Power
Learn
Project

Regulating Carbon Emissions with Machine Learning

A Data-Driven Approach to Accelerate Climate Action (SDG 13)

Problem Statement

Climate Change Needs Urgent Action;

- Carbon emissions are rising globally, accelerating climate disruption.
- Regulation efforts are often reactive, not predictive.
- Lack of timely, actionable insights for emission control.
- SDG 13 Goal: Take urgent action to combat climate change and its impacts.

Solution

Smarter Regulation Through Machine Learning

- Predict carbon emission levels across countries/sectors.
- Identify key factors contributing to high emissions.
- Support proactive policy decisions using data insights.

We built a supervised machine learning model (Random Forest Regressor) to:

✅ Predict CO_2 levels based on input data (energy use, policy strength, etc.)

✅ Classify emission zones as Low, Medium, or High risk

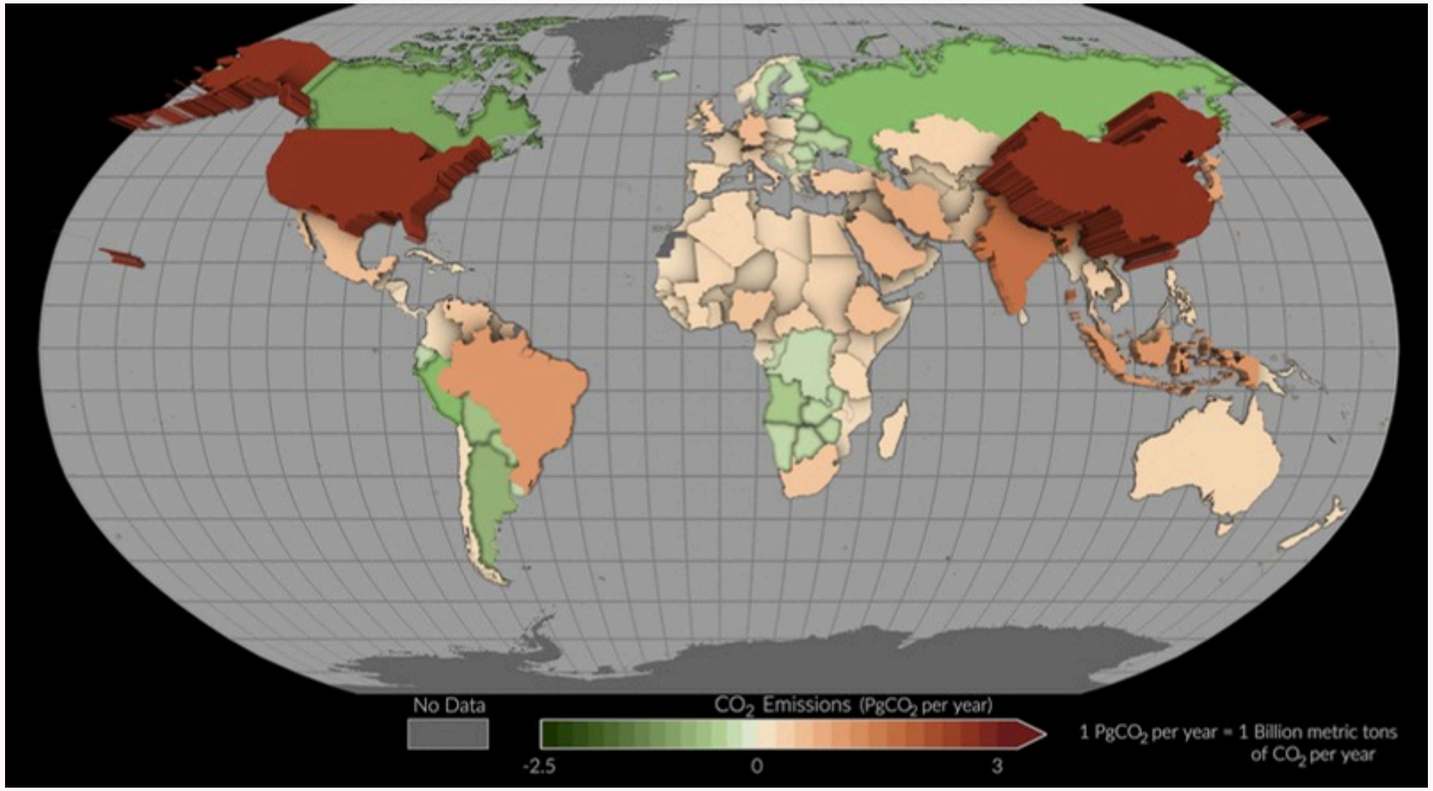
✅ Recommend focus areas for intervention

Product

- *Data Sources: Open climate and emissions datasets*
- *Features Used: Fossil fuel use, population, GDP, energy policy scores*
- *ML Model: Random Forest Regressor*
- *Performance: R^2 = 0.87, RMSE = [Insert your value]*
- *Tools: Python, Pandas, Scikit-learn, Matplotlib*

Impact Potential

- Forecast emissions trends for 50+ countries
- Assist policymakers in designing smart climate policies
- Raise early warnings for regions nearing emission caps
- Promote global equity by spotlighting high-risk zones



Ethical Considerations

- Ensured data diversity to reduce bias
- Model explainability for transparency
- No use of personally identifiable data
- Advocates for just transition, not penalization

Model Workflow

- Data Cleaning & Preprocessing
- Feature Engineering & Selection
- Train/Test Split (e.g., 80/20)
- Model Training (RandomForestRegressor)
- Model Evaluation (R^2, RMSE)

Model performance:

Metric	Value	Change
R^2 Score	0.87	↑ 5%
MAE	0.42	↓ 12%
RMSE	0.58	↓ 8%

Scaling the Vision

- Integrate real-time satellite and energy data
- Collaborate with environmental NGOs and regulators
- Explore NLP to analyze policy effectiveness

Social Impact

🌱 **Empowering Policy Makers**

- Supports emission caps and regulatory enforcement based on facts, not guesswork

🌆 **Protecting Vulnerable Communities**

- Helps identify high-risk zones early to prioritize climate adaptation resources

📊 **Raising Public Awareness**

- Encourages accountability and transparency in emissions reporting

🌐 **Contributing to Global Climate Goals**

- Encourages international collaboration around AI for sustainability

🤖 **Promoting Ethical AI for Good**

- **Demonstrates responsible use of machine learning for societal benefit**

Team Members

MICHAEL RANDA

CHIEF TECHNOLOGY OFFICER

VALENTINE SABULKONG

SOFTWARE ENGINEER

RODA MUTHONI

CREATIVE DESIGN LEAD

Thank you!

 Alforgood

 Alforgood

 Alforgood