F21DV: Lab 3

# Introduction

This report will serve as an accompaniment to html files containing the JavaScript code to solve lab 3 of the F21DV course. It will go through the explanation of how the code in my javascript files are structured, how my implementation satisfies the requirements and answers to the queries. This report assumes some prior knowledge of JavaScript and will focus on describing the use of the d3.js v7 library.

I demonstrated to Shuangjiang Xue on the 18th of March 2022.

A GitHub repository was created and showed to be helpful with code management. With the help of the desktop app for GitHub, I managed to smoothly operate on both my IDE of choice (WebStorm) and see the progress on my GitHub page. The repository is the following but may be set to private depending on when this link is clicked: <https://github.com/YoussefBonnaire/DataVisualisation>.

# Application and Code Structure

The web page looks like the following image. It is separated into two parts with a map and chart each. The first an exploration of the vaccine by country on specific dates, and the second a visualization of the cases deaths and gdp per country on different dates.

Graphical user interface

Description automatically generated

The Initialisation of the SVGs, dropdown menus and the slider are all done in the main.js file as well as the call to functions DrawMap, showBarChart, DrawCovMap and showLineGraph from files VaccMap.js, VaccBar.js, CovMap.js and CovLine.js respectively allowing the graphs and maps to appear.

The first part, the vaccinations, has interactivity between the map, the dropdown, the slider and the bar chart. The map shows each country with a color based on its vaccination % determined by the dropdown. The bar chart shows the top 10 countries for that period for the dropdown selected.

If a country is hovered over on the map, the onMouseOver function highlights this country in orange, adds text indicating the value of the vaccination % and highlights the corresponding bar in the bar chart if applicable. And the opposite happens when one of the bar charts is hovered over.

Chart

Description automatically generated

If the slider indicating time or the drop down are changed, both the map and the bar chart colors and values are updated using the UpdateMap and UpdateChart functions.

Chart

Description automatically generated

If a country is clicked on the map and does not already appear in the top 10, this country will be added transitioning the axis using the top10\_ and .on(‘click’, top10\_) functions.

Chart

Description automatically generated

Chart

Description automatically generated with medium confidence

The map svg also allows for brushing over and selecting specific countries using the selectBrush function in VaccMap.js which changes the bar graph to the selected countries calling the populateBar function in VaccBar.

Chart

Description automatically generated

Chart

Description automatically generated

Regarding the second part, the cases and deaths, the dropdown, map and graph have interactivity between each other. The map shows countries colored based on their gdp per capita and red circles showing the values based on the drop down depending on the day. The graph starts by showing the total deaths and cases per million for the entire world with dots on the first of every month.

Hovering above any of the dots causes a box to appear with data about the cases, deaths, % of people vaccinated, fully vaccinated and boosted on the date of the dot by calling the hoverDot function and changes the bubbles on the map to show data about the current date calling the UpdateCovMap function in CovMap.js.

Chart, diagram

Description automatically generated

Chart

Description automatically generated

Clicking on any of the countries on the map changes the line graph showing the data for that specific countries using the UpdateLine function in CovLine.js. This change also allows for the dots to display the gdp data for that country in the box using the hoverDotupd function in CovLine.js.

Chart

Description automatically generated with medium confidence

Finally, the dropdown changes the bubble value on the map to account for the specified value in the drop down.

Chart

Description automatically generated with medium confidence

With the combined functionality of these two parts, many questions can be answered about countries and the progress of COVID-19 vaccines, cases and deaths in the past 2 years.

# Requirements

|  |  |  |
| --- | --- | --- |
| Number | Requirement | Completetion |
| R1 | Use of three different D3 layouts in a single dashboard | Four have been used with 2 maps, 1 bar graph and 1 line graph |
| R2 | Use of automatic scaling of all axes in a single layout during data update | Updating date/dropdown on vaccine bar chart has automatic axis change changing the countries around based on dropdown value |
| R3 | Use of cross-layout brushing in which moussing over one data point in one chart highlights multiple associated data points in another chart. | Hovering over vaccmap country highlights both map and barchart if bar exist for country, hovering over dots in CovLine changes bubble data to new date in CovMap |
| R4 | Use of bidirectional interaction between three charts | Hovering over bar chart achieves the same as hover over vaccmap country |
| R5 | Faceted selection interaction between two layouts (in which mouseover or click in one layout results in  data being filtered in a second layout). | hovering over dots in CovLine changes bubble data to new date in CovMap, Clicking country in VaccMap adds bar chart to VaccBar of said country’s values |
| R6 | Use of a map layout that has interaction with another layout. | Stated in every point before |
| R7 | Use of scalar data on a map (e.g. circles of different sizes to indicate different weightage) | Bubbles on CovMap indicate different weightage of values of cases and deaths by country |
| R8 | Use of cross-layout brushing in which dragging a rectangle over several data points in one chart  highlights multiple associated data points in another chart. | Brushing over VaccMap selects countries and updates the VaccBar to show bar graph of values of selected countries |
| R9 | Use of a clustering analysis | N/A |

# Queries

1. The visualization for this following segment can not accurately be portrayed via the form of static pictures as it entails going through the different dates of the data, however an overview is present in the form of the line graph:

Chart, line chart

Description automatically generated

Furthermore, it is important to state values for the majority of Central Africa is not represented in the data and we can therefore not infer any information onto it.

With the monthly data, on the map we are able to observe the cases started in China in Jan 2020, making their way to Europe and the united states by April with big clusters of deaths and cases appear there. These countries handling this first wave and the cases increasing quickly over south America, the Middle East and south Africa in June of 2020. Followed by very large clusters around Europe once again around Nov/Dec 2020 lasting until May 2021 with South Africa and South America also having large cluster spikes from March 2021 to July 2021. During July 2021 Cuba and a number of countries along the North African coast, the middle east and Australasia have large spikes

Until November 2021 where once again the European countries and the United states have a large spike in cases. Regarding the deaths, the clusters happen at relatively similar location with a slightly delayed time as can be noted by the peaks on the death and case chart above. With a general trend of a smoother death curve after April 2021.

1. Though the clusters for the deaths happen at the same times and locations as the clusters for the cases, it is clear the bubbles for the deaths appear far more frequently and remain generally through all the dates in countries with lower gdp’s per capita (with case/death information present). This indicates that although rich countries are hit hard during waves, poorer countries are hit hard continuously wether there is a wave in cases or not, that is until their vaccination rates increase enough.
2. It is clear when going through the data for individual countries the deaths following April 2021 tend to spike less often smoothing out in countries with access to vaccines. Majority of European countries have seen their deaths remain close to 0 as their access to vaccines has been one of the best for a region. The same can be seen with South American countries and Canada, however, countries with less access to vaccines, African countries with low GDP’s per capita have seen their deaths continue to spike. The highest vaccination percentage around Africa currently is around 55-60% after a year of vaccines being available and most European, south American and Asian countries having averages above 55% up to 94%.

Chart

Description automatically generated

Moreover, the same countries with these high vaccination rates are the ones with increasing boosted rates ie. Europe, the Americas and Austrilasia. With the first upticks happening in Dec 2021 and a recent large spike in cases it seems too early to conclude on any impact these have has however, with the noted spike we have, so far, seen far fewer deaths with relatively smaller case spikes.

1. As noted throughout this discussion, there are clearly clusters which have been manifesting on different dates. Each continent tends to have spikes around the same times, moreover, the countries in each continent seems to increase their vaccination rates at similar speeds decreasing the chance of deaths leading to high correlation based on the geographical position of a country.

# Conclusion

With this report I have discussed the structure of my code and the capabilities of my application which complete the requirements of this course work with the files accompanying this report analyzing the data to answer questions on the evolution of covid 19 and the impact wealth, vaccinations and geographical positions have.