COVID-19- Analysis & Comparisons

1. Introduction and background

COVID-19. Coronavirus disease (COVID-19) is a newly found coronavirus-borne disease. The majority of patients who contract the COVID-19 virus will have mild to moderate respiratory disease and will recover without the need for specific treatment [1]. Seniors and individuals with underlying medical conditions such as cardiovascular disease, diabetes, chronic lung disease, or cancer are at an increased risk of developing serious illness [6]. The most effective method of preventing and slowing transmission is to have a thorough understanding of the COVID-19 virus, the sickness it produces, and how it spreads. Prevent infection in yourself and others by routinely washing your hands or using an alcohol-based rub and refraining from touching your face. Because the COVID-19 virus is typically communicated by saliva droplets or nasal discharge when an infected person coughs or sneezes, it is critical that you also observe respiratory etiquette (for example, by coughing into a flexed elbow) [1].

2. Objectives and goals

In this assignment, I want to analyze the what regions have most COVID-19 cases and most effect. In addition, I want to see which countries did the best to fight with COVID-19. Finally, I want to observe the outcome of COVID-19 in the globe. I will demonstrate above concerns by visualizing the following questions,

1. How on earth did COVID-19 spread so far?
2. In which regions the effect of COVID-19 is more?
3. How good the countries are doing to fight with COVID-19?
4. What is the outcome of COVID-19 over time?

These analyses will help the countries around the world to understand the effect of COVID-19 and to take necessary precautions based on the severity. For instance, by observing which regions are doing good to fight back with COVID-19, other countries may adopt their strategy which may save millions of lives. Furthermore, these analyses will also help people decide which regions they should avoid travelling based on the highest effect.

3. Datasets

I have included the following information directly from [2], "*This is the data repository for the 2019 Novel Coronavirus Visual Dashboard operated by the Johns Hopkins University Center for Systems Science and Engineering (JHU CSSE). Also, Supported by ESRI Living Atlas Team and the Johns Hopkins University Applied Physics Lab (JHU APL).*" The dataset is available at: https://github.com/CSSEGISandData/COVID-19. The dataset contains 49,068 entries.

Fields include

- Province/State
- Country/Region

- Lat- latitude
- Long- longitude
- Date
- Confirmed- confirmed COVID-19 cases
- Deaths- deaths caused by COVID-19
- Recovered- number of people recovered from COVID-19
- Active- number of activate COVID-19 cases
- WHO Region- world health organization regions

The following snippet is the subset of the dataset,

Province/State	Country/Region	Lat	Long	Date	Confirmed	Deaths	Recovered	Active	WHO Region
Quebec	Canada	52.939900	-73.549100	2020-05-15	41429	3402	0	38027	Americas
NaN	Tajikistan	38.861034	71.276093	2020-04-25	0	0	0	0	Europe
NaN	Barbados	13.193900	-59.543200	2020-03-07	0	0	0	0	Americas
NaN	Eritrea	15.179400	39.782300	2020-02-19	0	0	0	0	Africa
Prince Edward Island	Canada	46.510700	-63.416800	2020-03-01	0	0	0	0	Americas
Alberta	Canada	53.933300	-116.576500	2020-04-08	1373	26	0	1347	Americas

Figure 2. Subset of the dataset

4. Visualization Plan

How on earth did COVID-19 spread so far?

To answer the question, I choose geo visualization (choropleth map). I mainly focused number of confirmed COVID-19 cases. I think this specific chart is best because it shows the which regions has the most COVID-19 cases and prioritizing those regions first to fight back with COVID-19 (e.g., supplying vaccines to those regions). As show in Figure 2, we can see more than 2-million confirmed COVID-19 cases in the U.S., Brazil has almost 1-million cases, and Russia has around 500,000 cases. To generate the plot, I used Python and used the *ploty graphic library maps* [3].

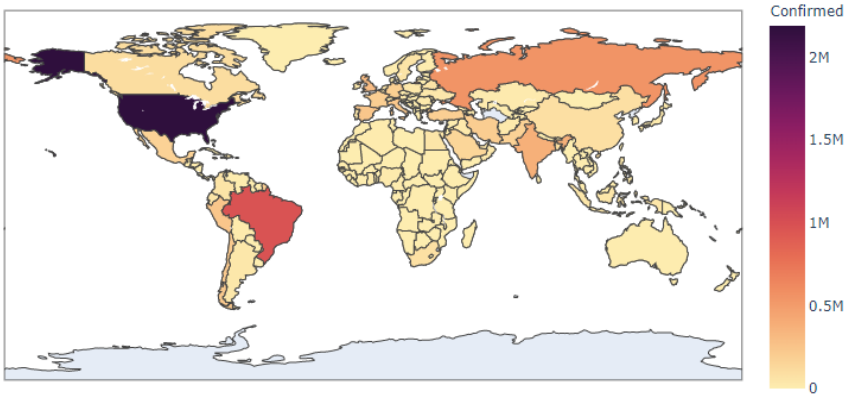

Figure 3. Confirmed COVID-19 cases on the world map

In which regions the effect of COVID-19 is more currently?

I choose heatmaps as it will clearly distinct those highly effected regions on the map. It will help people to make travel decisions, speedup vaccination on those regions and enforce mandatory social distance. As shown in Figure 3, the yellow and orange regions have the highest effect of COVID-19 currently. We can also see USA and Canada are now recovered from affected zones. I used Python and used the ploty graphic library maps [3] and create map with release incidents and monitoring stations.

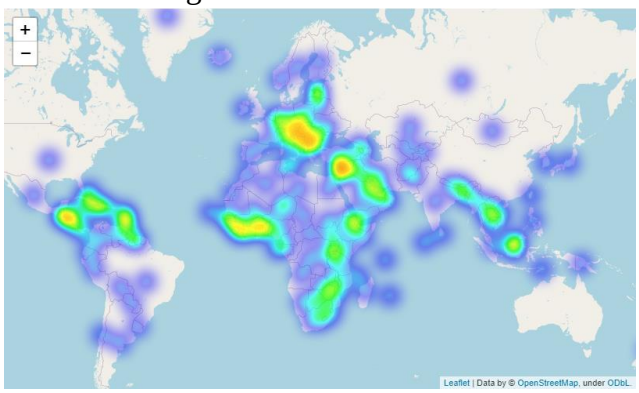

Figure 3. Current effect of COVID-19 around the world

How good the countries are doing to fight with COVID-19?

To answer this question, I choose circle timeline (temporal visualization technique) and plot number of new cases for different country.

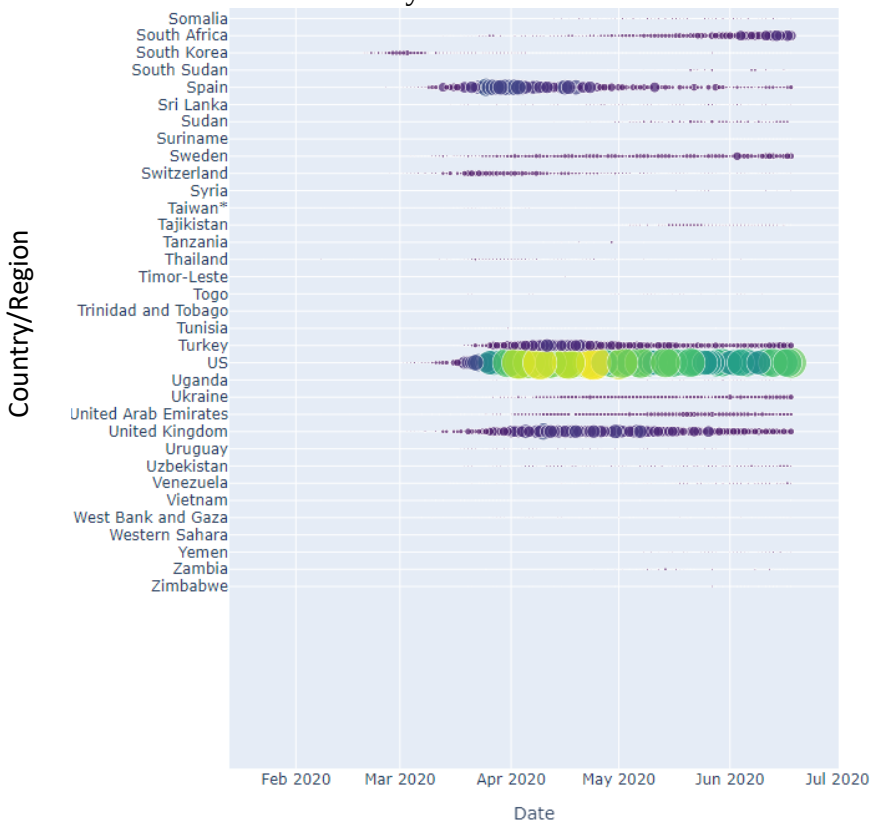

Figure 4. Number of new of cases of COVID-19 over time for different countries

If the number of new cases are decreasing over time, then countries are doing well. Figure 4 shows that, Spain did well to reduce the number of new cases and USA has significantly increased number of new cases and it keep increasing. South Africa has similar trends like USA, however, the number of new cases are significantly lower than USA. I used Python's *ploty* library bubble chart [4] to generate the plot.

What is the outcome of COVID-19 over time?

I am using area chart (temporal visualization technique). I think it is best to use this specific plot to visualize the COVID-19 cases that is Active, Recovered, and cause Deaths, because it shows the data over time and the area shows among the total cases how many people recovered, died and still infected. Figure 5 is showing the between April 2020 to July 2020 the COVID-19 infected around 14-million people. The area marked as red are the portion of the people who died. We can conclude that majority of the people recovered from COVID-19. I used Python's *ploty* area chart [4] to generate the plot.

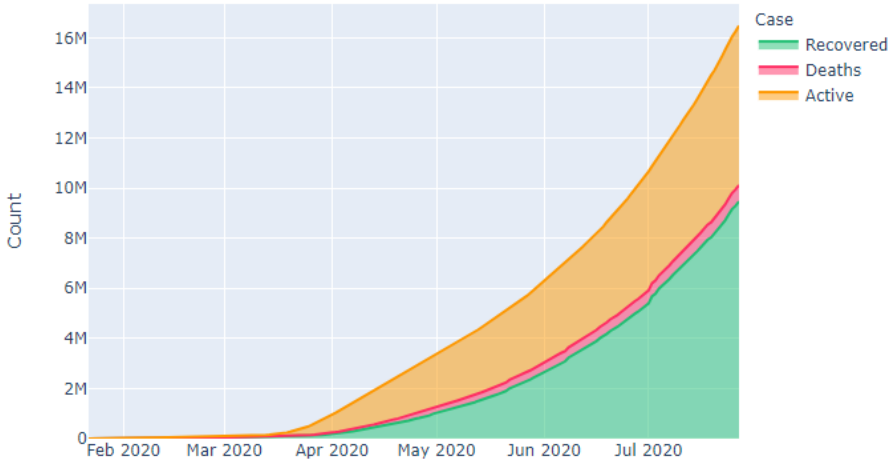

Figure 5. Outcome of COVID-19

5. References

[1] *Coronavirus. (2022). Retrieved 3 April 2022, from https://www.who.int/health-topics/coronavirus#tab=tab_1*

[2] GitHub - CSSEGISandData/COVID-19: Novel Coronavirus (COVID-19) Cases, provided by JHU CSSE. (2022). Retrieved 3 April 2022, from https://github.com/CSSEGISandData/COVID-19

[3] Maps. (2022). Retrieved 3 April 2022, from https://plotly.com/python/maps/

[4] Bubble. (2022). Retrieved 3 April 2022, from https://plotly.com/python/bubble-charts/

[5] Filled. (2022). Retrieved 3 April 2022, from https://plotly.com/python/filled-area-plots/

[6] CDC (2022). Retrieved 3 April 2022, from https://www.cdc.gov/coronavirus/2019-ncov/need-extra-precautions/people-with-medical-conditions.html

Appendix

The codes of the above plots are available at:
https://github.com/abirhossen786/visualization_tools_coursework/tree/main/iviz2

N.b. Some lines of the codes were directly taken form online and from the library examples. I want to give the credits to Google, Stack Overflow, and Kaggle!