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A5: Implementing Your Dashboard Design

Visualisation and Visual Data Analysis

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Motivation

Short reminder of the overall problem in your own words, what is your selected design, and why?

As a conclusion to the previous report, we decided to implement the dashboard design on the topic *COVID-19 tests performed in Europe Statistics*. (Figure 1)

The planned tasks that users could solve using this board are:

- the Crisis Staff can monitor the frequency of Covid-19 testing in specific countries to supply new tests.
- laboratories monitor the frequency of testing for Covid-19 in specific areas so that they can plan to purchase new tests, expand their laboratory services, or hire additional staff.

Chosen design provided more detailed information because the idea was to implement the timeline (the user could choose the time slot) and brushing.

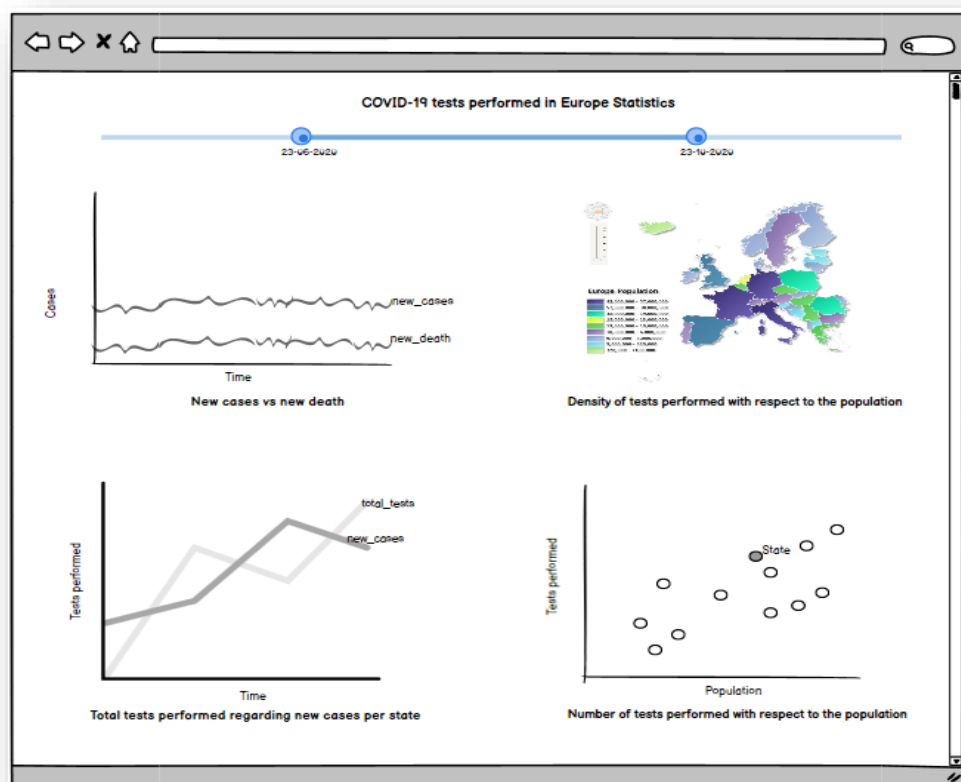


Figure 1: COVID-19 tests performed in Europe Statistics - prototype

Prototyping / Design process

Describe the results of prototyping your design as a web-based dashboard.

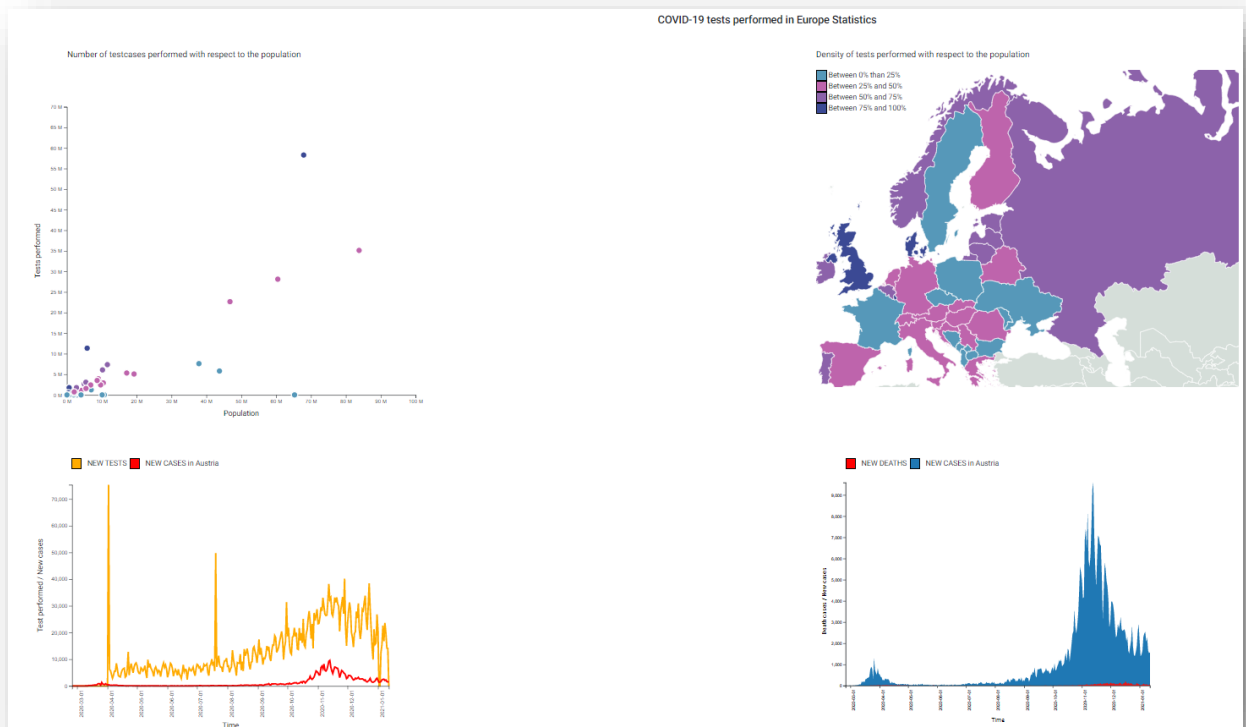


Figure 2: COVID-19 tests performed in Europe Statistics - result

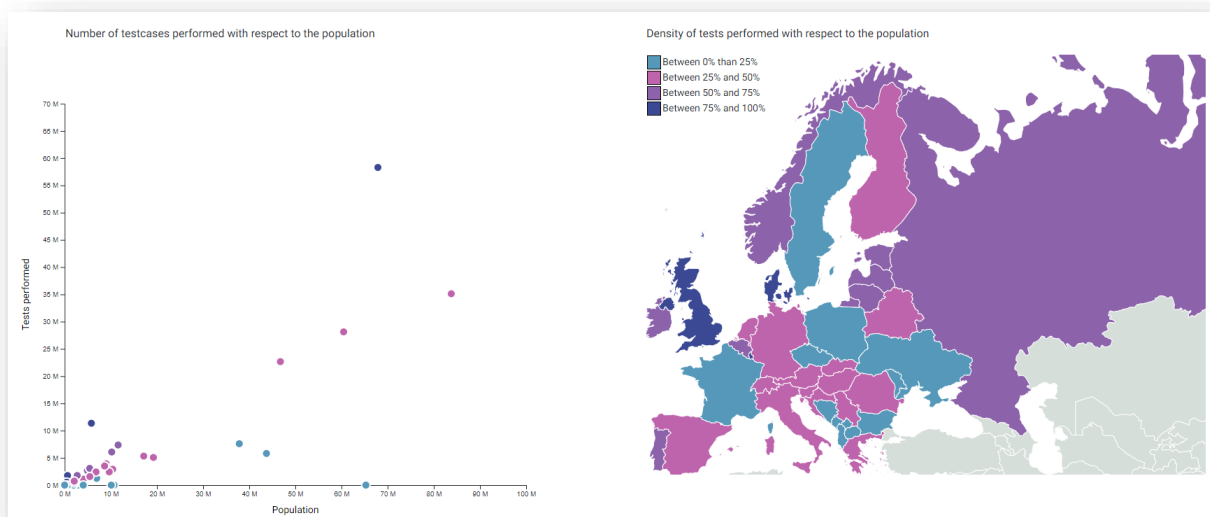


Figure 3: Number of testcases performed with respect to the population and Density of tests performed with respect to the population.

Figure 3 shows two charts: *Number of testcases performed with respect to the population* and *Density of tests performed with respect to the population*.

These two graphs are linked in the following ways:

- Click one county on the choropleth map - Chosen country will be shown on the scatter plot.
- Do the brushing on the scatter-plot – Selected points (countries) will be visible on the choropleth map.

When you hover the mouse over a point on the scatter plot, the name of the country will be displayed.

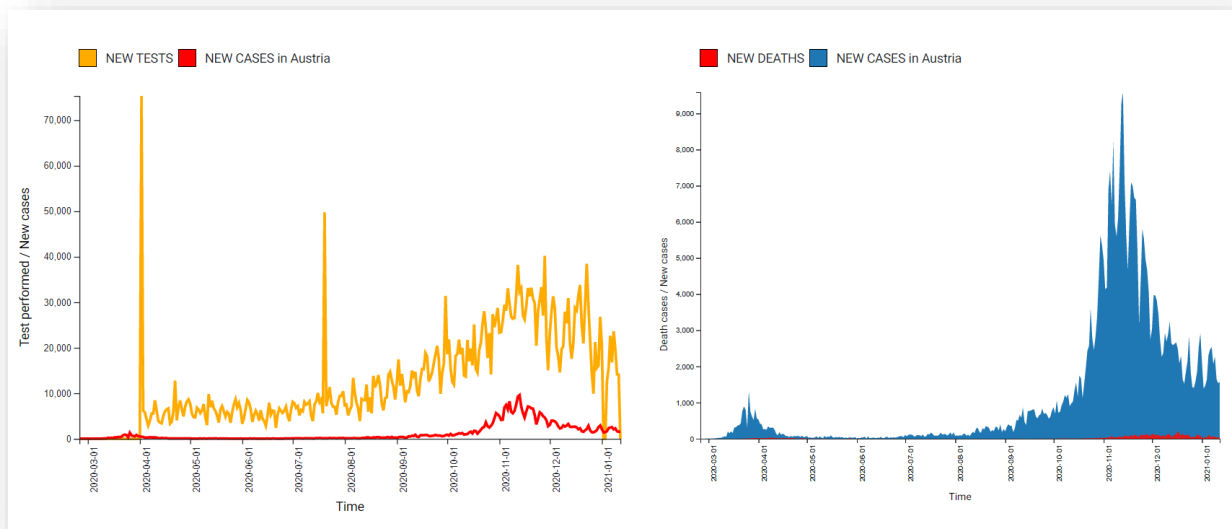


Figure 4: Total tests performed regarding new cases per state and New cases vs new death.

Figure 4 shows two charts: *Total tests performed regarding new cases per state* and *New cases vs new death*.

These two graphs are linked with the choropleth map. When a user clicks one country on the choropleth map, those two graphs display data for the selected country.

What can be found in the data using your visualization system?

From implemented dashboard the user can easily get information about how some countries reacted on the Covid-19 virus. Which means, using graphs you can see how some countries started testing too late. How some countries struggled with providing accurate data

From the graphs it can be easily visible how many new cases each country had in specific period. Corresponding with this, user can also see, how many tests have been performed per new cases.

User can see how many people did die from Covid-19 and how this has been changing through the time. It can be easily visible that in summertime we had much less infected people and much less deaths.

On the *Choropleth Map*, user can see the density of tests performed with respect to the population.

Did you have any visualization ideas that will not work on the real data? If so why?

During implementation, it could be observed that it would not be possible to have accurate results on any daily basis analysis. Also, comparing statistics between countries would not be easy to implement. I also found some naming problems in the data. For example, some countries that have two or more words in its name, are named differently in some files, e.g., Bosnia and Herzegovina vs Bosnia and Herz., Czech Republic and North Macedonia.

Some countries also have invalid data, which means that we have number of new cases as negative number e.g., France. This can be easily seen on the graph, where spike goes under the x-axes.

If changes emerged during the prototyping process, describe the changes to your initial visualization design.

In general, provided data is great source that can be used to make great statistics and visualize them via graphs. However, collecting the data was not organized in the best way, so not all prototype ideas could come true.

The *date slider* idea could not be implemented, because not all the data have the date/time information. Some countries did not provide the date for their data. Also, they did not provide data on the daily basis. Therefore, *date slider* would be obsolete and would not make any sense in such a country.

Another small thing that changed (not caused by the data provided) is the *scatter plot* component. Initially it was planned to put it under the *Choropleth Map*, and it was moved to the left side of *Choropleth Map*. Reason for this is user experience (better overview and easier navigation through the page).

Implementation Details

Describe your final implementation, how it addresses the tasks, and your technical decisions regarding the implementation.

Given that we did not have the data from the daily basic and no date data for some states at all, still using this dashboard, the Crisis Staff can monitor the frequency of Covid-19 testing, at least, in some countries to supply new tests. Laboratories still can monitor the frequency of testing for Covid-19 in specific areas so that they can plan to purchase new tests, expand their laboratory services, or hire additional staff.

From technical perspective, Angular framework for solution implementation was used. Key reasons for that are more experience in Angular than in any other technology. Also, there was some code from the previous assignments (A1, A2, A3) which could be reused in this task as well.

The application is divided into four major components, including respective services for data manipulation. It was crucial decision to use Observables in the services that I implemented. Since we have multiple files from where we load the data, it was important to take into consideration data loading performance.

Using service, the following issues have been solved:

- each file has been loaded only once.
- each file has been loaded asynchronously, so user doesn't have to wait too long to see some graphs on first view.
- each component could use/share same data from the services (no individual component should load the data)
- using Observables to notify other component about data changes in one component.

Discussion

What have you learned?

From technical perspective I have drastically improved my D3.js library knowledge. With finishing this project, I have more understanding on file loading and application performance improvements.

In regards of Data Visualization, I got more understanding on how pure text data can be converted in something more meaningful and powerful when used in good way and right tools. I also learned what is the difference between organized and not organized data.

My biggest finding through this project was that I was losing focus between two things: data and coding. In the end, I realized that next time I should fully concentrate on the data and binding related data to something meaningful. Then in the end, convert this to the code.

What would you do different next time?

Next time I would spend much more time on the data analysis, preparation, and solution planning. The biggest mistake that I did with this task is that I jumped in directly to the implementation. Reason for that was that I have been too self-confident in the coding part of this task and simply started with the coding. As a result of this, it happened that I had to change my code and remove complete implementations few times.

I would choose completely different *use-case* and idea of my solution. The main reason is that 70% of the provided data is not used in my idea/implementation. Use cases that I have chosen to implement is not wide enough to cover all data we have. At the time when I was choosing the *use-case* that I want to cover, I was kind afraid that I do not take too much work, but in the end looks like my fears were not reasonable.

Conclusion

Project goal was to understand the full process flow of Data Analysis and Visualization. Starting with understanding the given data, finding suitable use case, dashboard design and implementation. All steps have been described and documented in the report. This experience can be used as base and guide for next projects in this field.

In the end, it can be concluded that project was great learning path and huge addition to the existing experience. It would be nice if there were more time and people involved into this project.