Charlotte Weather Patterns
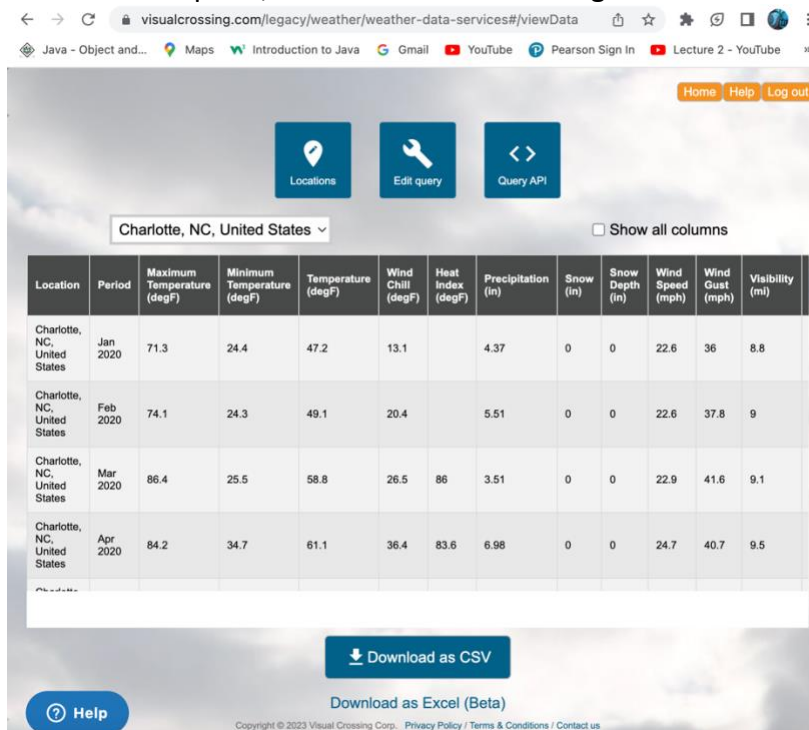
Link to Visual Crossing Data: https://www.visualcrossing.com/legacy/weather/weather-data-services#/editDataDefinition

1. Once you are on this page select Historical Summaries, Select the year range from 2020-2023.
2. Time Interval select Month.
3. Data Breaking Select Years
4. When you click request weather data you might not see it because it is a paid subscription, but it will look something like this.

I was inspired to closely analyze the weather data of one of the cities in the U.S. I decided to explore Charlotte's weather summaries from 2020 to 2023 to see if any apparent patterns or trends can be spotted. I used a weather database called Visual Crossing which allowed you to get any city's weather summaries for any select range of years. I used this database to collect Charlotte's monthly weather summaries from 2020 to 2023. I wanted to answer any questions about trends I might find between variables such as average temperature, relative humidity, wind speed, wind gust, and precipitation for Charlotte over the period. In this report, I wanted to dig deeper into any striking changes or patterns that can be spotted about the important weather elements such as temperature, precipitation, relative humidity, wind speed, and wind gust over the past 3 years in Charlotte, NC.

With all the talks about gradual global temperature increase and global warming, I wanted to analyze the temperature changes over the past 3 years to understand any trends

that we might see. I did some research to figure out that temperature had a relation with relative humidity. To display the relationships between these two weather elements, I decided to use Altair to construct both a bar graph that portrays the monthly changes in average temperature coupled with a line graph that highlights the monthly changes in relative humidity from 2020-2023.

By examining figure 1, you can understand a little more about Charlotte's trends regarding temperature and relative humidity over the given period. First, one thing that stands out is the repetitive sudden rise of temp during the months of June, July, and August in all three years. This makes sense because, during the peak months of the summer, the temperature always rises. You can also see that the temperature following the summer starts to decrease as we transition into fall and winter. One observation that can be seen is that following January 2020, January 2021 and 2022 saw a gradual decrease in the overall temperature while Jan 2023 saw a gradual increase from the previous years. Even though fluctuations in temperature are very normal, from our data we can see that from 2020 to 2023, there has been an overall slight increase in temperature. A similar pattern can be seen with relative humidity. You can see a lot of fluctuation across the given years, but overall, from Jan 2020 to Jan 2023 like the average temperature we do see an increase in the relative humidity. The reason why we did not conclude an overall decrease in relative humidity since the last data point on the graph is lower than the first data point, is because you always want to compare trends up to the same month from when you start. From 2020 to 2023, overall, we see major fluctuations in temperature and relative humidity with a gradual increase at the end.
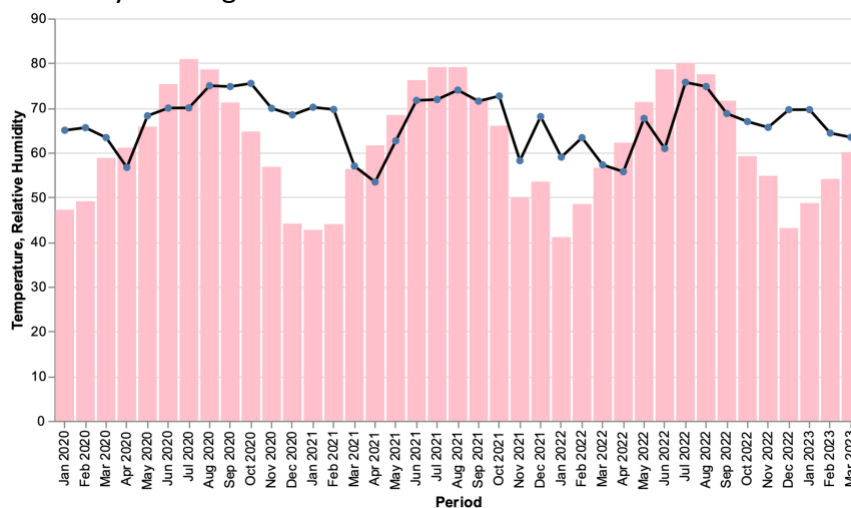

Figure 1

To display the precipitation data for Charlotte from 2020 to 2023, I decided to use a 2D-Area graph in excel. I thought this would accurately display any trends or patterns that can be seen in the data during the given period. Like temperature, precipitation seems to be very seasonal because the inches of rain fluctuate a lot. If you closely look at figure 2 you can see that the maximum precipitation of about 7 inches occurred during the month of April 2020.

After that, the precipitation levels fall and occasionally have small spikes in the inches of rain throughout the 3 years. The trend over the three years looks to be a slight decrease in the inches of precipitation from Jan 2020 to Jan 2023. This could just be a short-term fluctuation, and maybe in fact precipitation levels are increasing if you compare a decade of data instead of a couple of years. From the given 3-year data we can see that the precipitation levels seem to rise and fall consistently every couple of months showing there is no conclusive trend that can be extrapolated.
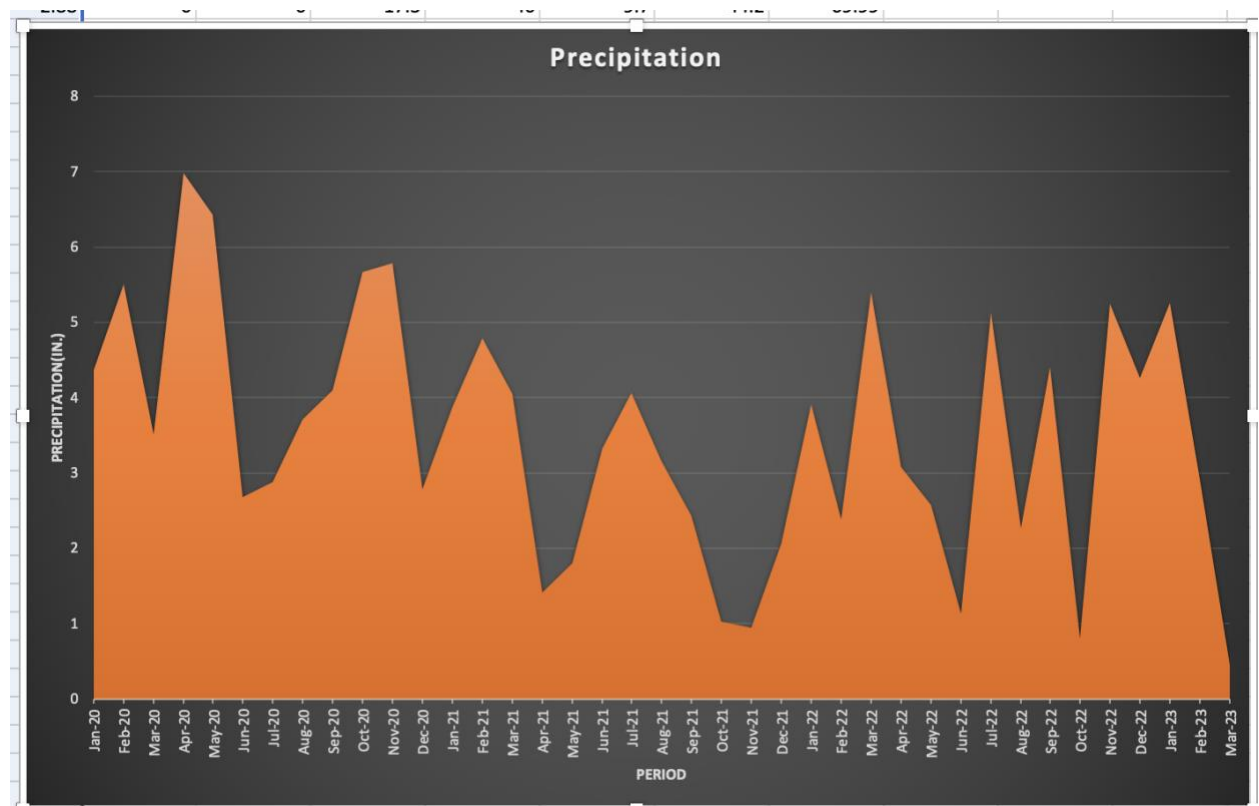

Figure 2

Finally, I used Microsoft Charticulator to create a bubble chart that examines the wind speed over 3 years with the wind gust being a factor in the size of the bubble points. I thought the bubble chart here would be effective because I would be able to capture the change in wind speed during the period while also examining the relationship these variables have with wind gusts. If you take a closer look at figure 3 you can see a lot of monthly fluctuations in the wind speed as time goes on while the wind gusts during these months stay mostly constant. On a larger picture, it looks like you might see an increase in the wind speed if you are comparing the Jan 2020 data point to the Jan 2023 point, while the wind gust doesn't seem to have changed

too much. Like the changes in the variables in figure 1 and figure 2, wind speed and wind gust elements in figure 3 don't seem to have any drastic changes that we can make decisive conclusions on.
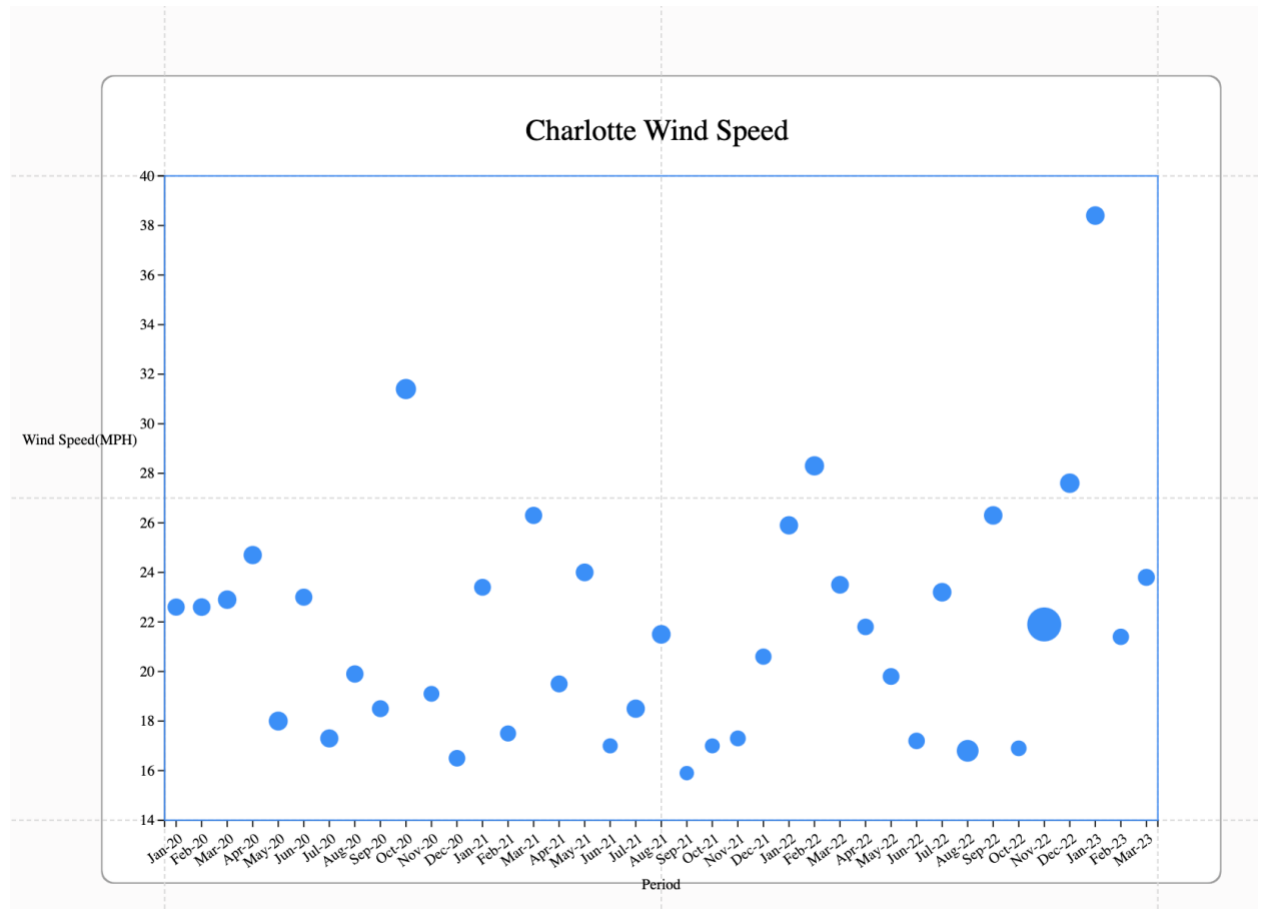

Figure 3

To conclude, I would say that we have seen a lot about the general trends of the weather elements in Charlotte over the 3 years. The most prominent thing that can be seen in the variables among all three figures is that there seems to be a lot of fluctuation and variability. No one trend can be decisively spotted or made about the variables examined in this data. It does sometimes seem that the temperature, wind speed, and precipitation slightly increased while the relative humidity looked like it had a slight decrease over time. These could not be the actual trends because maybe a long period was not used to make any decisive conclusions. I think if a 2 to 3-decade dataset was examined in the future we might see more obvious trends about the weather elements that we can confidently make conclusions about. The trends we saw would represent more short-term trends than long-term ones.

Extra Credit:

Link to Public Repository: https://github.com/COMP790-InfoVis/module-two-data-three-ways-vidyuthj