Analysis Report on Carbon Emissions Over the Past 20 Years

A Detailed Analysis Using Data from World Bank and Global Carbon Atlas

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1. Introduction

Understanding the trends in carbon emissions over the past 20 years is crucial for developing effective environmental policies and tracking the progress of interventions aimed at reducing emissions. This report aims to analyze and interpret the changes in carbon emissions across different countries using data from the World Bank and Global Carbon Atlas. The analysis will help identify patterns, compare trends between countries, and provide insights into the effectiveness of global and regional efforts to combat climate change.

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2. Used Data

Data Sources:

1. **World Bank Open Data**:

   This dataset contains CO2 emissions metrics (in metric tons per capita) for various countries from 1960 onwards. The data is provided in CSV format with columns for country name, country code, and yearly CO2 emissions. It is sourced directly from the World Bank's official database and is available under an open data license that allows for free use with proper attribution.

2. **Global Carbon Atlas**: This dataset provides detailed emissions data focusing on fossil fuels, cement production, and land-use changes. It is provided in CSV format, with each row representing a country-year pair and the corresponding CO2 emissions. The data is sourced from the Global Carbon Project and is also available under an open data license requiring proper attribution.

Licenses:

Both datasets are available under open data licenses that allow for free use, provided proper attribution is given. This report includes the necessary attributions for the data sources.

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3. Analysis

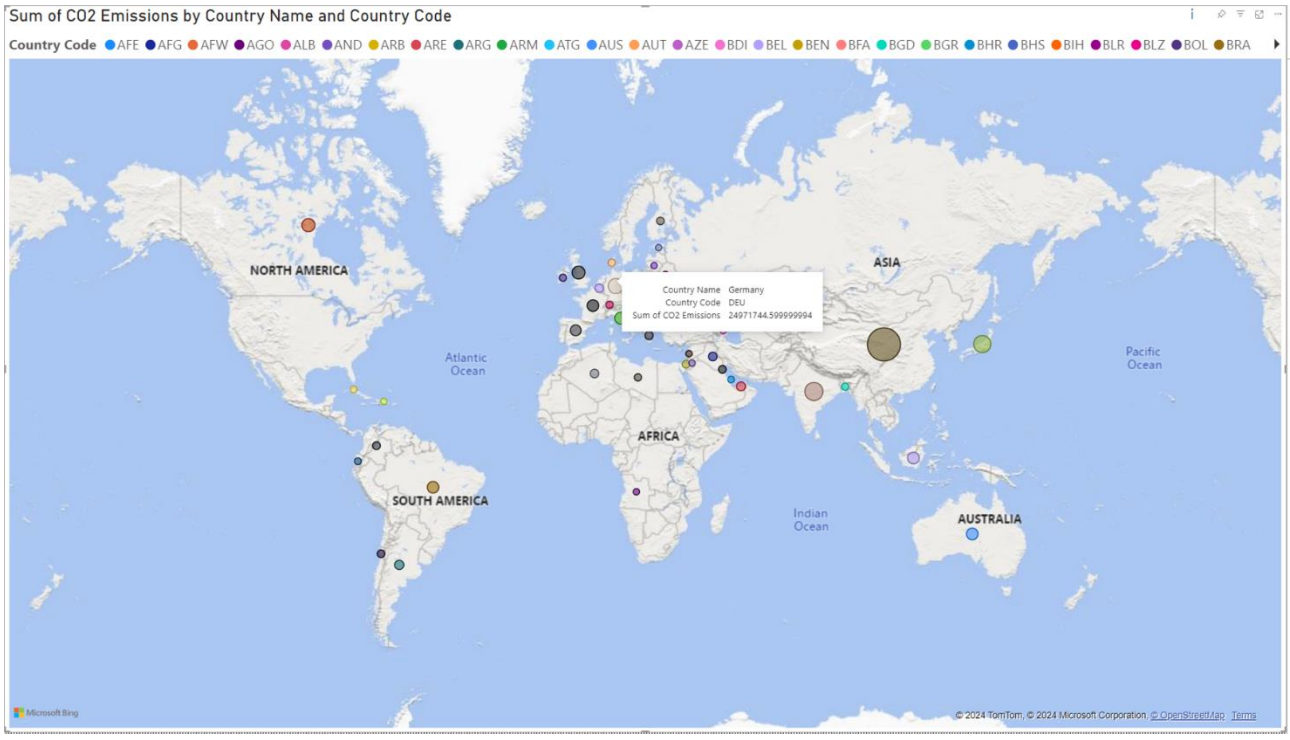
Methodology: Our data pipeline is implemented in Python using libraries such as pandas, requests, and selenium for automation. The data cleaning steps involved downloading the data, removing unnecessary columns, reshaping the data, and handling missing values.

- **World Bank Data**: The data was downloaded as a zip file, extracted, unnecessary columns were removed, and the data was reshaped to a long format with columns for year, country, and CO2 emissions. Any missing CO2 emissions data was handled appropriately.
- **Global Carbon Atlas Data**: The data was downloaded using Selenium to navigate and click the download link on the website. It was cleaned by removing the first row (containing column names), renaming columns, and reshaping the data to have year, country, and CO2 emissions columns. Missing and non-numeric data were handled appropriately.

Results:

We performed trend analysis and created visualizations to show CO2 emissions trends over the past 20 years for selected countries. We also conducted a comparative analysis to highlight differences in emissions trends between countries and regions.

Figures:



The visualization shows the trends in CO2 emissions for selected countries over the past 20 years. The analysis highlights both increasing and decreasing trends in emissions, indicating the varying effectiveness of policies and interventions across different regions.

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4. Conclusions

Findings:

The analysis revealed key trends in CO2 emissions, with some countries showing significant reductions while others have increasing emissions. This indicates that while some regions have successfully implemented measures to reduce emissions, others still face challenges.

Reflection:

While the analysis provided valuable insights, some uncertainties and limitations remain. For instance, some countries may have missing data for certain years, which could affect the analysis. Additionally, differences in data collection methods and definitions between sources could introduce inconsistencies. Future work should focus on addressing these issues and improving the data pipeline to handle any new data formats or quality issues.

Future Work:

To further improve the analysis, future work should include continuous monitoring of data quality, updating the data pipeline to handle new issues, and expanding the analysis to include additional factors that may influence carbon emissions, such as economic growth and policy changes.