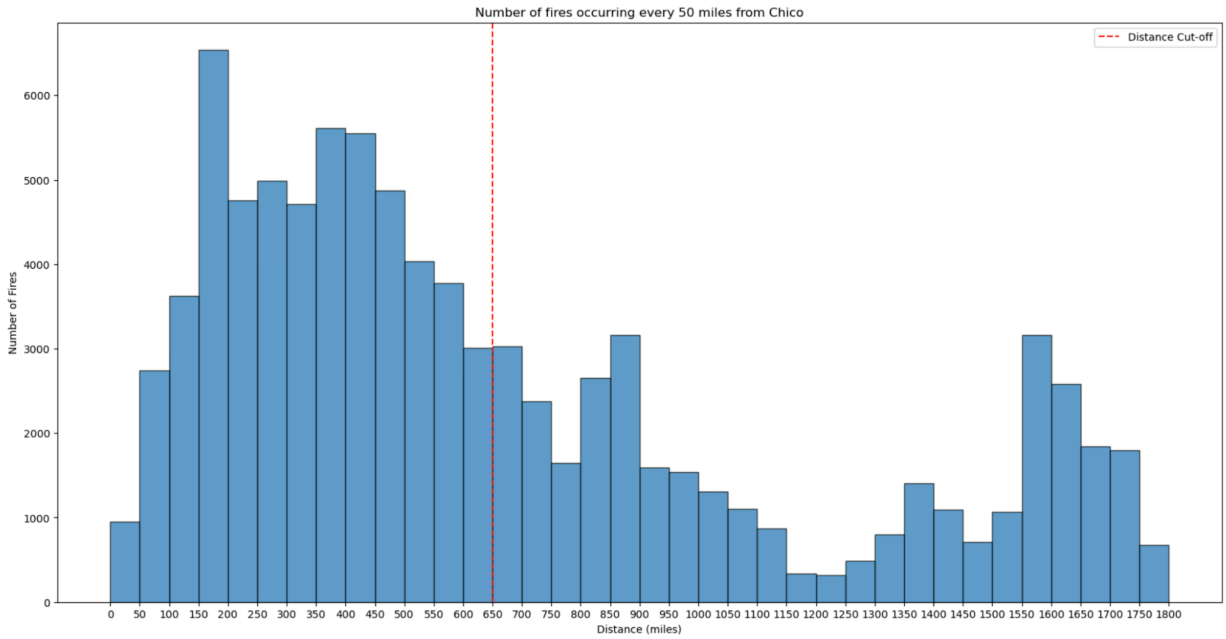
Visualizations

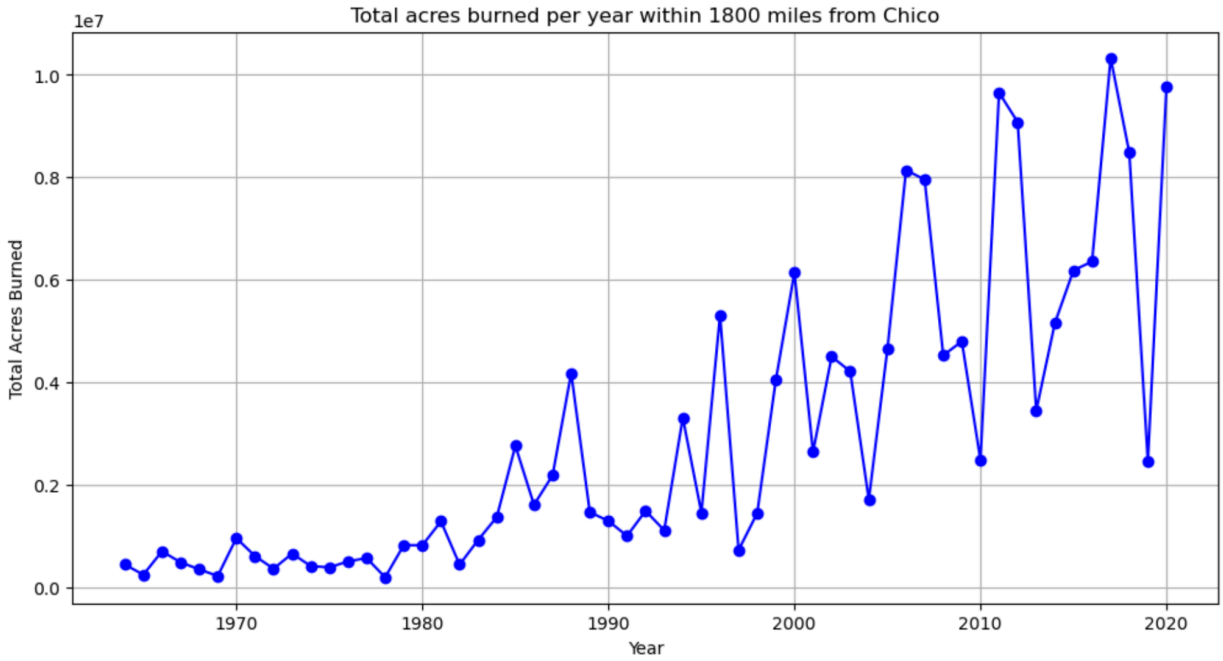
1. A histogram showing the number of fires occurring every 50 mile distance from your assigned city for all fires ranging up to 1800 miles away from Chico, CA.



This histogram shows the distribution of wildfires occurring every 50 mile distances from Chico, CA, within a range of up to 1800 miles. The data is binned in 50-mile intervals, providing a visual representation of how wildfire occurrences vary with distance from Chico. The x-axis represents the distance from Chico, and the y-axis represents the number of fires that occurred within each 50-mile interval. Viewers can look at the height of the bars to determine the frequency of fires at different distances to observe the trend that there are more fires closer to Chico, CA.

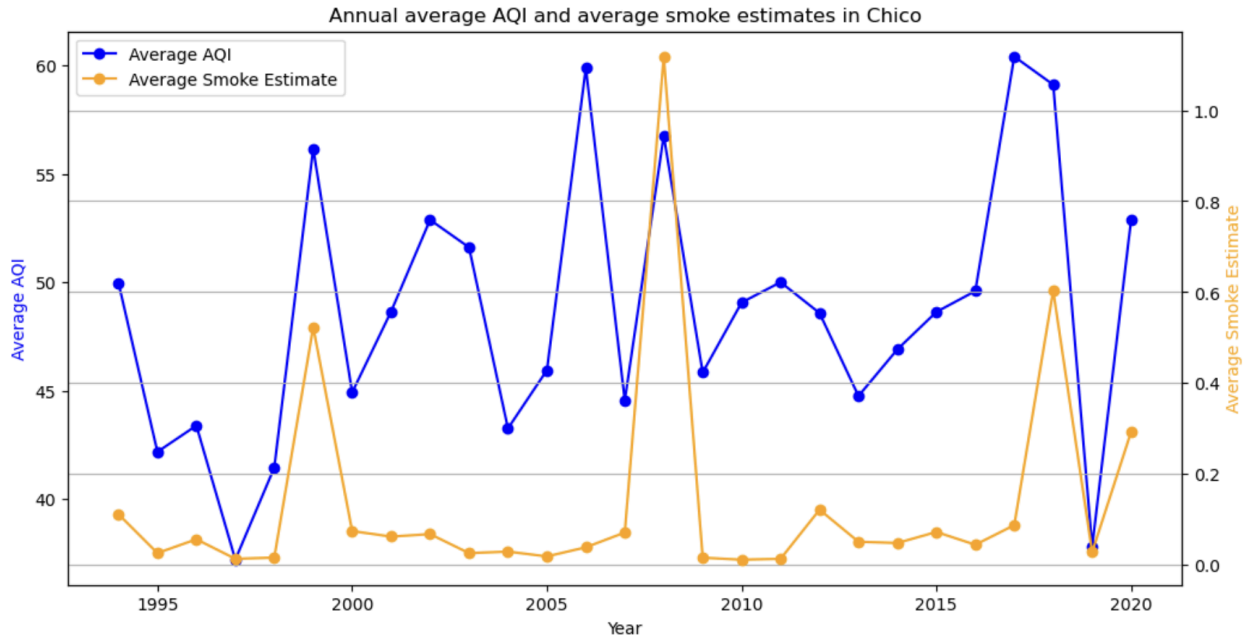
The underlying data is based on the Combined wildland fire datasets for the United States and certain territories, 1800s-Present (combined wildland fire polygons), collected and aggregated by the US Geological Survey. Data processing includes filtering to include only wildfires within 1800 miles of Chico and the last 60 years of wildland fire data (1964-2024).

2. A time series graph of total acres burned per year for the fires occurring in the specified distance from Chico, CA.



This figure shows a time series of the total acres burned per year for wildfires occurring within 1800 miles from Chico, CA, over the last 60 years. The viewer can read the figure by observing the patterns in the total acres burned per year over time. The x-axis represents the years and the y-axis represents the total acres burned per year for the wildfires occurring within 1800 miles. Same as the first graph, the underlying data is derived from the combined wildland fire datasets. Data processing involves filtering the dataset to include only wildfires within 1800 miles from Chico, CA, and aggregating the total acres burned for each year. The time period for the data spans from 1964 to 2024.

3. A time series graph containing fire smoke estimates and the AQI estimates for Chico, CA.



This time series graph illustrates the annual average Air Quality Index (AQI) and the annual average fire smoke estimates for Chico, CA, over the last 60 years (1964 to 2024). Viewers can read the figure by observing the two different y-axes and the trends in the plotted lines. The left y-axis represents the annual average AQI, plotted in blue, while the right y-axis represents the annual average smoke estimates, plotted in yellow. The x-axis represents the years.

The underlying data consists of two components. For average AQI, the data is collected from the US EPA using their Air Quality System (AQS) API. The average smoke estimates are derived from the wildfire data collected from the combined wildland fire datasets, it estimates the impact of smoke on air quality based on the distance and size of fires near Chico, CA, and fire type. Data processing involves aggregating AQI values and calculating smoke estimates for each year, resulting in two comparable datasets over the same time period.

Reflection

One key takeaway I had from answering the research question posed by this assignment is that from the time series graph containing the fire smoke estimates and the AQI estimates, I observed that there are certain years where both the AQI and smoke estimates spike together (for example, 1999, 2008, and 2018), suggesting a possible positive correlation between AQI and smoke impact. However, there are also years where trends diverge, indicating that while there is some correlation, it might not be consistent across all years. There may be other influencing factors on AQI apart from wildfire smoke alone. From the data acquisition process, I've also become more familiar with obtaining data from APIs and working with GeoJSON files.

The possibility of collaboration changed my thinking about how to approach the smoke estimate calculation, and ways to visualize data. By leveraging the strengths and expertise of my peers, I was able to approach the problem more comprehensively and creatively.

Attributions:

Visualization techniques, such as using a dual-axis plot for AQI and smoke estimates, were developed through discussions with a peer, Joobee. The calculation logic for smoke estimates was inspired through brainstorming sessions with another peer, Fiona. Methods to process the wildfire GeoJSON data and request AQI data through API calls were referenced through example notebooks shared by Dr. David McDonald.