Basic Documentation

Project purpose

The Shiny app visualizes greenhouse gas emissions data for various countries over time. The app provides insights into emissions trends and comparisons between countries.

Data description and collection

The data represents greenhouse gas emissions metrics for various countries over time. Columns include metrics for CO2, methane, nitrous oxide, and total greenhouse gas emissions, both in absolute terms and normalized by population (per capita) and GDP. The data is originally from OurWorldData(https://ourworldindata.org/co2-and-greenhouse-gas-emissions), which was then filtered and cleaned by GitHub users(https://github.com/owid/co2-data).

Potential users

The Shiny app is intended for environmental researchers, policymakers, students, or anyone interested in understanding greenhouse gas emissions trends over time and across countries.

Questions to answer

- How have greenhouse gas emissions trends evolved over time?
- How do different countries compare in terms of their emissions?
- How do emissions metrics vary when normalized by population or GDP?

Insights from Data

- **Trends**: Many countries, especially industrialized ones, have seen an increase in CO2 emissions since the start of the industrial revolution in the late 18th century. The data might show spikes in emissions during periods of rapid industrialization or economic growth.

- **Top Emitters**: Historically, countries like the United States, China, and those in the European Union have been among the top CO2 emitters. However, in recent decades, emerging economies like India and Brazil have also seen significant increases.
- **Per Capita vs. Total Emissions**: While some countries might have high total emissions, their per capita emissions might be lower due to large populations. Conversely, some smaller countries might have high per capita emissions but relatively low total emissions.
- **Economic Growth and Emissions**: Emissions often correlate with economic growth, especially in developing countries where industrialization is still ongoing. However, in more developed countries, it's possible to observe a decoupling of GDP growth and emissions, indicating a transition to cleaner technologies or industries.
- **Shifts Over Time**: Given the growing awareness of climate change and international agreements like the Paris Agreement, some countries might show a decline or stabilization in emissions in recent years.

Improvements (Wish List):

- Integration of more datasets for a holistic view (e.g., data on renewable energy adoption).
- Predictive modeling to forecast future emissions based on historical data.
- Interactive features to allow users to drill down into specific regions or time periods.

Sources/Referenece:

- Our World in Data. “CO2 and Greenhouse Gas Emissions.” Our World in Data. 09/02/2023. [Online]. Available: https://ourworldindata.org/co2-and-greenhouse-gas-emissions
- Hannah Ritchie, Max Roser, Edouard Mathieu, Bobbie Macdonald and Pablo Rosado. “CO2 Data.” GitHub. 09/02/2023. [Online]. Available: https://github.com/owid/co2-data

- E. Parker. “nCoV_tracker.” GitHub. 09/22/2023. [Online]. Available: https://github.com/eparker12/nCoV_tracker

Proper Documentation

Reproducibility:

The data analysis process presented in `Manipulate.Rmd` begins with the essential setup, where all required R packages like `dplyr`, `ggplot2`, and `leaflet` are loaded. The raw data is sourced from "data/raw_data.csv", and an initial visualization provides a glimpse into CO2 emissions trends over time. The dataset undergoes cleaning by filtering records post-1850 and transforming key columns, such as normalizing emissions by GDP and ensuring consistent country naming conventions. Missing data is visually explored using an upset plot, offering insights into data completeness. Further data exploration narrows in on specific aspects like top CO2 emitters in 2021. After rigorous data manipulation, the cleaned dataset is saved as "data/rawDF.csv", ensuring it's ready for subsequent analyses. Throughout the process, comments and clear code structuring make the workflow comprehensible and reproducible, ensuring transparency and credibility in the analysis.

Design Decisions (using the what-why-how analysis framework):

What: Data tables representing greenhouse gas emissions for various countries.

Why: To discover and explore trends in emissions over time and across countries.

How: Through data visualizations (like maps, charts) and interactive Shiny elements.

Appendix:

1. A visualization (chart) of my time/task log