

Fighting Climate Change with Machine Learning: Predicting CO₂ Emissions (SDG 13)

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Introduction

Climate change remains one of the greatest threats to humanity. The United Nations' Sustainable Development Goal 13 (Climate Action) calls for urgent action to combat climate change and its impacts. To support this, I developed a machine learning model to predict future CO₂ emissions by country, helping policymakers and researchers understand and act on emissions trends.

The Problem

Rising carbon dioxide emissions are a major driver of global warming. However, without accurate forecasting tools, it's difficult for governments and organizations to proactively implement emission-reducing policies.

My Approach

I used supervised learning with regression models to forecast CO₂ emissions based on historical data. The process involved:

- Data Collection & Cleaning: Used a publicly available emissions dataset (global_emissions.csv) with features like GDP, population, and energy consumption.
- Exploratory Data Analysis: Created correlation heatmaps to understand which features most influence emissions.
- Model Training: Applied regression techniques (e.g., Linear Regression) to build a predictive model.
- Model Evaluation: Assessed using metrics like Mean Absolute Error (MAE) and plotted predicted vs actual emissions for visual insight.

Results

The model showed a reasonable ability to predict national CO₂ emissions trends. Visuals like the actual vs predicted scatter plot helped validate its performance and expose areas for improvement.

Ethical Considerations

It's crucial to recognize that emissions data may be incomplete or skewed, especially for lower-income countries. This could lead to underrepresented predictions or unfair assumptions. My solution strives to promote transparency and sustainability by providing interpretable results that support, not replace, expert judgment.

Impact

By forecasting future emissions, this project offers a starting point for climate-conscious decision-making and aligns directly with SDG 13. With more real-time data and wider feature integration, it could become a reliable emissions monitoring tool.

Conclusion

AI and machine learning can play a powerful role in solving global challenges. With this project, I've learned how technology can support climate resilience—and I hope to keep building solutions that matter.

GitHub Repo & Demo

<https://github.com/onyangor/AI-MACHINE-LEARNING-ASSIGNMENT>