Jeremy Fedewa

CMSE 402 Final Project Writeup

4/26/2022

What did I do?

For this project, I looked at temperature data for a bunch of countries and regions, and looked for trends in temperature change and how they varied by country, by region, and by industrialization.

What dataset did I use?

Originally, I was using a dataset from the National Oceanic and Atmospheric Administration (NOAA), which had temperature data for a bunch of weather stations across the United States. The data spanned the years between 1750 and 2019 and there were daily weather readings (maximum temperature, minimum temperature, and precipitation) for each weather station. There were an astronomically huge number of datapoints, with hundreds of thousands of rows of data for every year, and separate files for each year which had to be individually downloaded and unzipped. This proved a little too overwhelming for me, so I decided to switch to a smaller (and more well organized) dataset from Kaggle.

This new dataset had temperature data for several hundred countries and regions spanning from 1961 to 2019. The temperature change was given in monthly, quarterly, and yearly intervals, with the given temperature given as a difference from a baseline temperature defined by the average temperature between 1950 and 1980. This dataset was way easier to work with, but unfortunately it didn't allow me to do the same kind of analysis I originally was interested in doing.

I also used a dataset which was just a list of countries, their corresponding 3-digit codes, latitudes and longitudes. This allowed me to make my choropleth graphs using Plotly, as my original dataset didn't include country codes. I also used these latitude and longitude coordinates to check for any correlation between latitude and temperature change.

What questions did I ask?

Before I switched datasets, I was interested in looking at what day, on average, is the best to plant certain crops in different parts of the United States. With my new dataset, this wasn't feasible.

Instead, I decided to look at:

- How have global temperatures changed since 1961?
- How are different areas of the world were affected differently by climate change? (does latitude have an effect? What about industrialization? Are different continents affected differently?)

What argument did I ultimately make?

I found that, as is widely known, global temperatures have risen nearly 1.5 degrees Celsius since 1980. Also, countries at more extreme latitudes – as well as more industrialized countries – tend to

experience more extreme temperature change. Europe was the continent with the most extreme temperature change since 1980, with a 2019 temperature anomaly above 2.0 degrees.

Using these trends, I concluded that ultimately, the countries which are responsible for the largest portion of the world's greenhouse gas emissions are also the countries experiencing some of the most extreme consequences of climate change.

What did I learn?

- How to use a diverse range of visualizations (trying not to just make 4 line plots).
- How to make all of my visualizations look like they belong together, carefully choosing a color scheme to make my poster as easy to understand as possible.
- How to make radial line graphs (which I used to compare the continents).
- How to properly format a poster (I'd never done one before this project).

What went as expected? What didn't?

The biggest thing that didn't go to plan was needing to switch datasets part of the way through the project. Trying to figure out what to do that was in the same vein as my original idea was a little difficult, but it wasn't a major setback. A few rows of my data gave me trouble, especially when the name of a country changes in the middle of the dataset. I spent a lot of time trying to stitch together the two parts of my Russia data, half labelled "USSR" and the other half labelled "Russian Federation", but for some reason, no matter what I did it didn't want to behave, so I ended up omitting it from my final project.

Everything else pretty much went how I wanted it to. Cleaning and analyzing the data wasn't overly difficult and I think my visualizations turned out really nicely. I found some clear trends in my data which made it fun to visualize. I especially like the last visualization on my poster comparing temperature change in Europe and industrialized countries to temperature change in non-industrialized and less developed countries. I really like how it clearly shows that industrialized countries experience much more temperature change than non-industrialized countries.