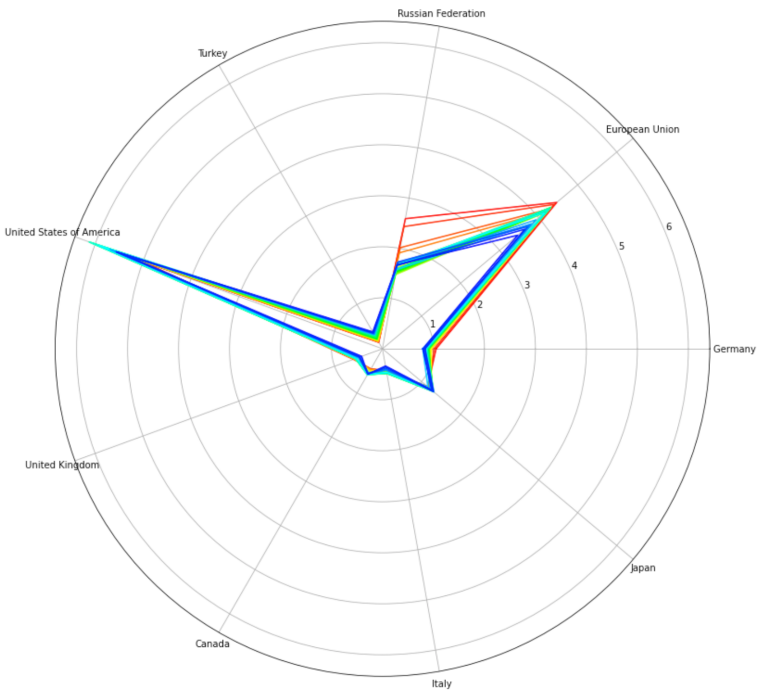
Cagri Gungor – Final Report

How Has the Carbon Dioxide Emission of Countries Changed Over the Years?

Carbon Dioxide Emission of Countries (In Gigatons) From 1990 to 2014



Carbon Dioxide Emission Change of Countries From Their Averages (In Kilotons) From 1990 to 2014

Explanation to Figures and Legend

While the top figure shows the carbon dioxide emission of countries, the below figure shows countries' carbon dioxide emission change according to their averages. The purpose of the top figure is mainly to compare the emission across countries and to give outline information on emission change over the years for each country. The purpose of the below figure is to provide detailed information on emission change over the years for each country. To represent the years, the color change from red to blue is used. The legend shows the years and corresponding colors for each year. The black color represents the averages of the countries in the below figure.

Findings From the Top Figure

- Regardless of the year, the United States has by far the largest carbon dioxide emission among other countries.
- The European Union has the second largest carbon dioxide emissions on average, while the Russian Federation has the third largest.
- Turkey, United Kingdom, Canada and Italy have similar and lowest carbon dioxide emissions on average among the other countries.

Findings From the Below Figure

- United Kingdom, Germany, and European Union gradually decrease their carbon dioxide emissions between 1990 and 2014.
- Russian Federation decreases carbon dioxide emissions between 1990 and around 2000, then increases carbon dioxide emissions and reaches close to its average in 2014.
- United States, Italy, Canada and Japan increase carbon dioxide emissions between 1990 and around 2005, then decreases carbon dioxide emissions. In 2014, while the US and Italy produce CO2 emissions of around 100000 kilotonnes less than their averages, Canada and Japan produce close to their averages.
- Turkey gradually increases their carbon dioxide emissions between 1990 and 2014.

Explanation to Data and Methodology

The dataset named International Greenhouse Gas Emissions has been used for the project that is available on Kaggle. The Greenhouse Gas (GHG) Inventory Data contains the most recently submitted data, covering the period from 1990 to the most current year accessible. The GHG data include details about human-caused emissions by sources and removals by sinks of the following GHGs: carbon dioxide (CO2), methane (CH4), nitrous oxide (N2O), hydrofluorocarbons (HFCs), perfluorocarbons (PFCs), an unspecified mix of HFCs and PFCs, sulfur hexafluoride (SF6), and nitrogen trifluoride (NF3). Only the carbon dioxide information in the dataset has been used for this project. The top figure shows the exact value of the carbon dioxide emission of the countries over the years in the circle. The circle is divided by 9 which is the number of countries has been used for the visualization. There is different size of circles inside the biggest circles that correspond to the carbon dioxide emission level. It increases by 1 gigaton for each circle increment. The below figure also includes same characteristics with top figure. The difference is that the numbers in the below figure are normalized by subtracting the averages of the countries from their emissions over the years. It makes the visualization better in terms of observing the emission change over the years. While the top figure is related to amount of the emission, the below figure is related to change in the emission. In the Legend, the years are represented from red to blue for the years from 1990 to 2014. In this color transition, the middle years like 2002 are represented with a color close to green. Thus, we can basically separate the years with three different main colors. The red like colors are for past before 1995, the green like colors are for middle years between 1997 to 2006, and the blue like colors are for the recent years after 2006 to 2014.

Explanation to Significance

Carbon dioxide emission is one of the biggest factors for global warming so all countries should be careful about their emissions for the safe of the world. In this project, I study the amount of carbon dioxide emission of the countries to observe which country has larger and smaller emissions and the change of the carbon dioxide emission of the countries from their averages to observe the trend in which countries reduce and increase their emissions over the years.

Github Page: https://github.com/cagrigungor/CO2_Emission_Visualization

Dataset: https://www.kaggle.com/datasets/unitednations/international-greenhouse-gas-emissions