Climate Impact Predictor

This project aims to analyze and predict **CO2 emissions** by country, providing insights into the environmental impact of various energy consumption and economic factors. The goal is to empower users, policymakers, and researchers with a tool to understand and forecast climate-related trends and make informed decisions.

Overview

The Climate Impact Predictor uses machine learning, specifically a **Random Forest model**, to predict CO2 emissions based on key indicators such as energy consumption, energy production, GDP, population, and energy intensity per capita. The project also explores advanced insights into temperature anomalies and potential natural disasters based on CO2 levels, enhancing its real-world application.

Features

- **Interactive User Interface**: Developed with Streamlit, allowing users to:
    - Select a country and year for predictions.
    - View CO2 emissions, energy consumption, and renewable energy usage data.
    - Explore visualizations for trends in energy consumption, renewable energy usage, and feature importance.
- **Machine Learning Model**: A Random Forest model that identifies key factors influencing CO2 emissions, with energy consumption revealed as the primary driver.
- **Advanced Predictions**: Optional features to predict temperature anomalies and the likelihood of natural disasters in the coming years based on CO2 levels.
- **Collaborative Design**: Wireframes and UI design using Figma, enabling clear and user-friendly navigation.

Usage

1. **Select the Year and Country**: In the app sidebar, choose the year and country for which you want predictions.
2. **View Predictions and Data Visualizations**:
    - The app will display CO2 emissions, energy consumption, and renewable energy data for the selected country and year.
    - Interactive charts for feature importance, energy trends, and CO2 levels.
3. **Advanced Analysis** (Optional):
    - View temperature anomaly predictions and natural disaster probabilities based on CO2 levels.

Model Insights

The Random Forest model revealed **Energy Consumption** as the most significant factor influencing CO2 emissions, followed by other features with minimal impact. This insight aligns with real-world data, emphasizing the role of energy usage in environmental impact.

Future Enhancements

- **Predict Future Climate Scenarios**: Forecast temperature anomalies and disaster likelihood over the next decade.
- **Global Interactive Map**: A map view showing CO2 emissions and renewable energy usage across all countries.
- **Enhanced Visualizations**: Add more dynamic visual elements, such as animated trends over time

Acknowledgments

- Streamlit for the UI framework.
- Data sources from **Kaggle** for energy and climate change data.
- Figma for wireframe and UI design.