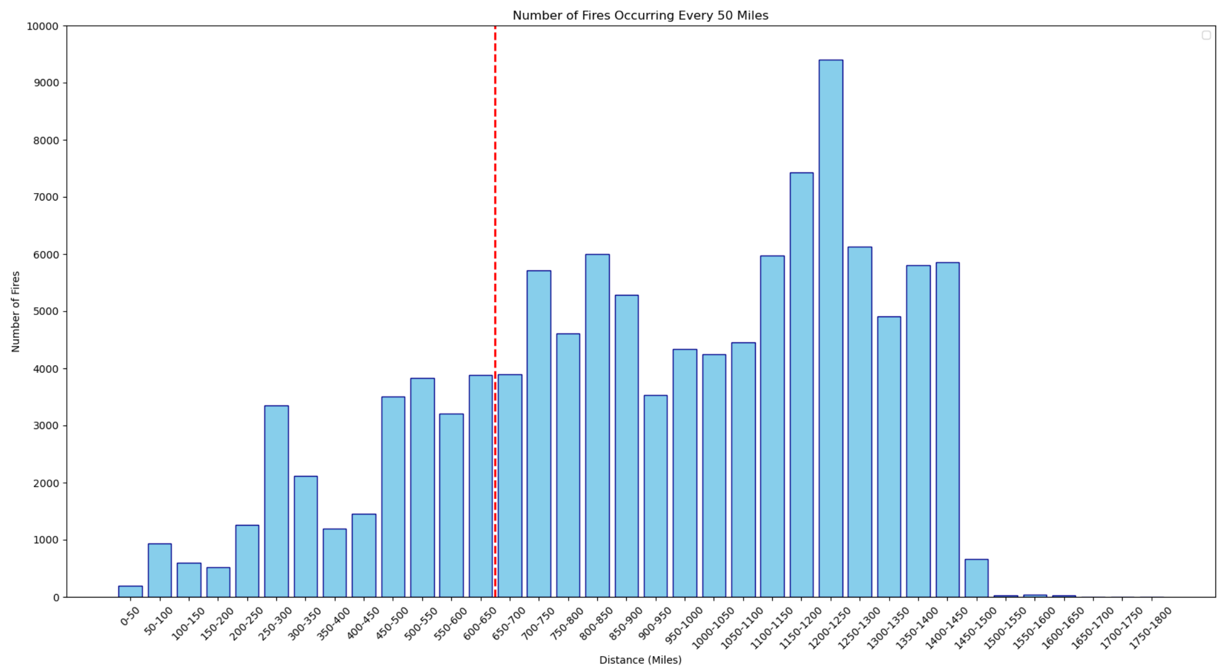
Wildfire Analysis – Wichita Kansas

Graph 1: Histogram of number of fires occurring every 50 miles, ranging up to 1800 miles from Wichita, Kansas.



This histogram shows the distribution of wildfires occurring, in increments of 50 miles, ranging up to 1800 miles from Wichita, Kansas. The x-axis represents the distance bins, grouped in intervals of 50 miles. Each bin corresponds to a specific range in distance from Wichita Kansas. The y-axis represents the number of wildfires within each distance bin. The original data consists of the year and distance in miles. I generated distance bins ranging from 0 to 1800 with increments of 50 miles. For each bin, I filtered the rows to include wildfires where the distance falls within the range (eg: Distances from 0 miles to less than 50 miles will be in the 0-50 bin). I counted the number of entries and saved it as the number of fires for that bin.

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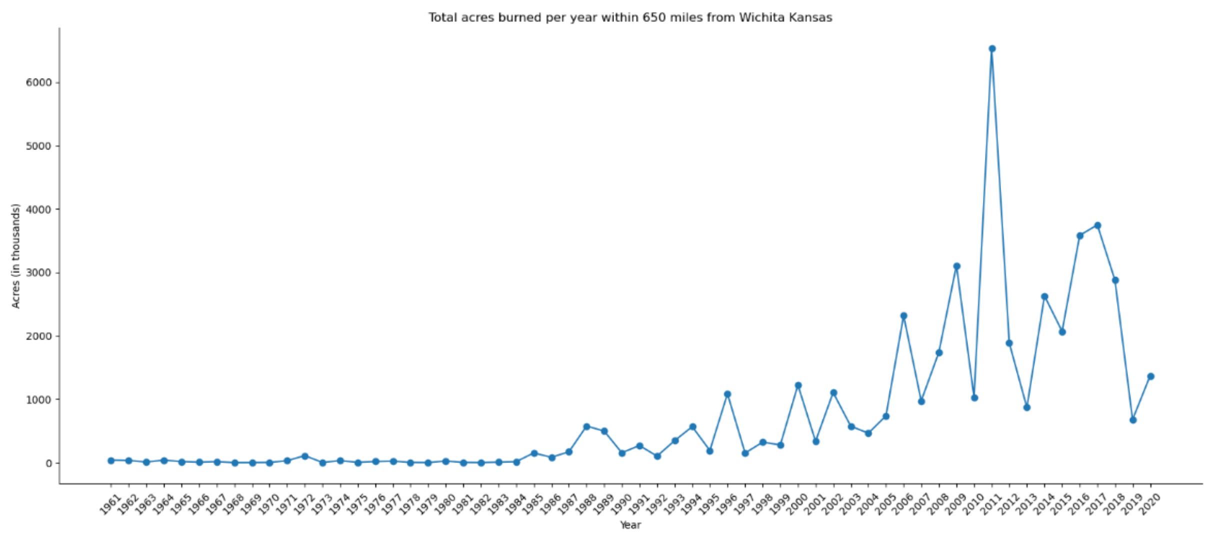
Graph 2: Time series graph of total acres burned per year for fires occurring up to 650 miles from Wichita, Kansas.



This time series shows the total acres burned per year, for wildfires up to 650 miles from Wichita, Kansas. The x-axis represents the year, and the y-axis represents the total acres burned in thousands of acres. I chose to display the total acres burned in thousands for improved readability, making it easier to observe trends over the years.

The original dataset consists of individual records for each wildfire. It contains the year, acres burnt, and the distance from Wichita Kansas. I first filtered for entries to include only wildfires where the distance is within 650 miles of Wichita Kanas. I then grouped the data by year and calculated the total sum of acres burned for the year.

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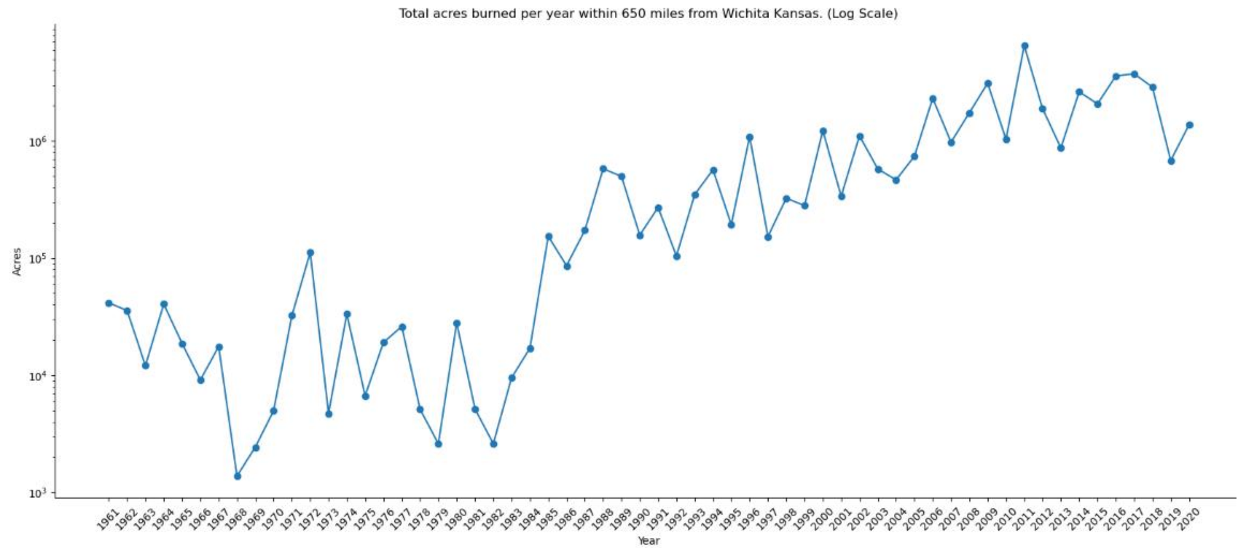
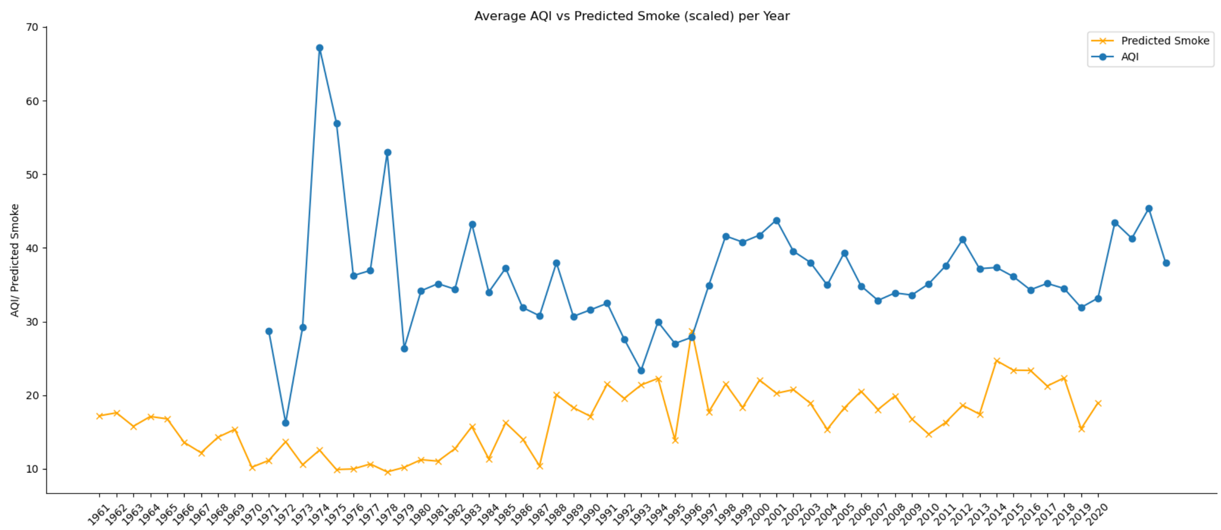
Graph 2.1: Time series graph of total acres burned per year for fires occurring up to 650 miles from Wichita, Kansas. (Logarithmic Scale)



This time series graph is similar to Graph 2, with the exception of a logarithmic scale being applied on the y-axis which represents the total acres burned. The logarithmic scale allowed a clearer visualization of the data as there are drastic differences in total acres burned. Between 1961 and 1984, the total acres were relatively low compared to the rest of the years. These years appeared compressed, and it was difficult to explore trends. This choice allowed for a clearer comparison between the years and emphasized the relative changes.

Graph 3: Time series graph containing fire smoke estimates and AQI for Wichita, Kansas.



This time series graph shows the fire smoke estimates and the yearly average AQI for Wichita Kansas. The x-axis represents the year, and the y-axis represents the AQI value or predicted smoke. The AQI is indicated by the blue line with solid circle dots, and the predicted smoke is indicated by the orange/yellow line with an x.

The original AQI data contains the parameters (eg: PM2.0), year, and AQI. I calculated the yearly average AQI by grouping the entries by year and calculating the average AQI per year. The original predicted smoke data contains the year and predicted smoke. I grouped the entries by year and calculated the average predicted smoke for the year. Since it doesn't make sense for predicted smoke to be negative, I applied log transformation to the value and used the absolute value. Afterwards, I multiplied the value by 100 so it's on a similar scale to AQI for easier comparison.

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Reflection Statement

While exploring the estimated impacts of wildfire smoke on Wichita Kansas over the last 60 years. I encountered some unexpected findings regarding the correlation between wildfire smoke and air quality. I had expected that there would be a strong positive correlation between AQI and years (especially in the recent years). This was due to frequent fires in recent years and global warming worries. While there is an overall positive trend, it was not as strong as expected. This lines with my hypothesis that we need to consider more variables to gain a comprehensive understanding of smoke's impacts. For example, wind direction and intensity could significantly influence the results.

Throughout the process, I have also gained a clearer understanding of the structure of the wildfire dataset and GeoJSON files.

For the project, I referenced the example code provided by Dr. David W. McDonald to carry out the API call for AQI, reading the wildland fire dataset and computing the distance from the wildfire. I also had discussions with a peer (April) who has already taken this class. She enriched my understandings about the dataset and sparked ideas for my smoke prediction.

The discussion with my peers helped me approach smoke estimates creatively. It has fostered a lot of brainstorming and has allowed me to explore features from the wildfire dataset to include in my model. It was interesting because we all had a different way of thinking about how to represent smoke impact.

I thought it was interesting how we are all working on different cities. While we are doing the same tasks, our results highly differ, and it was exciting to see the different results.