

# 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<sub>2</sub> levels based on input data (energy use, policy strength, etc.)
- ✓ Classify emission zones as Low, Medium, or High risk
- ✓ Recommend focus areas for intervention





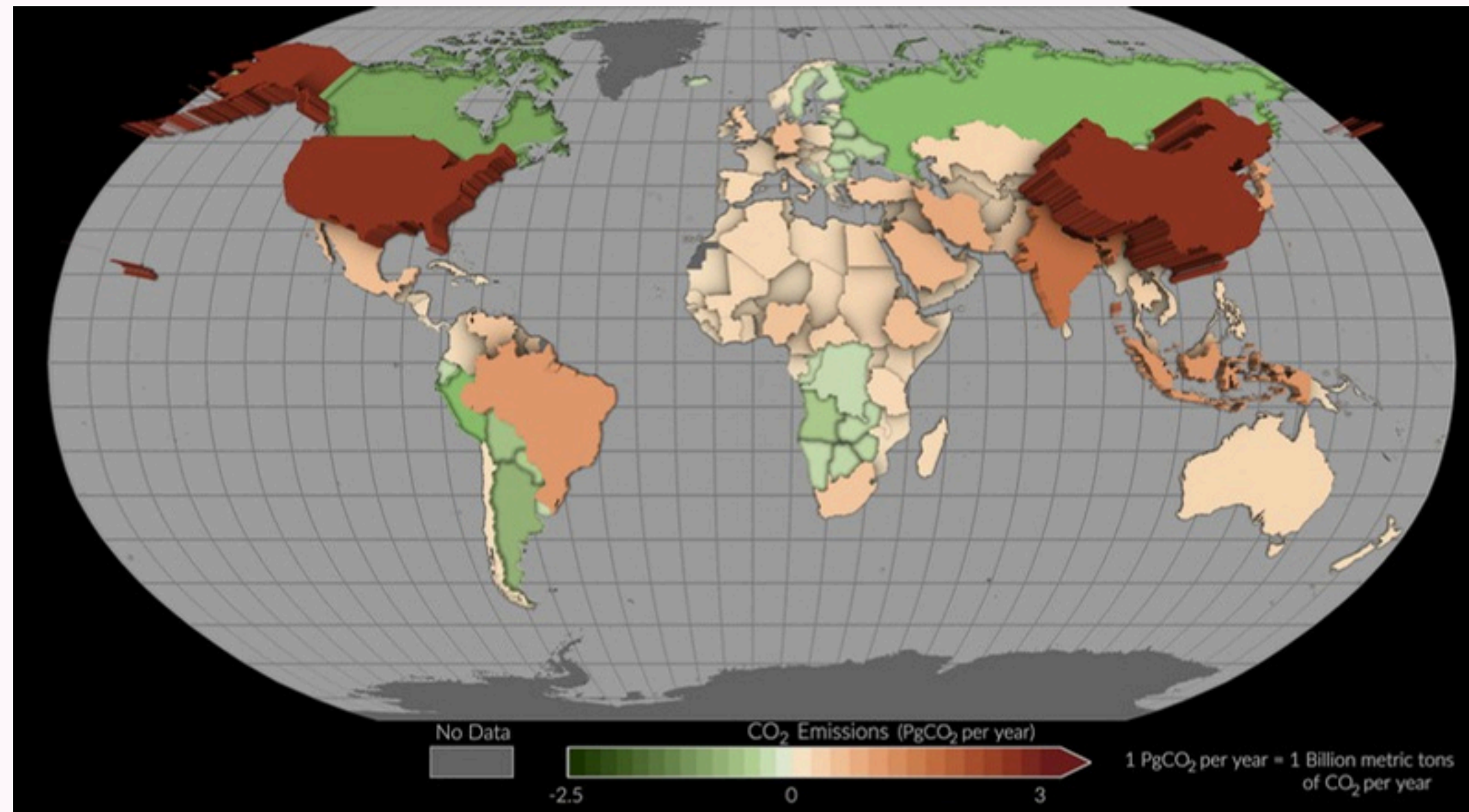
# Product



- 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

## Commitment

Reducing our environmental impact is not something we take lightly: it is a commitment to ourselves and to our customers. We want to make a real impact and reframe how we and the entire watersports industry operate.

## Introspection

We can't improve ourselves without learning what's wrong first. Knowing that, we decided to run a thorough Corporate Social Responsibility (CSR) audit on our company, focusing specifically on our organization's carbon emissions.

## Transparency

We want anyone to be able to understand the impact we have on the planet and to track it over the years. This is why we now share our audit and action plans with full transparency.

## Reduction

Reduction directly affects a company's impact on the environment, and implies deep changes in the structure and processes of the company. F-ONE and MANERA are committed to this reduction scheme. Our time and money will be invested into improving our own impact before even thinking about carbon compensation.

# 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



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# Thank you!



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