INFO 5100

Project 2 Description

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Description of the data

We gathered the following data from multiple sources:

1. Gross Domestic Product data, or GDP for short, of every country from 1960 to 2014, from World Bank database
2. National CO2 emission data of every country from 1960 to 2011, from World Bank database
3. CO2 emission data per capita of every country from 1960 to 2011, from World Bank database
4. ISO 3166-1 numeric country code, from Wikipedia
5. Latitude and longitude of geographic center of every country, from opendata.socrata.com
6. Shape file of world map, world-50m.json, from TopoJSON

Based on the National CO2 emission data, we combined all of the data into one JSON file, following the format below:

[

{

"CountryName": "United States", // country name

"CountryID": 840, // country id from ISO 3166-1

"Latitude": 38, // Latitude of geographic center in USA

"Longitude": -97, // Longitude of geographic center in USA

"CountryCode": "USA", // country code from GDP data

"IndicatorName": "CO2 emissions (kt)", // same for every country

"IndicatorCode": "EN.ATM.CO2E.KT", // same for every country

"y1960": 780726.302, // US National CO2 emission data of 1960. Format of the key is “y” + year, and the data ranges between 1960 and 2011

"p1960": 552066.85, // US CO2 emission data per capita of 1960. Format of the key is “p” + year, and the data ranges between 1960 and 2011

"g1960": 440359.029, // US GDP data of 1960. Format of the key is “g” + year, and the data ranges between 1960 and 2014

}

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The primary data we used are national CO2 emission and GDP data, given that we only have CO2 emission data from 1960 to 2011, while GDP data ranges from 1960 to 2014, we decided to limit the display between 1960 and 2011 only.

Data Mapping

There are 4 visualization elements in our project: the GDP map, CO2 emission circle, GDP pie chart, and detailed information of each country. The value of all four elements will change if the year changes on the time axis.

1. GDP map:

We started by grouping every country’s GDP by year, and then based on the data size, we map them to a color range of ["#2a2f3c", "#8792ab"] by linear scale. The smaller the GDP, the darker the color.

When drawing the map, each country would be filled with different color, based on its GDP level.

2. CO2 emission circle:

First of all, we grouped all national CO2 emission data from all years. Then we map the entire dataset data to a linear scale, which would be reflected as the radius of circles. Each circle was centered at the geographic center of its corresponding country.

3. GDP pie chart:

Using the same GDP data, we divided each country’s GDP by the sum of GDP of the same year, to get the GDP percentage of that country against the world. Then we mapped the percentage to a pie chart. With color randomly assigned from color d3.category20c.

4. Detailed information of each country:

When hovering over each country, a prompt will pop up and display a detailed report on that country in that year; data displayed included, country name, total CO2 emissions in Kilo Ton, Percentage of world emissions, metric tons per capita, and GDP. Also, there will be a line chart that shows the GDP level against Total CO2 emissions, from year 1960 to 2011.

GDP and total CO2 emission data were mapped to a log scale, in order to even out its difference in absolute value.

The Story

From year 1960 to 2011, we have discovered that almost every country has enjoyed some level of economic development, although different countries grow at different rate.

While United States stayed at the top all the time, countries such as Japan and Germany had a major growth during the 60s and 70s; when their growth plateaued starting in the 90s, Brazil, China, and India has entered into a period of high growth, and the trend continued until 2011.

Countries in Africa and East Europe enjoyed their share of economic prosperity, however, they remained less developed compared to their peers in other continents.

With the GDP growing at all time, we also noticed that, for most countries, carbon dioxide (CO2) emission level increased alongside the economic gains. The only exception is United States. In the 21st century, US economy kept its growth, but its CO2 emission level plateaued around 5.7 million Kilo Tons per year. Our guess was that the deployment of green tech and clean energy movement may have taken into effect in recent years, hence they have successfully limited emission of the greenhouse gases.