show a strong correlation, confirming model accuracy.

Ethical Considerations:

The dataset may contain regional reporting inconsistencies, especially for developing nations. Predictions should support—not replace—policy decisions. Emphasis on transparency and open reproducibility ensures fairness and responsible AI use.

Impact:

This project contributes to SDG 13 by enabling data-driven climate action. Forecasting helps governments and NGOs identify emission hotspots, track progress, and optimize green investments.

Files:

- `SDG13_CO2_Prediction.ipynb` (model code)
- `cleaned_co2_data.csv` (processed dataset)
- `rf_co2_model.pkl` (trained model)
- GitHub: [https://github.com/CaptainTyborg/WEEK-2-Assignment-for-Specialisation]