

- Who worked on the project
 - THE Kent Ratliff. And Jackson Yang
- How to deploy the project
 - One file of code, one csv file, one json file. All packed together, just need to edit the two lines in the code file to properly locate the csv and json
- Where the data came from
 - We are using data from the United Nations Environmental Programme, openly available at their website
- What you did to transform the data to a usable state
 - I'm glad you asked. The vast majority of time that was put into this project was spent on cleaning, manipulating, recleaning, and transforming the data. Unfortunately for something as official as the UN, the data was not in great shape when we got it. We gathered several CSVs of data on different environmental factors such as greenhouse gas emissions and the amount of arable land that a country had. Unfortunately, while several universal identification systems are in place for identifying countries, there were many discrepancies between our CSV data and the topoJSON that was drawing our world map. Essentially the topoJSON was IDing regions it was drawing differently than our CSV was IDing countries, so we could not match data to a geo spatial region, which is the core idea of our visualization. This realization occurred after running through several different world map topoJSONs, as those that would easily draw would make it more difficult to identify countries, or some would appear to draw separate regions while it was actually just drawing lines on top of a land shape. Unfortunately that last part was realized after we manually went into the JSON file and appended a country name to every single region so that we could match it to our CSV based off of that, only to once again be devastated by the realization that we had spent significant time attempting to clean data we could not use. Ultimately, we were led to a workable topoJSON that a past student had used (thanks Professor), and it appeared we were in good shape. Alas, we were not free yet. We had to edit the CSV to create multiple entries for certain countries that were split into parts so that the correct entire region would be changing color based off of the right data. Then, we encountered more struggles with our CSV. Our data was organized in such a way that we could not figure out how to actually use; it was wide rather than long. Each country had its own row and then columns with a data type and year, but despite our efforts we were not able to use it in this format. A quick piazza response sent us on our way into python territory to successfully transpose our data into the proper format, leaving only some manual deleting of extra spaces and trimming strangely named countries that the python script could not recognize.
- A description of who the visualization is for and what questions it is designed to answer
 - The description is for people ranging from the environmental scientist to the curious procrastinator looking to explore some interesting data. It answers questions regarding the current state of the world environments and the

seriousness that is the reality of climate change. How has this country changed over time in terms of this data? What regions are generally worse/better when it comes to this environmental data? Thanks to our choropleth map, you can easily tell by color which areas and countries contribute the most or least to climate change causing phenomena.

- A description of the visualization including rationale for the encodings and interactions you chose. A description of any approaches you contemplated or tried and then rejects would be appropriate as well
 - We have a topoJSON choropleth world map that colors countries based off of environmental data that can be chosen from a dropdown menu. We needed to have a change in dataset across the map visualization so we needed one variable. The bulk of the approaches that failed that are worth discussing dealt with the cleaning and implementation of the data. Building the framework was fairly straightforward but we tried many approaches to get the data to work, several of which were listed above. Several different for loop iterations, data translations, and manual manipulation all failed. We contemplated a 3d globe instead of a 2d map but realized quickly that in terms of comparison, a key part of the vis, a globe does not allow for comparison across all countries as not all can be visible at any one time.
- An evaluation of your project. What works, what doesn't work, what changes would you make if you were to do this again.
 - Users are able to select from a list of environmental factors and have the content of the map change based on what they select. Unfortunately, we were unable to implement selecting years, so the first recorded year of that dataset is what is displayed. The line graph did not end up getting implemented mainly due to time constraints caused by an overwhelming amount of time (~15hrs) being spent on data cleaning.
 - The color scale changes based on what is selected, the tooltip shows users details about specific countries