Sam Scherer: Bad Air – Documentation

Project Motivation

The purpose of this project is to allow users to understand trends in air quality in Hamilton, and to allow users to compare air quality of US counties between the years 1980 and 2021.

Data Used for Visualizations

These visualizations implement data acquired from https://www.epa.gov/outdoor-air-quality-data, accessed on February 15, 2022. Data was also pre-processed before being added to the application: separate yearly per-county datasets were combined into a larger 1980-2021 dataset, and county FIPS codes were added to each data item to match their respective county names, so that the choropleth map could be implemented more easily.

Visualization Components

The project can be separated into 3 'views,' though in implementation these views are really just sections of the page separated by vertical position on the page, accessible by scrolling.

The first view, *US Air Quality by County*, shows a map of the United States, broken up along county lines. Each county is color-coded depending on its 90th percentile AQI in 2021, with a darker color representing a higher value. On the right side of the view, users can select a different year to view data for, or can choose to color-code based on Max AQI or Median AQI instead of 90th percentile AQI. Hovering the mouse cursor over a county displays that county's value for the selected year and data type.

US Air Quality by County

2021 - 90th Percentile AQI
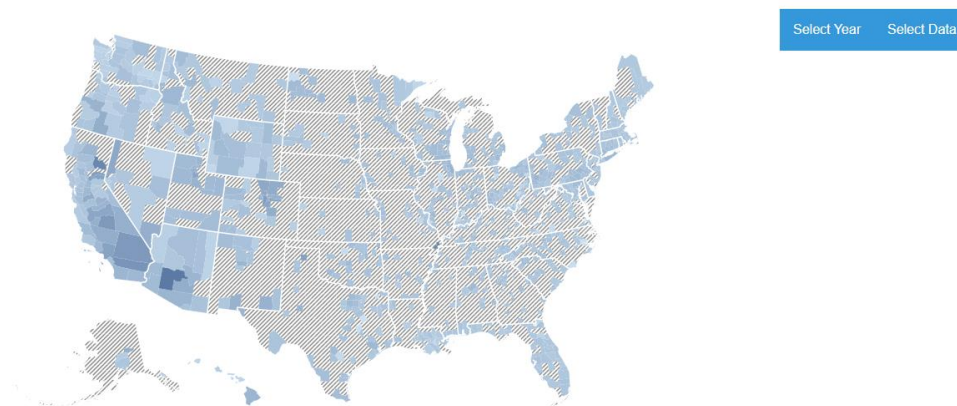
The second view, *Data for Hamilton County, 1980-2021,* contains three static multi-line graphs, which display changes in air quality from 1980-2021 for Hamilton County, Ohio. The purpose of these graphs are as follows: "Hamilton County AQI vs. Time," which shows Max AQI, 90th Percentile AQI, and Median AQI values per year, "Hamilton County - # Of Days where Pollutants were the Main Pollutant vs Time," which shows trends in the main air pollutant from 1980-2021, and "Hamilton County – Days without Data," which shows the number of days without data per year (which is typically near 0, but increases for the year 2021).

Data for Hamilton County, 1980-2021:

The third view, *Data for Hamilton County, 2021* contains two bar charts, which visualize air quality for Hamilton County, Ohio in 2021. The first chart, "Percentages per Daily AQI Hazard Level for 2021," shows the 6 hazard levels, and the percentage of days in which air quality reached those levels for Hamilton County in 2021. The second graph, "Percentage Of Days where Pollutants were the Main Pollutant for 2021", shows the measured pollutants on the X-axis, and the percentage of days where they were the most prevalent on the Y-axis (there is also an accidental, additional and item among the pollutants. This item doesn't affect the other days' data, and can be ignored).

Data for Hamilton County, 2021:
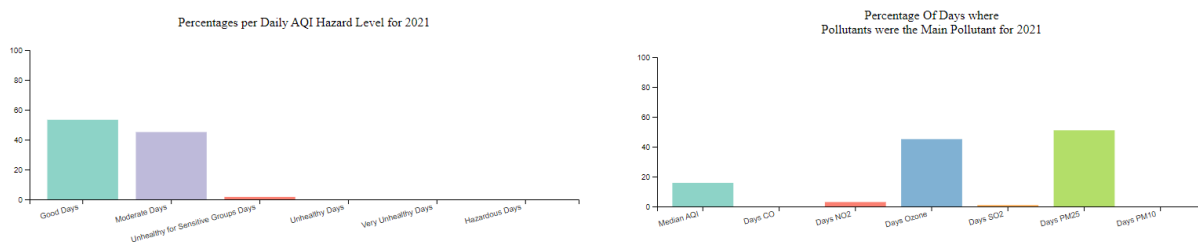
Findings Reached

The first view shows that, in the year 2021, the air quality is worse in the western end of the US. More information can be found by using the application, but this is the first thing that I notice when observing the visualization.

The second view shows that AQI levels have been improving over time for Hamilton County, and that SO2 prevalence has been decreasing, replaced with a higher prevalence of PM25.

The third view shows that the AQI levels for Hamilton County in 2021 are primarily at good-to-moderate levels, with a small but non-zero number of days during which the air is unhealthy for sensitive groups.

Technology Documentation

In creating these visualizations I used d3, and Topojson. I *did not* use any javascript frameworks like React or Bootstrap. I organized my code with classes, where each visualization has no more than 1 class (the Bar chart visualizations share a class).

To run my application locally, download my https://github.com/swiimii/VID_Assignments repo, navigate to the *Midterm_Project* folder, start an http server in that folder, then visit the address at your local server. My application can also be accessed at https://www.sam-scherer.com/VID_Assignments/Midterm_Project/ (via Github Pages).

Demo Video: https://www.youtube.com/watch?v=LQWn2nvNAPI