Correlation Analysis between Deforestation and CO2 Emissions by Country

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1 Introduction

Understanding the relationship between deforestation and CO2 emissions is critical for developing effective climate policies and mitigating climate change impacts. This project aims to analyze the correlation between net forest conversion (deforestation rates) and CO2 emissions by country. By leveraging statistical techniques, we aim to uncover significant relationships between deforestation rates and CO2 emissions. The findings will provide valuable insights for researchers, policymakers, and environmentalists working on climate action and forest conservation.

2 Used Data

For this analysis, we used two comprehensive datasets from Kaggle.

2.1 Deforestation and Forest Loss

- **Source:** `https://www.kaggle.com/datasets/chiticariucristian/deforestation-and-forest-loss`
- **Description:** The dataset provides information on the net change in forest area (forest expansion minus deforestation) for various countries over the years 1990, 2000, 2010, and 2015. It includes the following features:
  - *Country*
  - *Year*
  - *Net forest conversion*

2.2 CO2 Emissions by Country

- **Source:** `https://www.kaggle.com/datasets/ulrikthygepedersen/co2-emissions-by-country`
- **Description:** The dataset provides a comprehensive overview of CO2 emissions by country from 1960 to the present day. It includes information on CO2 emissions by country compiled from various sources, including the UNFCCC and the IEA. It includes the following features:
  - *Country*
  - *Year*
  - *CO2 Emissions (kt)*

3 Analysis

We performed data cleaning and integration on the two datasets to ensure consistency and relevance for our analysis. The following steps were taken:

3.1 Data Cleaning and Transformation

- Renamed columns in the CO2 emissions dataset for clarity.
- Filtered both datasets to include only necessary columns: *Country*, *Year*, and respective measures.
- Merged the datasets on *Country* and *Year*.

3.2 Correlation Analysis

We visualized the relationship between deforestation and CO2 emissions using a scatter plot and calculated the Pearson correlation coefficient to quantify the relationship.

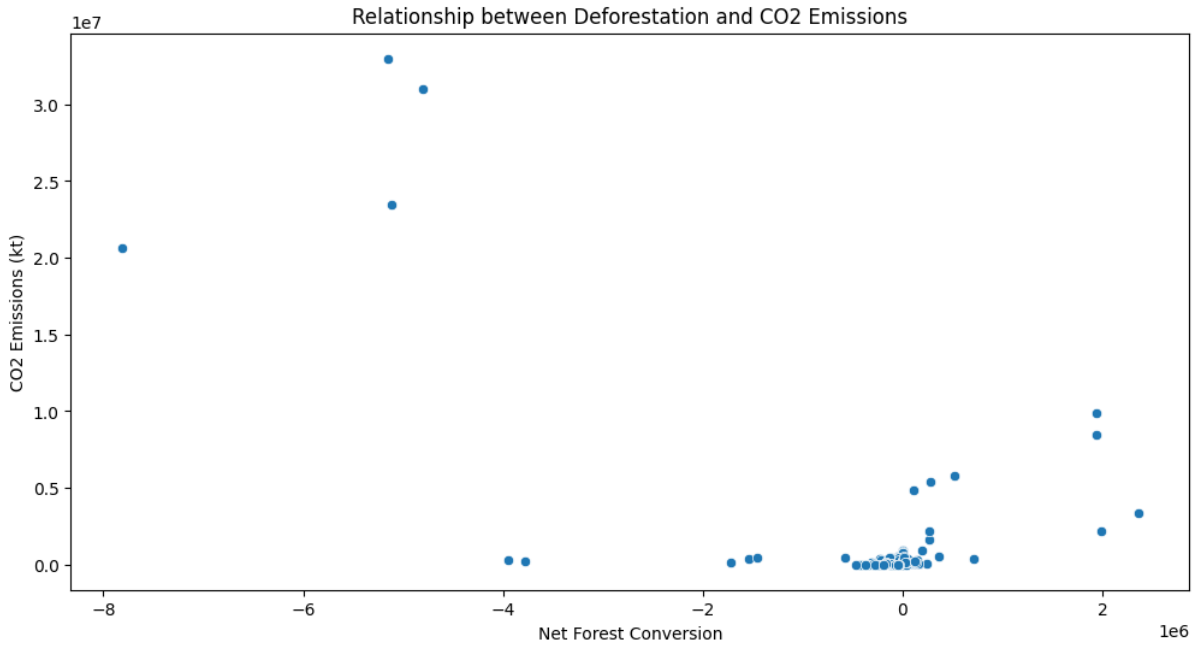

Figure 1: Relationship between Deforestation and CO2 Emissions

3.3 Results

The correlation coefficient between net forest conversion and CO2 emissions is **-0.676**, indicating a moderate negative correlation. This suggests that as deforestation increases (more negative net forest conversion), CO2 emissions tend to increase.

4 Conclusions

Our analysis reveals a moderate negative correlation between deforestation rates and CO2 emissions by country. This finding suggests that countries experiencing higher deforestation rates also tend to have higher CO2 emissions. While this analysis provides valuable insights, it is essential to consider other factors that may influence CO2 emissions. Future work could explore more comprehensive models to understand these relationships better.

4.1 Limitations

- The analysis is based on available data, which may have limitations in accuracy and completeness.
- Correlation does not imply causation; further studies are needed to establish causative factors.