

Assessing the Correlation between Agricultural CO2 Emissions and Global Temperature Changes (2000-2010)

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June 5, 2024

1 Introduction

1.1 Motivation

Among the most urgent problems of our day is climate change. Developing methods to lessen the effects of global warming requires an understanding of the connection between changes in global temperature and agricultural CO2 emissions. Examining the relationship between these variables from 2000 to 2010 is the goal of this report.

1.2 Research Question

The primary question addressed in this report is: *What is the correlation between agricultural CO2 emissions and global temperature changes between 2000 and 2010?*

2 Data Sources

2.1 Agricultural CO2 Emission Dataset

- **Source:** Kaggle: Agri-Food CO2 Emission Dataset
- **Content:** This dataset includes CO2 emission data from agricultural activities.
- **License:** CC0 Public Domain

2.2 Climate Change - Earth Surface Temperature Dataset

- **Source:** Kaggle: Climate Change Earth Surface Temperature Data
- **Content:** This dataset includes historical temperature data by country.
- **License:** CC BY-NC-SA 4.0

3 Methodology

3.1 Data Pipeline

The data pipeline was implemented to extract, transform, and load (ETL) the data from different sources into a unified format for analysis.

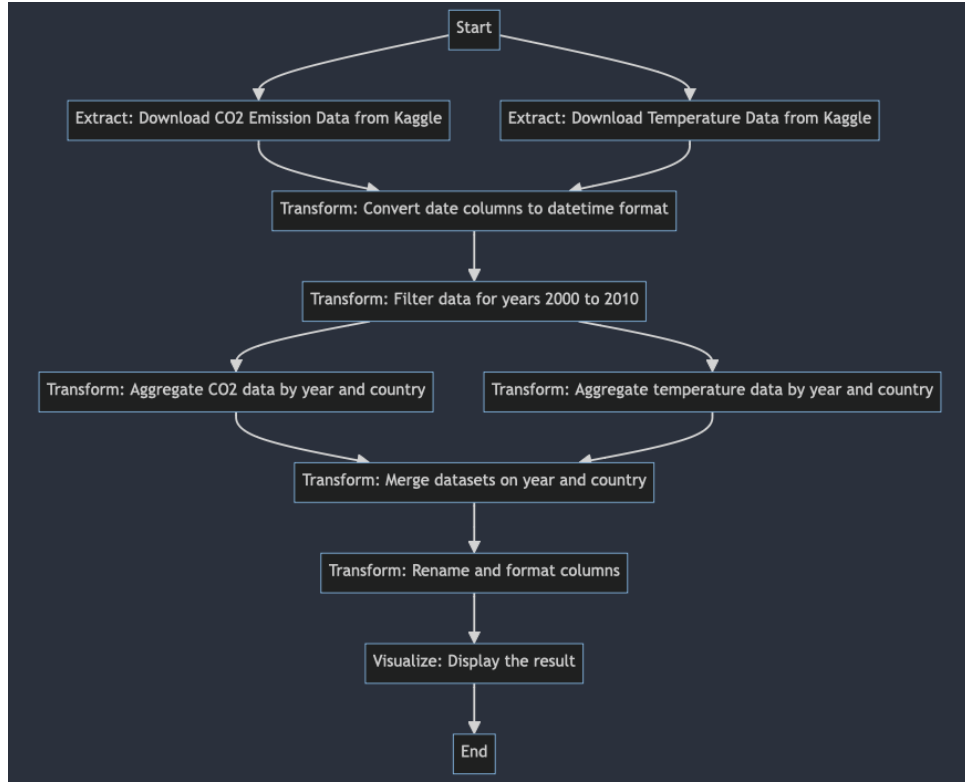


Figure 1: Data Pipeline Structure

3.2 Extract, Transform, and Load (ETL) Process

Task	Description
Extract	Download datasets from Kaggle and convert to CSV format.
Transform	Clean and preprocess the data, including: <ul style="list-style-type: none"> • Converting date columns to datetime format. • Filtering data for the years 2000 to 2010. • Aggregating data by year and country.
Load	Store the processed data into CSV files for analysis.

Table 1: ETL Tasks

4 Results

4.1 Correlation Analysis

The scatter plot in Figure 2 and the correlation coefficient of -0.06 indicate a very weak negative correlation between agricultural CO2 emissions and average temperatures from 2000 to 2010. This suggests that there is no significant linear relationship between the CO2 emissions from agriculture and the average global temperatures during this period.

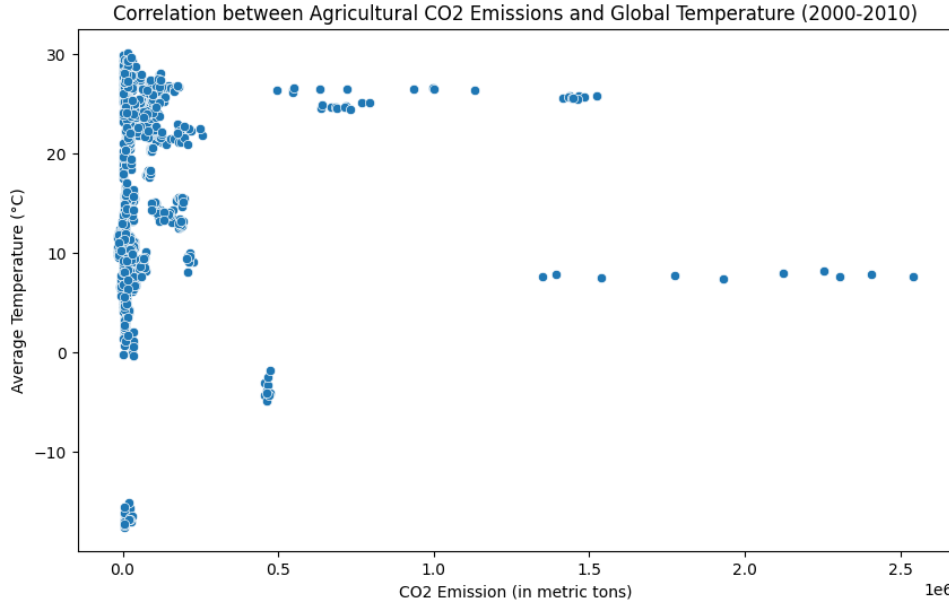


Figure 2: Correlation between Agricultural CO2 Emissions and Global Temperature (2000-2010)

4.2 Key Findings

- The data from 2000 to 2010 shows a very weak negative correlation between CO2 emissions and temperature changes.
- The correlation coefficient of -0.06 suggests that increases in agricultural CO2 emissions are slightly associated with decreases in average temperature, but the relationship is not strong enough to be significant.
- The majority of data points are clustered around lower CO2 emissions with a wide range of average temperatures, indicating that other factors besides agricultural CO2 emissions might be influencing the temperature.

5 Conclusion

The study concludes that there is a very weak negative correlation between agricultural CO2 emissions and global temperature changes from 2000 to 2010. This highlights the complexity of climate dynamics and suggests that agricultural CO2 emissions alone may not be a significant driver of global temperature changes.

5.1 Limitations

- Data completeness and accuracy were dependent on the datasets from Kaggle.
- The analysis is limited to the years 2000-2010.

5.2 Licenses

- CC0 Public Domain: Allows anyone to use, modify, and share the dataset without restrictions or crediting the creator.
- CC BY-NC-SA 4.0: Allows non-commercial use, modification, and sharing of the dataset with credit to the creator. Derivative works must also be non-commercial and share the same license.

5.3 Future Work

Future studies could expand the timeframe and include more comprehensive datasets to further investigate the relationship between CO2 emissions and temperature changes.