Data Visualization - Project 2

Authors

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Introduction

The dashboard created aims to show and let the user explore how the community is moving around differently according to the number of deaths and cases. For this two different datasets were merged:

- Community mobility dataset: https://www.google.com/covid19/mobility/ [1]
- Coronavirus source data: https://ourworldindata.org/coronavirus-source-data [2]

This analysis covers the period between the 1st of March 2020 and the 2nd of March 2021, and focus on the Member states of the European Union, which are the following 27 countries: Austria, Belgium, Bulgaria, Croatia, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, the Netherlands, Poland, Portugal, Romania, Slovakia, Slovenia, Spain and Sweden.

The indicators describing mobility changes, represent the percent change in the number of total visitors (or the time spent) compared to the baseline (which is a normal value for that day of the week. It is the median value from the 5 week period Jan 3-Feb 6, 2020) and are the following:

- Transit stations: Includes visits to subway stations, sea ports, taxi stands, highway rest stops and car rental agencies.
- Parks: Includes visits to public gardens, castles, national forests, campgrounds and observation decks. Parks typically means official national parks and not the general outdoors found in rural areas.
- Workplaces: Includes visits to places of employment.
- Grocery and Pharmacy: Visits to grocery shops and pharmacies are combined as these tend to be considered essential trips and should have approximately the same social distancing rules.
- Residential: This is the only indicator that, instead of showing the percent change in the number of visitors from baseline, shows the percent change of the average duration

(hours) spent in places of residence. Because, typically, a person works for 8 hours a day, and because there are only 24 hours in a day, the largest change possible on a working day might only be +50% and even less on weekends. This means the percent changes shown by this indicator cannot be directly compared to the other four mobility indicators [3].

The coronavirus data used for the analysis is from John Hopkins University and includes the following components:

- Cases: Number of cases for a certain country.
- Deaths: Number of deaths for a certain country.

Along with this report, the following deliverables are available:

- Github link containing the code used:
  https://github.com/dianafurtado/Data_Visualization_Projects
- Visualization deployment link:
  https://covid-19-mobility.herokuapp.com/

Visualization, interaction and technical aspects

The dashboard created to visualize the datasets described above was produced using Plotly with Dash software. In terms of visualization and interaction choices we opted to provide the user with the capacity to browse between the EU countries, the analysis period, to choose the mobility indicators to visualize and select whether to visualize confirmed cases or deaths. This way the users can focus their analysis on the parameters they are more interested to see.

We have organised the dashboard the following way:

- A **brief introduction** of the subject in analysis: in this case we provide the user with a description of how COVID-19 started and its impact in the World.
- A **selection bar** where the user can select the parameters to visualise in the dashboard: the EU country, the time frame (any time frame between the 1st of March 2020 and the 2nd of March 2021), COVID-19 figures to visualize - New cases or deaths.
- A **map** showing the selected COVID-19 figure for each EU country.
- The **total number of cases and deaths** for the selected country.
- A **heatmap** showing the average change of the mobility indicators, per country, during the selected time frame.
- A **graph relating the mobility indicators** (in here the user can select one or more mobility indicators to visualize) and see the relation of these with the **COVID-19 figure**

selected (cases/ deaths).

- Finally we provided the users with a Glossary to help them to understand key concepts used in the dashboard.

Discussion

Finland is the EU's best performing country having reduced its community movements in a more consistent way when compared to Czechia (EU's worst performing country). This means consistency in the restrictions to mobility seem to have a more effective impact than incoherent measures.

As previously mentioned, residential indicator should not be directly compared to the others due to the way it is calculated. This indicator shows the change in the number of hours spent in the residence and it should not show a big change, since, by definition, we already spend a great part of the day in that address.

Overall, all EU communities decreased their visits to Workplaces and to Transit stations since COVID-19 started.

The mobility indicator that shows higher changes is the visits to parks and most of the best performing countries fighting the pandemic crisis had their communities visiting the Parks for often. While it is true that cases start growing when visits to park reduce, we cannot conclude therefore that park visits reduce COVID-19 spread. This reduction might be related to external factors as the cold weather (during Winter months, visits to parks reduce, but there are also studies indicating that COVID-19 tend to spread quicker in Winter [4]).

We need to be careful when taking conclusions on COVID-19 spread only based on the mobility indicators, for the analysis completeness other factors, such as air pollution, sea level and population density, should be analysed. [5]

References

[1] Google Community 2021, *See how your community is moving around differently due to COVID-19*, Google, viewed 1 March 2021, <https://www.google.com/covid19/mobility/>.

[2] Ritchie, H 2020, *Coronavirus Source Data*, Our World in Data, viewed 1 March 2021, <https://ourworldindata.org/coronavirus-source-data/>.

[3] Google Community 2021, *Understand the data*, Google, viewed 1 March 2021, <https://support.google.com/covid19-mobility/answer/9825414?hl=en&ref_topic=9822927>.

[5] Rossi, A. 2021, Risk and severity of infection, the host and the environment could all play a role, MedPage Today, viewed 3 March 2020 <https://www.medpagetoday.com/infectiousdisease/covid19/89495>.

[4] Aabed, K. and Lashin, M., (2021). *An analytical study of the factors that influence COVID-19 spread*, Vol.28, Saudi Arabia, Saudi Journal of Biological Sciences.