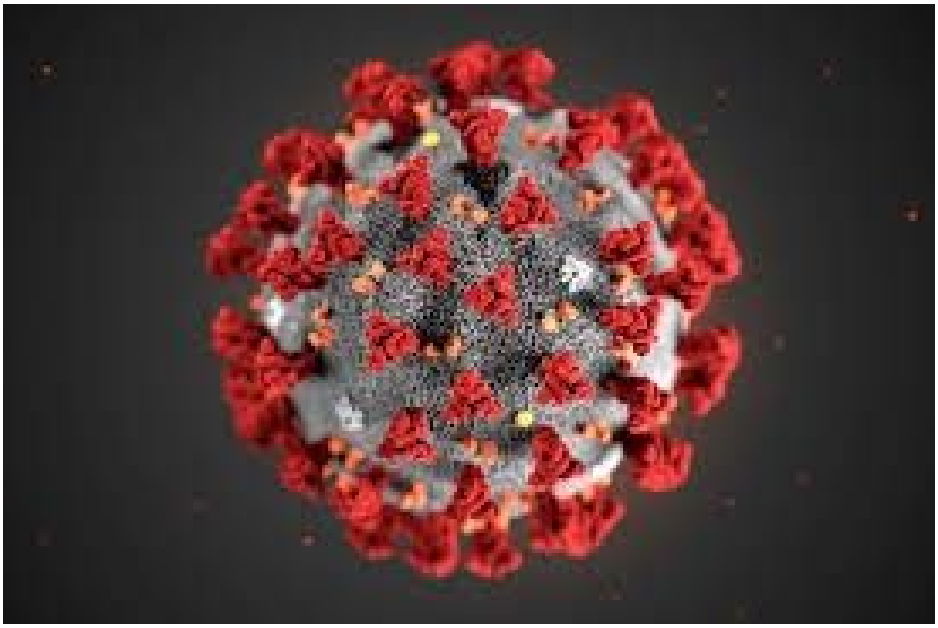
CSE 564 Visualization

Covid 19 Trends and Statistical Analysis Visualization



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Youtube link: https://www.youtube.com/watch?v=ogQjymGZRAk

1. INTRODUCTION

Covid-19 is caused by a coronavirus called SARS-CoV-2. It is thought to spread mainly from person to person, mainly through respiratory droplets produced when an infected person coughs or sneezes.The virus that causes COVID-19 is spreading very easily and

sustainably between people. We have created a dashboard which visualized covid cases, deaths and mobility trends for countries around the world. The basic visualizations that we use to analyze our data are: Pie chart, Stacked bar chart, Parallel coordinate plot and Scatter plot. We analyze the various countries of the world and get insight on the cases and death trends because of covid 19 and its correlation with the mobility trends. This report details out the work done as a part of the final project for CSE-564 (Visualization). Figure 1 shows what the dashboard for the project looks like. The front end has primarily been implemented using CSS and JavaScript and the charts are constructed using D3.js library.

Section-1 of the report presents the objectives of the project. Section-2 describes the data set that has been used for creating the visualizations. There is a detailed description about the structure of the data set. The implementation details for plotting the Pie chart, , Stacked bar chart, Scatter plot, Parallel coordinate and have been described in the subsequent sections. Finally, Last section talks about insights that can be inferred from the visualization of this data.

2. DATASET DESCRIPTION

We have used two datasets to show the insights on covid cases and its impact on other factors which is mobility in our case.

1. https://data.europa.eu/euodp/en/data/dataset/covid-19-coronavirus-data
2. https://www.google.com/covid19/mobility/

First Dataset - On 12 February 2020, the novel coronavirus was named severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) while the disease associated with it is now referred to as COVID-19. Since the beginning of the coronavirus pandemic, ECDC's Epidemic Intelligence team has been collecting on a daily basis the number of COVID-19 cases and deaths, based on reports from health authorities worldwide. To insure the accuracy and reliability of their data, their process is being constantly refined. This helps to monitor and interpret the dynamics of the COVID-19 pandemic not only in the European Union (EU), the European Economic Area (EEA), but also worldwide. The dataset contains the latest available public data on COVID-19 including a daily situation update, the epidemiological curve and the global geographical distribution (EU/EEA and the UK, worldwide).

Second Dataset - As global communities respond to COVID-19, the same type of aggregated, anonymized insights we use in products such as Google Maps could be helpful as they make critical decisions to combat COVID-19. These Community Mobility Reports aim to provide insights into what has changed in response to policies aimed at combating COVID-19. The data is collected over time by geography, across different categories of places such as retail and recreation, groceries and pharmacies, parks, transit stations, workplaces, and residential

DATASET -1 LISTING DATA

1. Date - The range of date is from 12-31-2019 to 04-27-2020
2. Country - The country for this data.
3. Cases - This lists the number of cases found on a daily basis.
4. Deaths - This lists the number of deaths happening on a daily basis.
5. Country code - This lists the country code for this countries
6. Continent- This lists the continent for that country.

DATASET -2 LISTING DATA

1. Date - The range of date is from 02-15-2020 to 05-02-2020
2. Country - The country for this data
3. Retail and recreation - Mobility change for retail and recreation.
4. Groceries and pharmacies - Mobility change for groceries and pharmacies
5. Parks - Mobility change for parks
6. Transit stations - Mobility change for transit stations.
7. Workplaces - Mobility change for workplaces.
8. Residential - Mobility change for residential.

OVERVIEW OF DASHBOARD

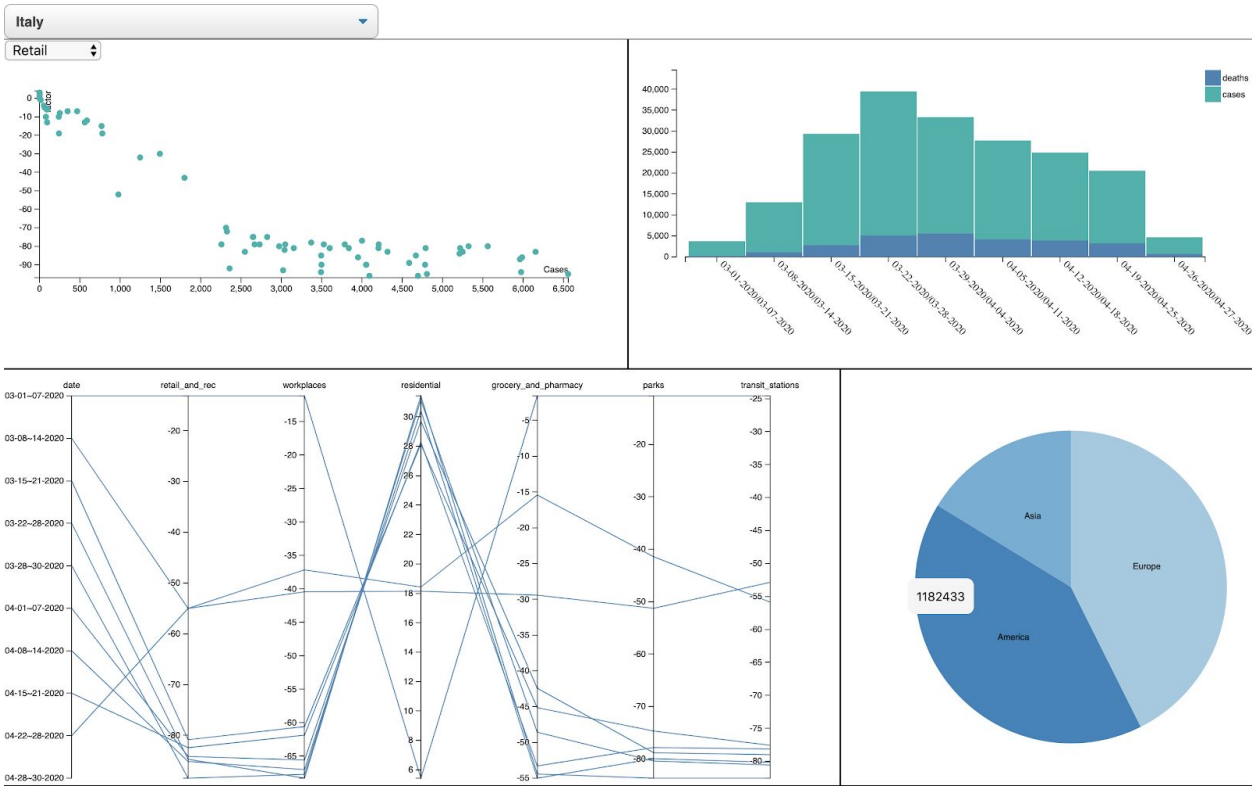

Fig 1: Dashboard Overview

3. ARCHITECTURE : Client - Server

Client Server: Front end, we have an interactive web application that uses D3.js (with CSS for styling the graphs) to render all the graphs. Each of the visualization is rendered on the screen after processing the data returned from the corresponding call to the back-end server (using FLASK)

Backend Server: The backend code is a python application which is hosted as a FLASK server. The file ”server.py” in the backend directory has to be run as ”python routes.py” in order to start up the server. This type of architecture helps as it automatically re-renders every time there is a change in front end. Flask is preferred because it provides scalability, is easier to implement and debug with and provides improved performance

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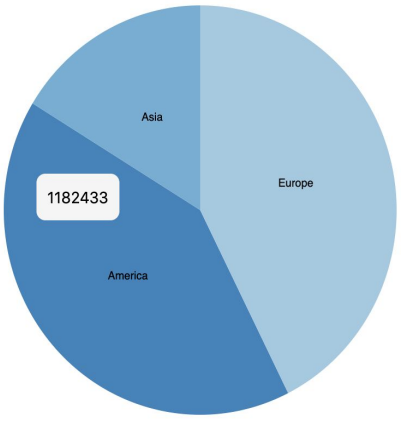
4. PIE CHART

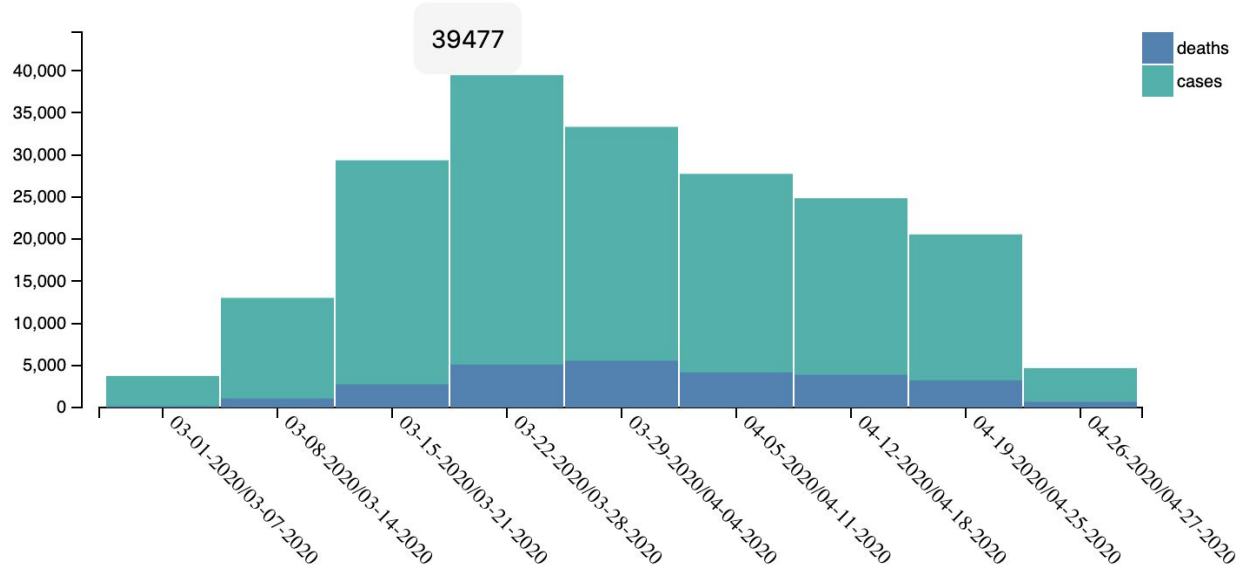
The pie chart depicts which continents are majorly affected because of the outbreak of this pandemic. America, Europe and Asia were amongst the most affected ones with America showing the enormous number of cases as compared to the other continents.

There is a tooltip showing total number cases for that continent from the date range of 12-31-2019 to 04-27-2020. This has three colors each for one continent.



5. STACKED BAR CHART

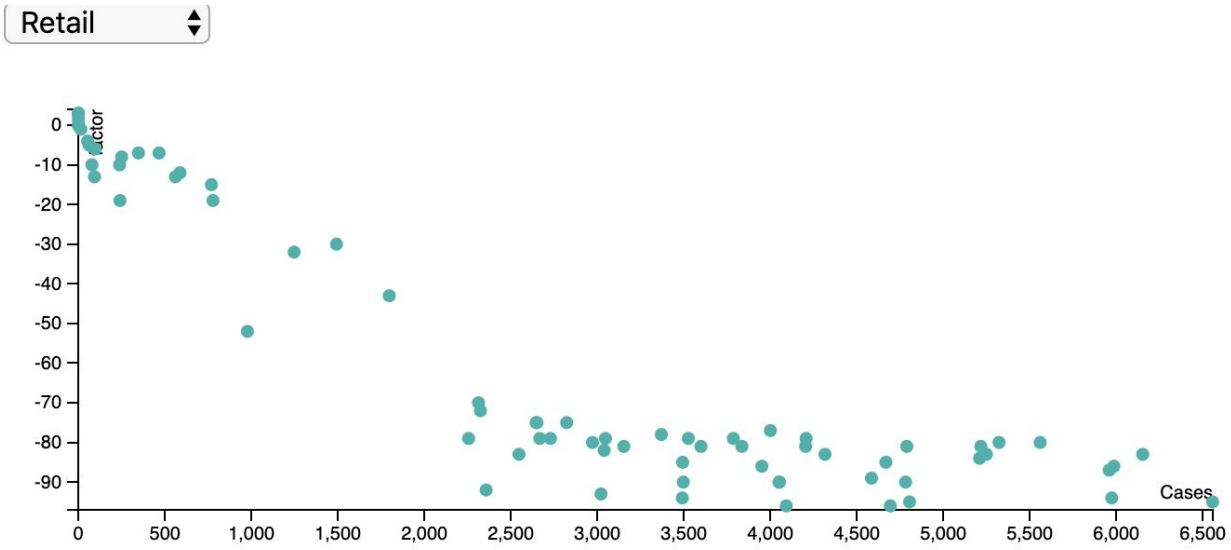
This is an interactive stacked bar chart showing both deaths and cases for a week placed on top of each other. The X- axis shows the dates week wise and the Y-Axis has the scale for a number of people. The chart is updated for every country change in the dropdown showing the respective trends for death and cases for that particular country. For almost all countries we can see that the pattern for deaths and cases are the same. There is a tooltip showing the number of deaths or cases upon hovering on the respective bar.

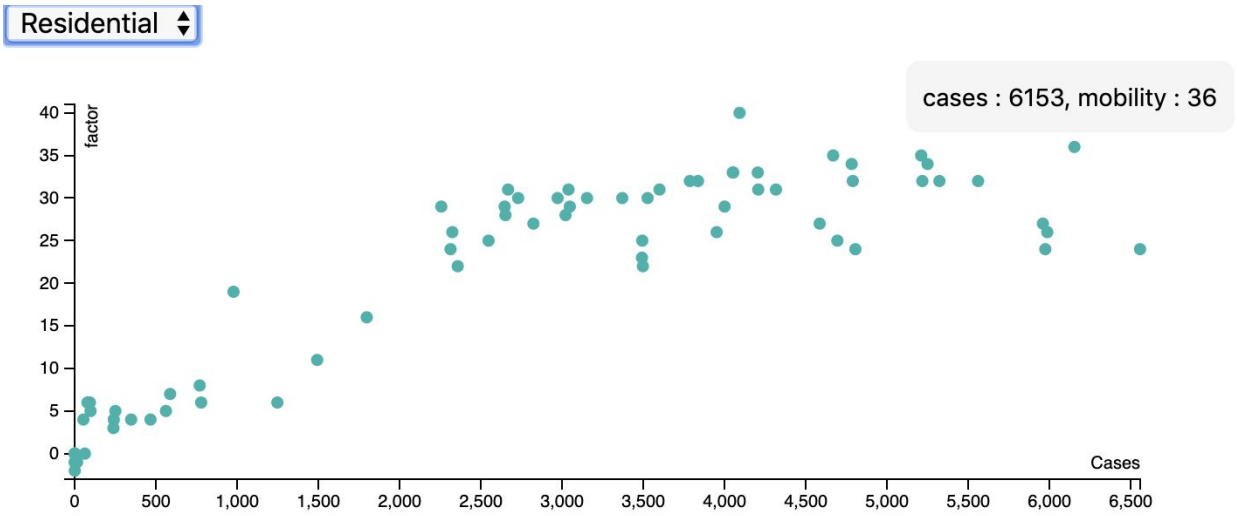


6. SCATTER PLOT

This is an interactive scatter plot which changes for every new country selection and has another drop down menu which has the mobility factors retail and recreation, groceries and pharmacies, parks, transit stations, workplaces, and residential.

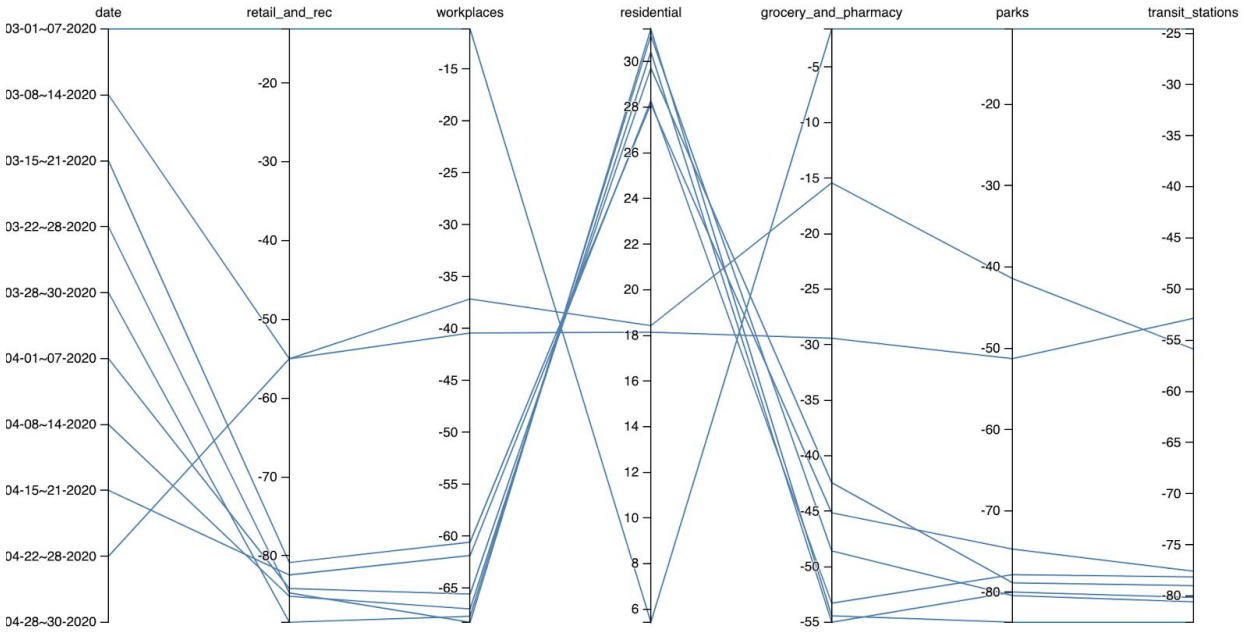
This plot shows the correlation between the number of cases spanned across two months with respect to the mobility trend ie.. if the number of cases were increasing which could see a negative correlation between cases and the mobility factor retail and recreation as people will not be going to places with increased population density. It also shows a positive correlation between cases and residential mobility since people will not be choosing to go outside. Upon hovering, each dot represents a point showing case and mobility change for that factor.



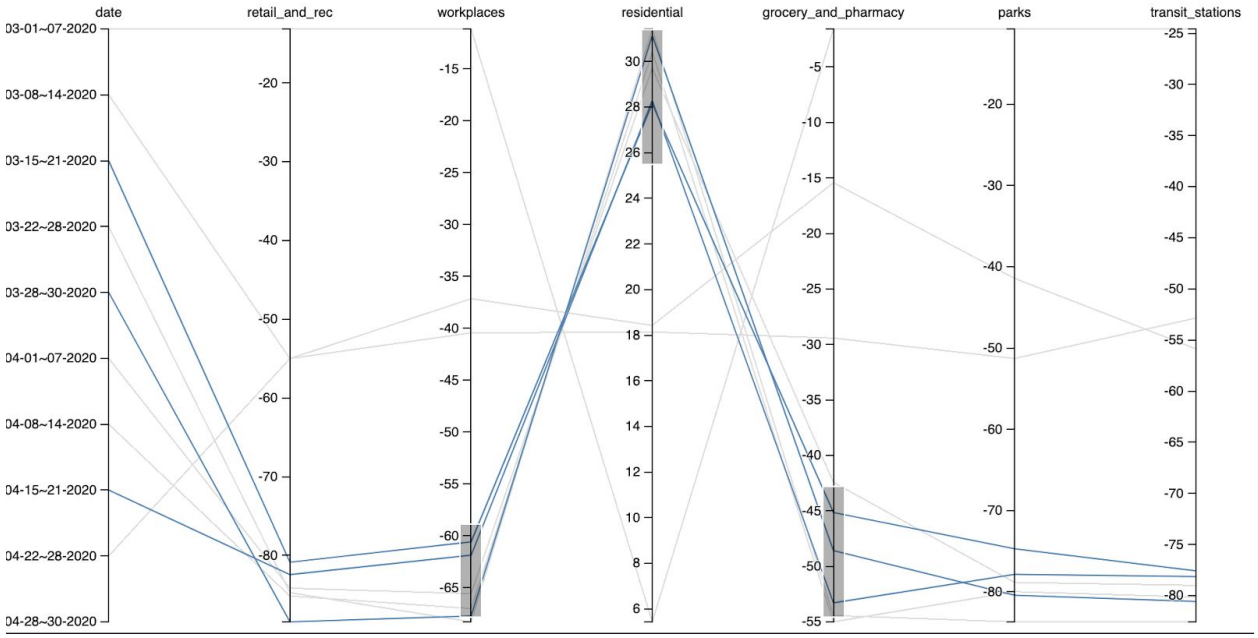


7. PARALLEL COORDINATE PLOT

This parallel coordinate plot shows the correlation between the mobility trend factors amongst each other. In the figure below we can see a proper negative correlation (ie.. boat eye) between workplaces and residential clearly showing that if people are staying home then they are avoiding going to workplaces, parks, retail and recreation etc.



Brushing: As we brush through the points we can see that almost all the mobility factors are positively linearly correlated with each other and are negatively correlated with the residential mobility.



8. CONCLUSION

We identified that America reported the most number of cases in the past three months. Also initially in the month of March cases were less but after the outbreak of this pandemic cases started to peak and then started decreasing explaining the measures such as lock down taken by the government. We can also see the mobility factors affected with respect to the increasing dates for a country such as workplace mobility, transit mobility and parks mobility change which is decreasing and the residential mobility change which is increasing as people are preferring to stay at home to avoid socializing..

9. REFERENCES

1. https://www.cdc.gov/coronavirus/2019-ncov/covid-data/data-visualization.htm
2. https://informationisbeautiful.net/visualizations/covid-19-coronavirus-infographic-datapack/