TDS3401 Data Visualization

Trimester 2, 2022/2023

Assignment 2

Tutorial Section: TT2L

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1. Dataset Description

The dataset utilized is the US Air Pollution Data, encompassing air quality measurements from various states and cities in the US. It includes information on pollutants such as NO2, O3, SO2, and CO, along with corresponding AQI values, mean values, 1st Max Value, and 1st Max Hour. The analysis focuses on the year 2015, enabling the examination of pollution trends, identification of regions with elevated pollution levels, and assessment of the impact of pollutants on air quality and human health.
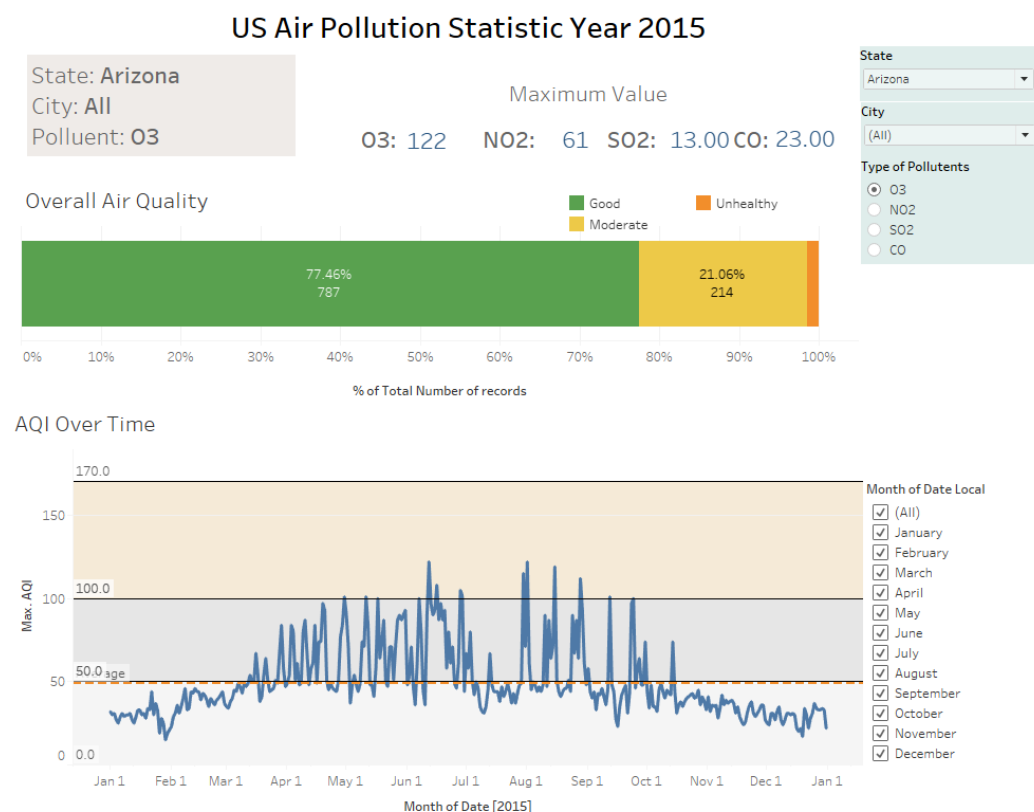
2. Summary Visualization

Figure 1: US Air Pollution Statistic Year 2015 Dashboard

This interactive dashboard enables users to analyze air quality data at the state and city level, providing a comprehensive understanding of pollution variations across different locations. Users can customize their analysis by selecting specific

pollutants and cities using interactive filters, aligning with their research goals. The stacked bar chart allows for a detailed examination of air quality values throughout 2015, categorized into Good, Moderate, Unhealthy, and Bad levels. The interactive features engage users, allowing them to explore the data, interact with filters, and observe changes in air quality parameters. Indicators confirm the selected elements and display the maximum value for each pollutant. The time filter in the "AQI Over Time" visualization facilitates the identification of temporal patterns and potential seasonal trends in overall pollution levels. Users can interact with the time filter to focus on specific date ranges and gain insights into the overall AQI trends.

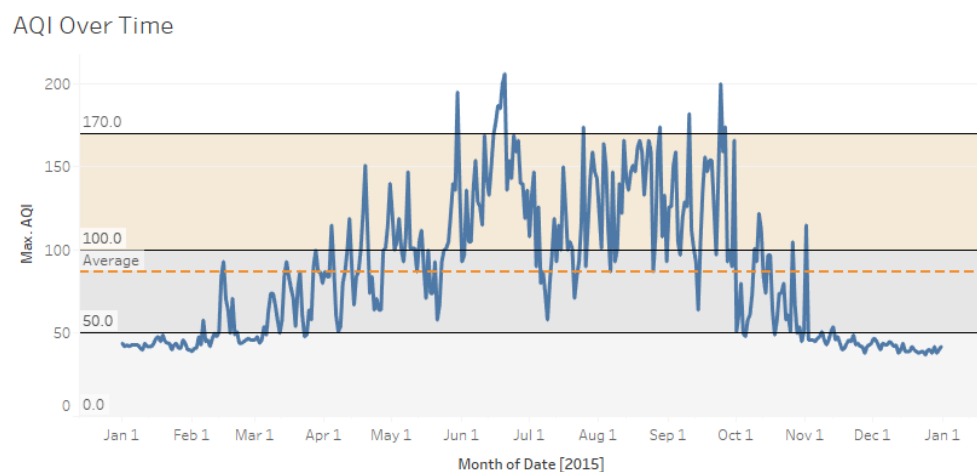# 3. Describe the trend, pattern, or relationship

Figure 2: Overall AQI Over Time in US states

The AQI Over Time - line chart provides a monthly analysis of air quality using the Average AQI value and identifies the maximum AQI value for each month. The visualization reveals the overall trend and patterns in air quality throughout the year. The average AQI line remains relatively stable at around level 52, indicating consistent air quality conditions. However, the other lines show an upward trend from April to the end of October, with air quality fluctuating between the "Good" and "Moderate" levels. This suggests that pollution levels vary during this period, warranting further investigation into the factors contributing to the increase in the overall air quality index. For the next step, we need to understand these causes.

4. Possible story or explanation for the trend

Based on the observed trend in the AQI Over Time - line chart, we can hypothesize a possible story for the fluctuation in air quality. From April to the end of October, there is an upward trend in pollution levels, with the AQI fluctuating between "Good" and "Moderate" levels.
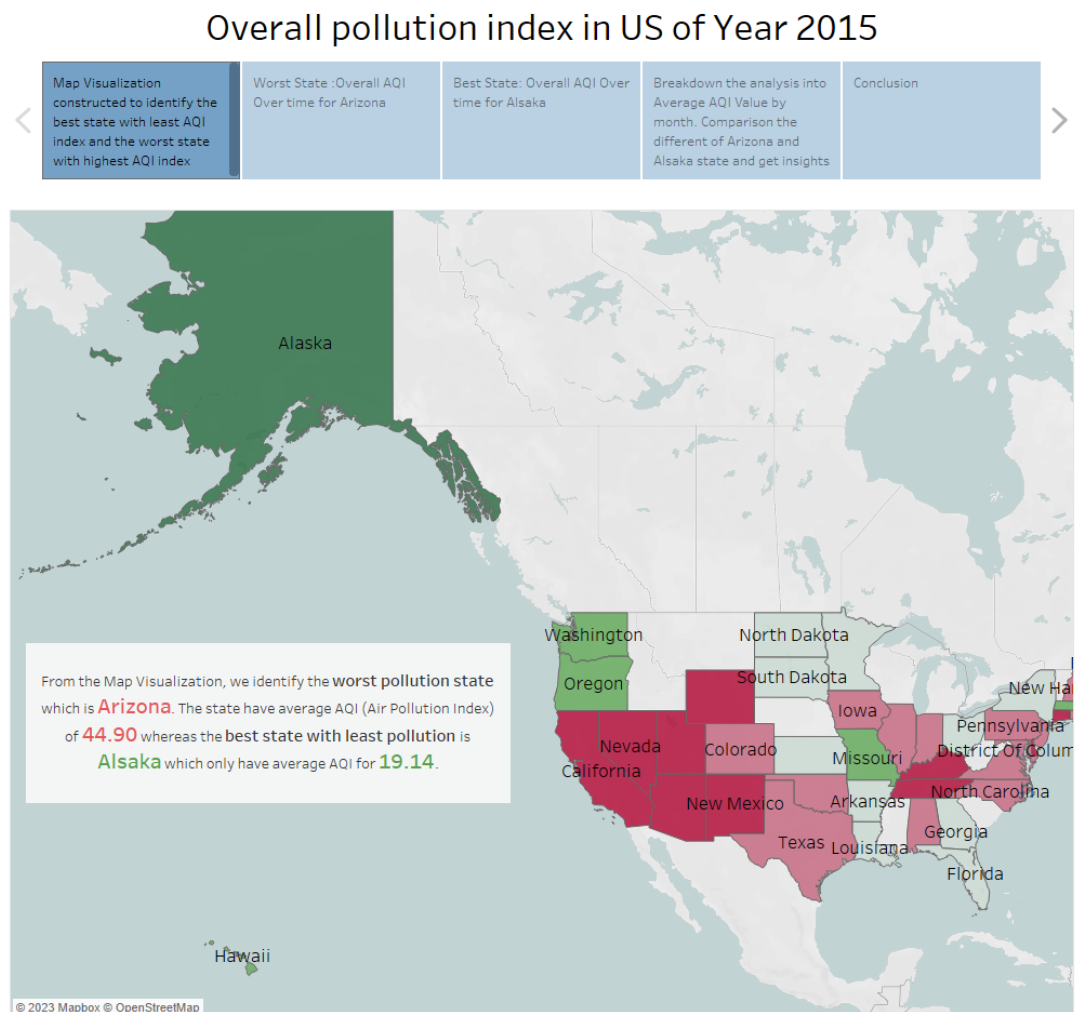
Overall pollution index in US of Year 2015

Figure 3: Map Visualization for Data Story

Our data story begins with a map visualization, which identifies Arizona as having the highest AQI and Alaska as having the lowest. To gain deeper insights, we use line graphs to analyze air quality trends in these states.
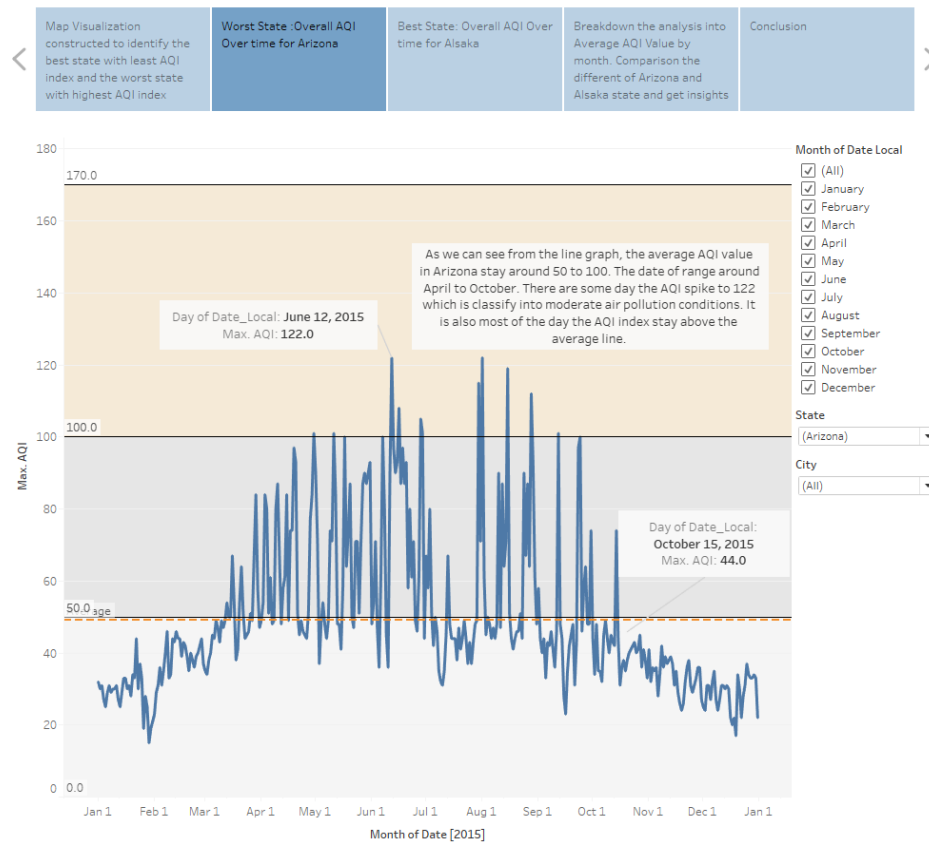
Figure 4: Worst State line graph analysis

Overall pollution index in US of Year 2015
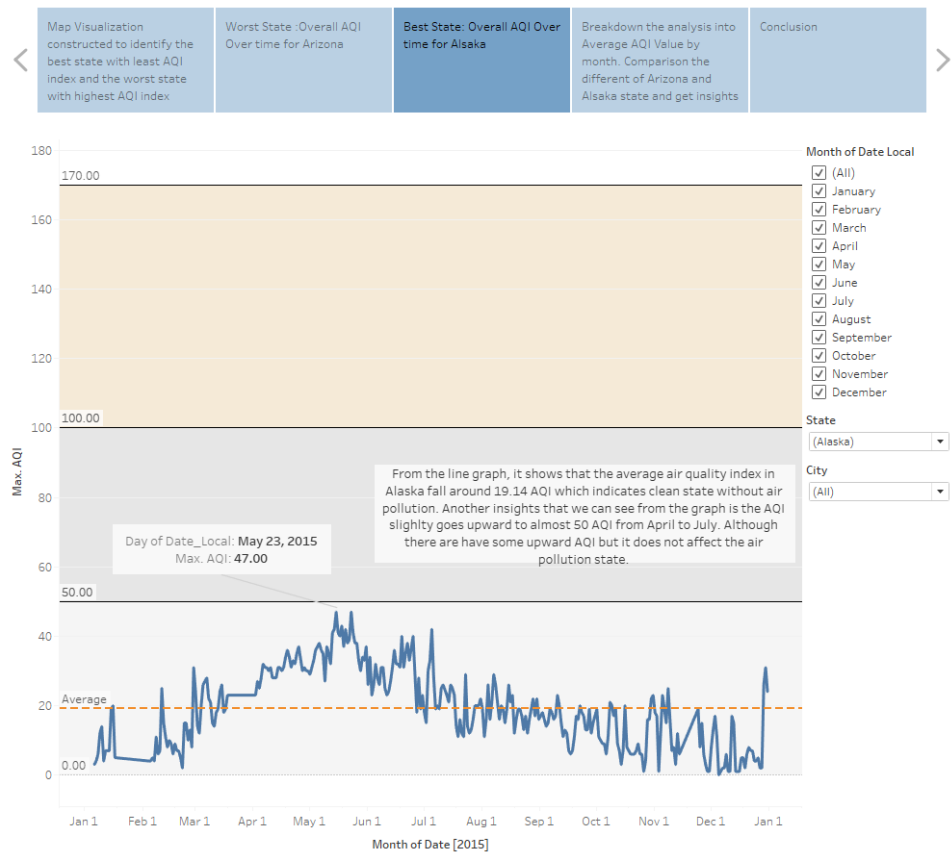
Figure 5: Best State line graph analysis

To further understand the trend, we expand the visualization to include bar charts depicting the overall AQI values for all states. By comparing pollution levels across the months, specifically from April to August, we identify specific pollutants such as NO2, O3, SO2, and CO that show higher concentrations during this time period. We then compare and contrast the air quality of Arizona and Alaska with the overall trends, seeking further insights.

Overall pollution index in US of Year 2015

Map Visualization constructed to identify the best state with least AQI index and the worst state with highest AQI index	Worst State :Overall AQI Over time for Arizona	Best State: Overall AQI Over time for Alsaka	Breakdown the analysis into Average AQI Value by month. Comparison the different of Arizona and Alsaka state and get insights	Conclusion

Average AQI Value by Month

Date Local

	April	May	June	July	August
O3	43.52	45.23	46.18	40.96	45.88
NO2	18.54	14.05	13.60	13.01	14.48
CO	3.56	2.98	2.90	3.07	3.24
SO2	2.44	1.97	2.00	2.07	2.33

Pollutents: O3, NO2, CO, SO2

Arizona

Month of D..		Value
April	O3	56.86
	NO2	29.89
	CO	5.04
	SO2	0.92
May	O3	60.60
	NO2	23.69
	CO	4.21
	SO2	1.20
June	O3	63.71
	NO2	21.70
	CO	3.82
	SO2	0.83
July	O3	45.26
	NO2	15.65
	CO	2.66
	SO2	1.35
August	O3	55.63
	NO2	20.62
	CO	3.80
	SO2	1.37

Alsaka

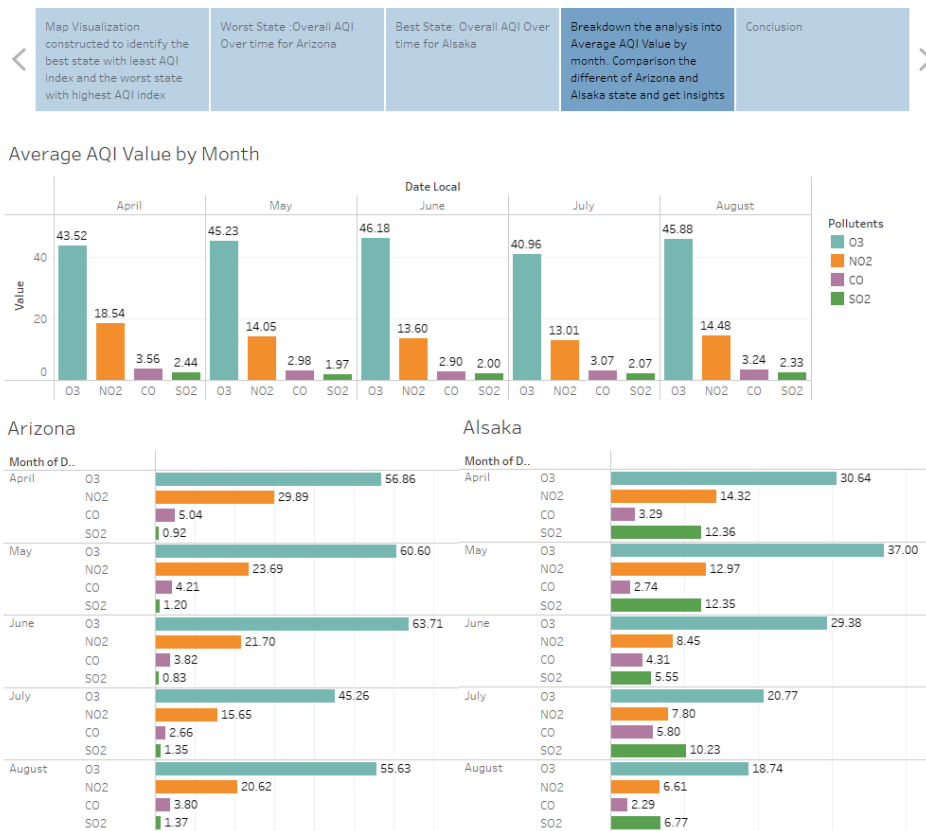| Month of D..		Value
April	O3	30.64
	NO2	14.32
	CO	3.29
	SO2	12.36
May	O3	37.00
	NO2	12.97
	CO	2.74
	SO2	12.35
June	O3	29.38
	NO2	8.45
	CO	4.31
	SO2	5.55
July	O3	20.77
	NO2	7.80
	CO	5.80
	SO2	10.23
August	O3	18.74
	NO2	6.61
	CO	2.29
	SO2	6.77

Figure 6: Overall Average AQI, Arizona state and Alaska state by selected month bar chart visualization

5. Describe how the visualizations of your data story fulfill each of the design principles.

In my data story, I followed the design principles of Cole Nussbaumer to create my visualizations. First, I made sure the visuals accurately represented the US pollution air quality data. The use of appropriate chart types, such as line graphs and bar charts, effectively convey the trends and patterns in the data without distorting or misrepresenting the information. Second, I added interactive features like filters so that users can customize their analysis and get useful insights from the data. The inclusion of interactive filters and a time filter empowers users to customize their analysis, focusing on specific pollutants, cities, or time periods of interest. Third, I made sure the visuals were easy to understand and accessible to a wide range of users. Clear labels, legends, and tooltips provide context and explanations for the

data, ensuring that users can interpret the information accurately. The use of color coding and consistent visual elements aids in conveying information effectively. Finally, The visualizations are visually appealing, employing a clean and cohesive design. The choice of colors, fonts, and layout elements creates a visually pleasing and harmonious overall appearance. Overall, my visualizations follow these design principles to provide accurate, useful, and visually appealing information to users.