MXB362 Advanced Visualisation and Data Science

Visualisation Case Study

Visualising the Impact of COVID-19 in Singapore

Name	Dennis Chen
Student ID	n12150801
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Summary

The COVID-19 pandemic, while largely subsided in many parts of the world, has left an indelible mark on global health and economies. However, this crisis highlighted areas where global containment efforts fell short. Advanced visualisation can provide profound insights into these challenges and inform future preparedness strategies.

The motivation for this case study is to propose a visualisation tool that is able to provide up-to-date daily insights on how the pandemic has spread, and thus offer the public ongoing insights into the evolving pandemic landscape. While total case numbers and regional breakdowns provide a quantitative overview of a pandemic, they often fail to effectively communicate the nuances and implications of the current situation to the general public.

This case study aims to be a tool that can be utilised for future pandemic, only using COVID-19 pandemic and specifically in Singapore, as a tool to evaluate the current pandemic visualisations available and improve on it, developing one that can be easily understood by the general public and allow them to make informed decisions regarding the current pandemic situation.

This case study takes great inspiration from Visualising SG COVID-19 Spread (Chua, 2021; Chua, n.d.)

Visualising SG COVID-19 Spread

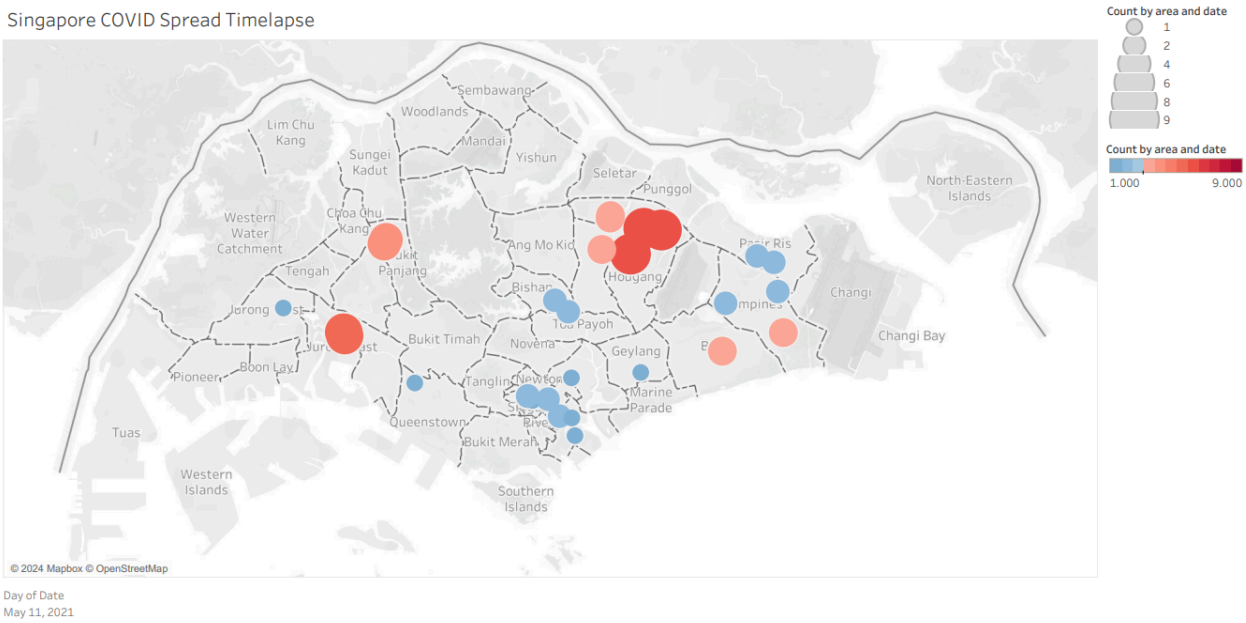

Fig 1. Singapore COVID Spread Book - Done by Hui Shun (Chua, 2021)

An existing visualisation is an animation that shows the daily distribution of COVID-19 cases in Singapore (Fig 1). The size of the circle represents the daily number of cases in that specific area whereas the colour gradient indicates the density of the number of cases till that date.

This visualisation can be rather misleading with the size of the circle. For each size of the circle, one is unable to tell at first glance how the increase in cases affects the increase in size of the circle. For the areas with more cases, the size of the circle is so big that it seems to cover up the entire district. Looking at this in the perspective of the general audience, they might think that the entire estate is a hotspot of the pandemic when in fact it could just be a particular neighbourhood in the district.

Other than that, having 2 different colour gradients to indicate the density of cases in the area might not be necessary. The excessive use of colour can create visual clutter which reduces the effectiveness of the visualisation, and might make it more challenging to interpret the visualisation for the general audience who might not understand how to read the legend. In this case, a single colour gradient is sufficient as the intention is to only represent a single set of data.

Dataset

The proposed raw dataset is a list that includes public places COVID-19 cases had visited for more than 30 minutes (Chua, 2020). The raw dataset has been cleaned and prepared and can be found in Google Sheets (*SG-COVID-Locations*, n.d.).

The main data that will be visualised will be the following:

- Time
- Date
- Latitude and Longitude Coordinates
- Area (Estate names)

The Date and Time data provides a temporal dimension to the analysis, whereas the geographic coordinates for each COVID-19 case is crucial for mapping and spatial analysis. Having the Area data provides a more general classification, which is useful for grouping and comparing different estates.

Expected Visualisation Techniques

The goal of this case study visualisation is to provide up to date insights regarding the current pandemic landscape and this will be achieved through the following visualisation techniques.

Technique 1: Choropleth Maps

Through the usage of choropleth maps, it provides an easy way to visualise the density of COVID-19 cases across Singapore and show the level of variability across the different estates in Singapore. This utilises the Area data within our dataset.

Technique 2: Spatio-Temporal Animation

Doing a spatio-temporal animation of the different data points on the map will allow the general public to see the areas which the COVID-19 cases have visited. This helps provide a visualisation of how COVID-19 spread and how the public behaviour evolved during the pandemic. This utilities the geographic coordinates data of our dataset.

Expected Outputs

According to the Singapore's government website, one should continue to self-monitor for up to 5 days if they are a close contact to any potential COVID-19 cases (*Gov.SG | Updates to Health Protocols*, n.d.).

Following the guidelines of the Singapore's government, the expected visualisation produced is an animation that shows the density and locations of COVID-19 cases within a period of 5 days. The visualisation produced should inform and educate the general public of how the pandemic landscape has changed for the past 5 days and this will help them make informed decisions with how they move on with their day.

Possible Tools to use

1. Data Manipulation
    1.1. Python
        1.1.1. Pandas – Flexible library designed for data manipulation and analysis
2. Visualisation
    2.1. Python
        2.1.1. Plotly – Useful for creating interactive visualisation
        2.1.2. Json – To load the GeoJSON file
3. Development on
    3.1. Jupyter Notebooks – Offers a user-friendly environment for coding and visualisation

Project Timeline

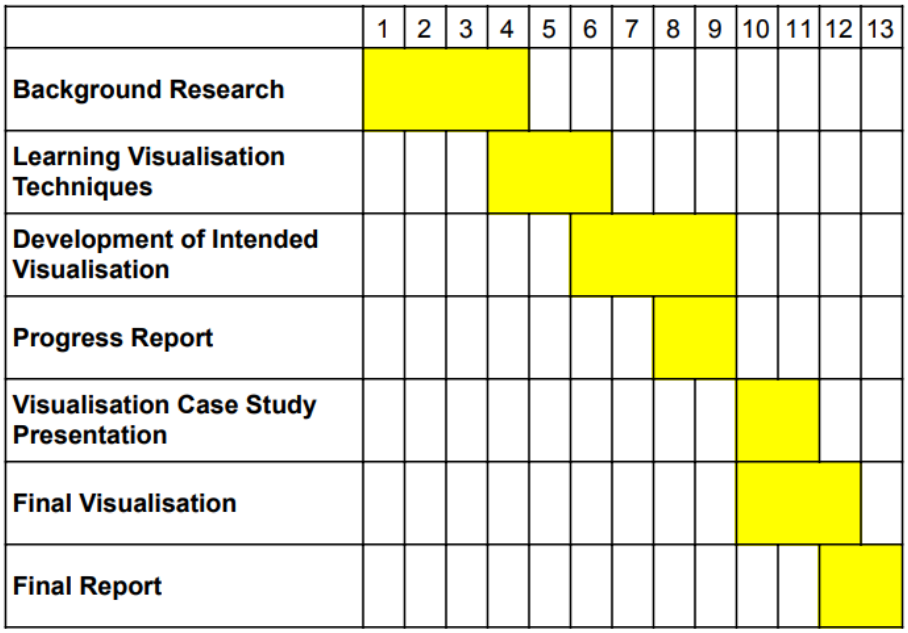

Fig 2. Gantt Chart of Case Study (MXB362, n.d.)

Progress to date

1. Background research of COVID-19 in Singapore
2. Understanding of Visualising SG COVID-19 Spread
3. Establishing case study visualisation goal
4. Establishing intended audience of visualisation
5. Exploring the dataset
6. Figuring out intended visualisation that satisfy case study goal

Expected outcomes by the time of Progress Report

1. Background research of COVID-19 in Singapore to be completed
2. Understanding and learning of the intended visualisation technique
3. Produced the intended visualisation
4. Documentation of methods and reasoning

Foreseen Problems and Risks

1. Implementing advanced visualisation techniques such as spatio-temporal animations may require sophisticated tools and technical expertise which might take some time to learn and apply.
2. Since the goal is to make this visualisation accessible and readable to the general public, we need to ensure that the visualisation is not too complex or difficult to interpret correctly. However, overly simplifying the visualisation could result in losing important information that needs to be conveyed to the audience.

Project Journal

Date	Progress	Time Allocated
29/07/2024	Ideation of potential case study topics	4 Hours
02/08/2024	Checking on current implementation of chosen case study topic	2 Hours
05/08/2024	Checking with tutor the feasibility of case study topic	10 Mins
13/08/2024	Finalising case study proposal	2 Hours

References

Chua, H. X. (2021, June 30). *Data VIS Singapore Jun 2021 MeetUp: Visualising SG COVID-19 Spread* [Video]. YouTube. https://www.youtube.com/watch?v=OFRegA91bAM

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