

# WebTract

Li Junyao(3A3, Leader), Jared Wong (3A3),  
Fu Zewei (3A3), Tan Jia Feng (3A2)

## **Introduction**

### **Problem Statement**

Due to the current pandemic, deciding when and where to travel overseas or even if one should do so in the first place becomes a question that is becoming increasingly difficult to answer for everyone, ranging from normal civilians looking for a holiday to CEOs of companies deciding if employees should go on overseas business trips. In general, the public may not be well informed on the severity of COVID-19 in different locations.

### **Rationale of Project**

We want to provide additional information such as cases of COVID-19 in a particular country that is clear, easy to understand, and visually appealing to the public. We hope that through such additional information, the public will be able to make well informed decisions that will meet the users' needs and most importantly keep them safe from the virus. Thus, our solution is to create a website that displays a global heat map of cases of the coronavirus, data on the number of people that are vaccinated against the virus, and graphs to show how each country fares amidst the pandemic. Thus, the public can be more aware of the locations with high risk of COVID-19 infections.

### **Significance of Project**

Through our project, not only will the problems above be readily solved, we also showcase how we can make use of the internet and websites to disseminate any kind of information to anyone that has access to the internet. The nature of our project allows us to develop new features if the need arises and as the COVID-19 situation evolves. We also use website scraping to save large amounts of data quickly and efficiently.

### **Scope**

The scope of this project will be information about the pandemic throughout the entire globe since we have a global heat map. However, the language of the website will only be English. We also adapt several ideas from existing similar websites, rather than developing something totally new yet not useful.

## **Literature Review**

Based on our research, there are several similar websites such as the World Health Organisation's (WHO) COVID-19 Dashboard (<https://covid19.who.int/>), and the Worldometers' COVID-19 website (<https://www.worldometers.info/coronavirus/>).

Such websites typically show the global death count due to COVID-19 and have a table of data for every country. The data in the table is more specific, such as new cases in a day, total recovered count, active cases, etc. One can search for a specific country and obtain the information on the pandemic of the country in question.

In Worldometers' website, it has a table of a lot of information and the table is searchable to access information quickly. However, there are only a few graphs and most of the data is not visualised.

In WHO's website, there is also a lot of data, and there are graphs for each country's cases. However, the heat map is in blue and very similar colours, thus the heat map is not visually appealing and may be misinterpreted since all parts of the heat map are the same colour.

Thus, for our website, we have decided to make heat maps of appropriate colours, graphs to show trends, and have a lot of data in the form of a table that is searchable for easy access.

# The Study and Methodology

## Ideation and Description of Study

When coming up with the idea for our project, we first started to find potential problems with solutions that were feasible for us. The biggest problem was obvious: COVID-19, but we did not really know how to solve the problem of COVID-19. This was mainly because we definitely could not find a feasible way for us to directly prevent people from being infected. However, we realised that by making information about the severity of the COVID-19 pandemic in each country available to users of the internet, we would be able to indirectly discourage them from travelling to those countries if possible. Additionally, in the case that users live in a country with many COVID-19 cases or low vaccination rate, they know that they should take extra precautions to protect themselves and others. On the other hand, by showing which countries have a high vaccination rate, users will also know which countries tend to be safer from the virus.

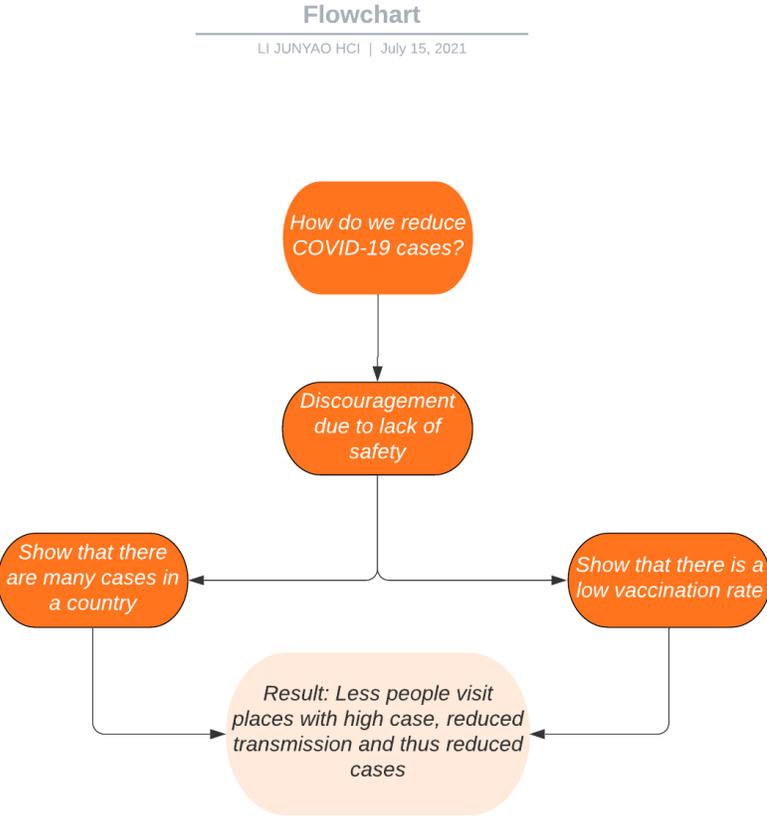


Figure 1: Our thought process.

## Development Platforms and Tools Used

The following are the platforms and software that we used to make the website:

- a. Atom  
A hackable text editor that we used to write our codes.
- b. Folium  
Used to plot graphs and make maps of individual countries' and global COVID-19 cases from the data we scraped from the various websites.
- c. Spyder from Anaconda  
Used to code the web scraper that was required to scrape the large amounts of data that would be used to update the website information, the heat maps of COVID-19 cases and the data on vaccinations.
- d. Streamlit  
A python library that we used to code our interactive data science website, and helps us display the graphs and maps plotted by Plotly and Folium.
- e. Plotly  
Used to plot graphs and make maps of individual countries' and global COVID-19 cases from the data we scraped from the various websites.

## Role of Members and Job Distribution

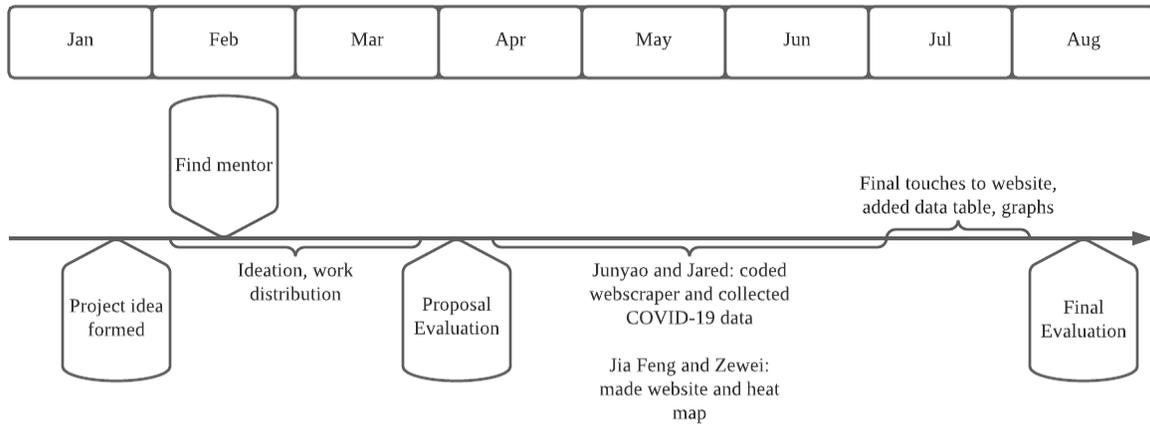
The following shows the job distribution for each member.

	Code web scraper (Python)	Design website and make heat map (Folium and Plotly)	Code data table and graphs for website (Streamlit)	Finalise and compile project report	Make website available to public (host website) (Platform)
Jared	✓		✓		
Junyao	✓			✓	
Jia Feng		✓	✓		
Zewei		✓			✓

*Figure 8: Table showing job distribution.*

## Project Timeline

The following is the timeline of our group's progress throughout the year.

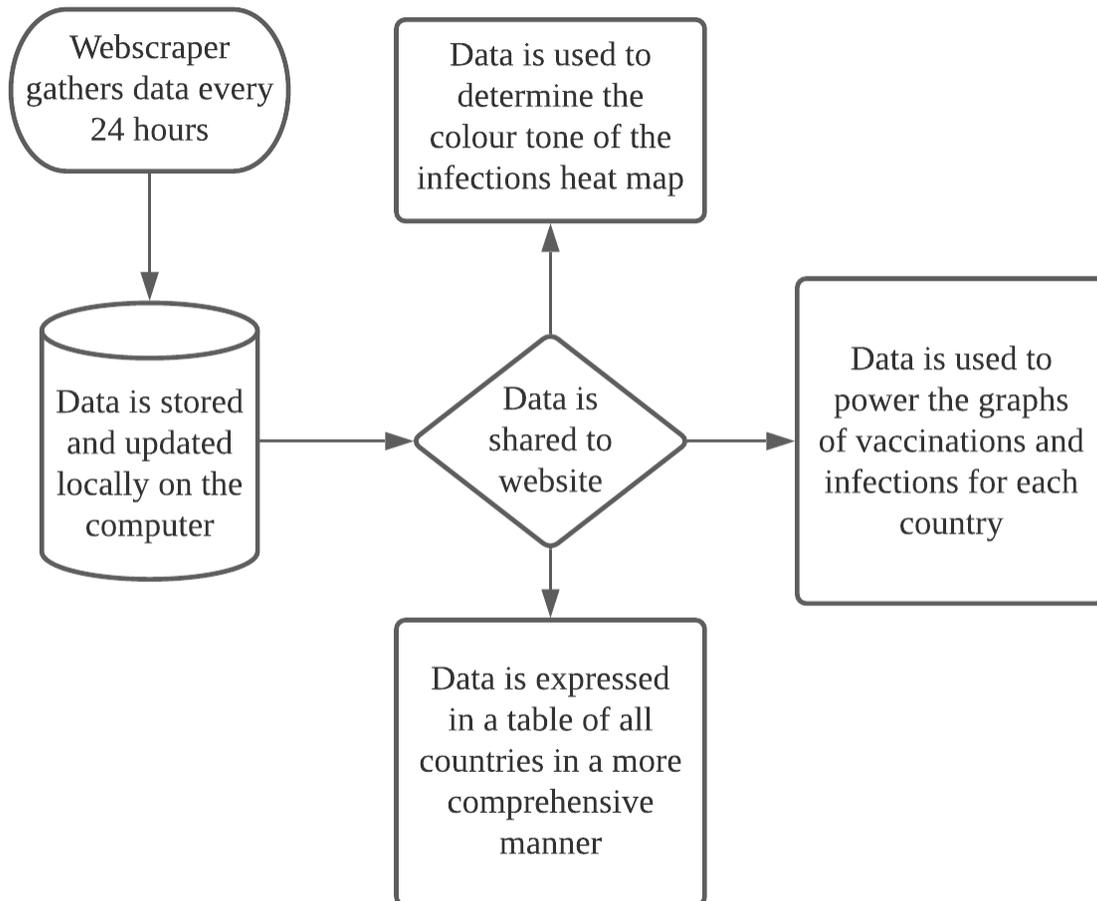


*Figure 9: Timeline of our project progress.*

## Outcomes, Analysis and Discussions

### Flowchart of the System/Features

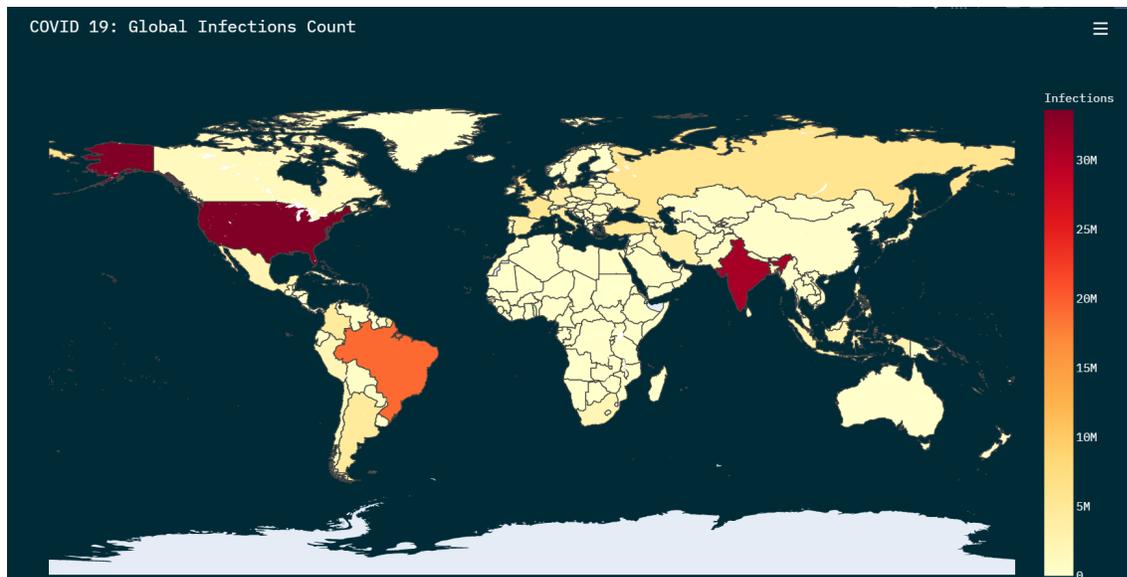
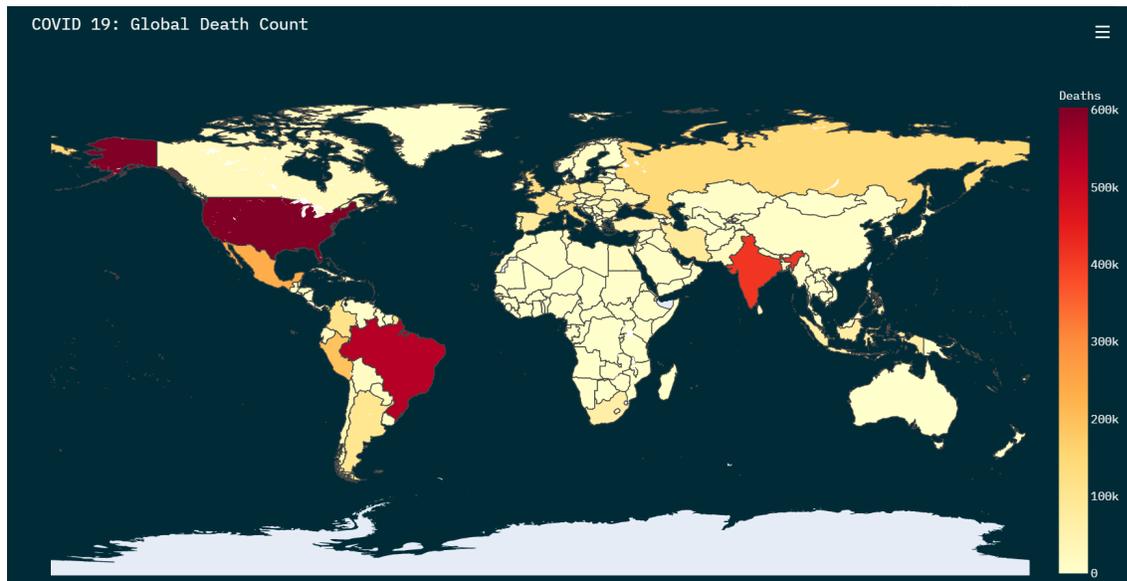
The following is a flowchart of how the website works.

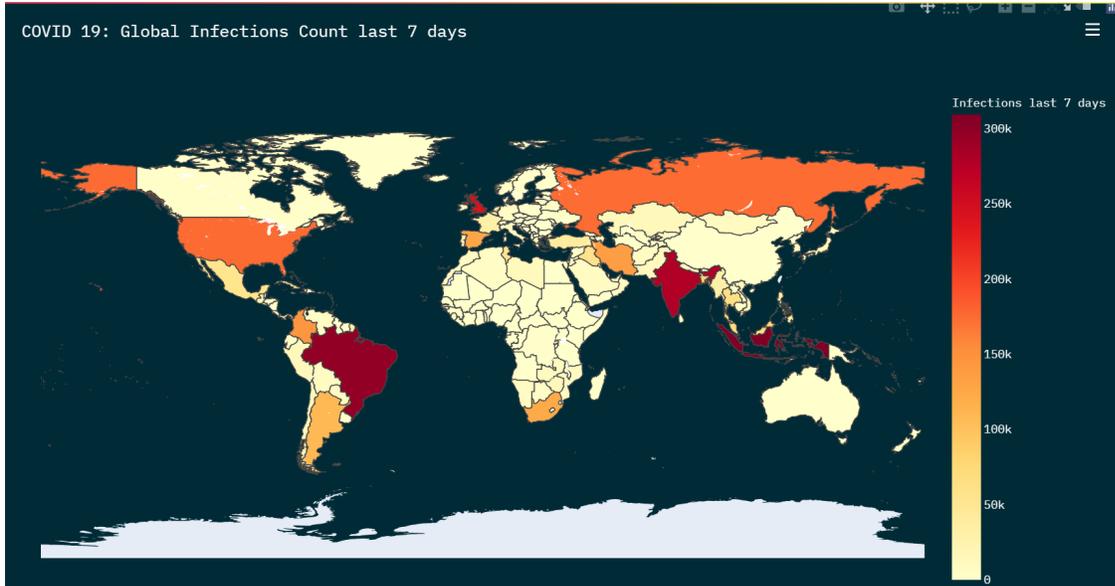


*Figure 10: A flowchart of how the website functions.*

## Features of the Website

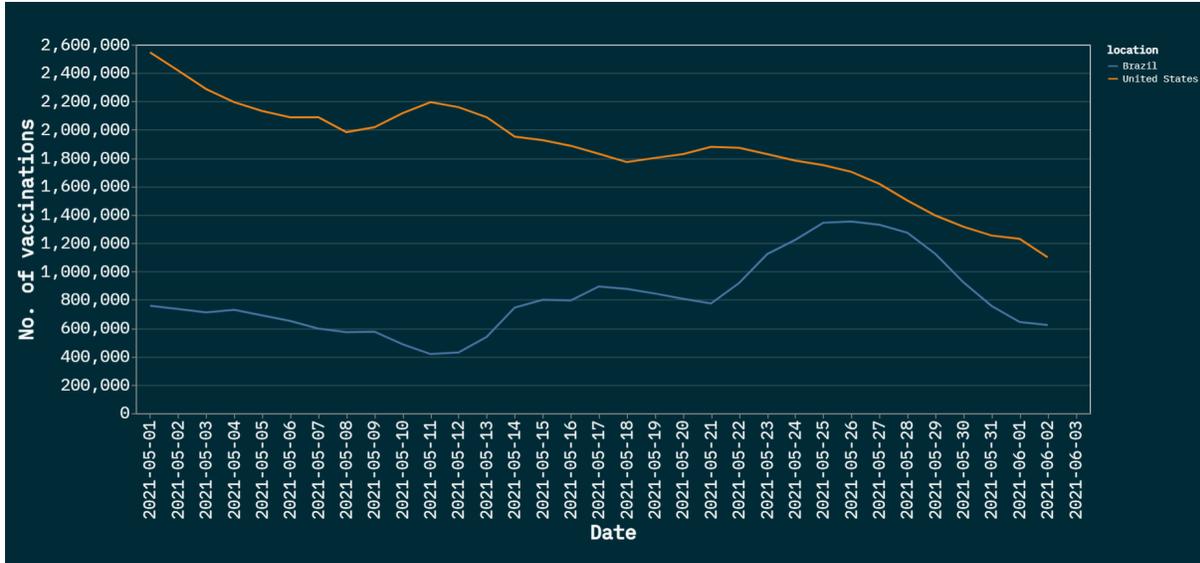
Global heat map of the number of cases, deaths and cases in the past 7 days in each country: Countries on the global map will be in varying colour tones, depending on the number of cases and deaths in that country. The colour for the heatmaps varies from yellow to red.





Graphs of cases and vaccinations in each country: Each country will have a graph to show how many people in the country have been vaccinated per day or have contracted the virus in the past one month. Graphs can be combined together to compare the number of cases and vaccinations per day in each country.

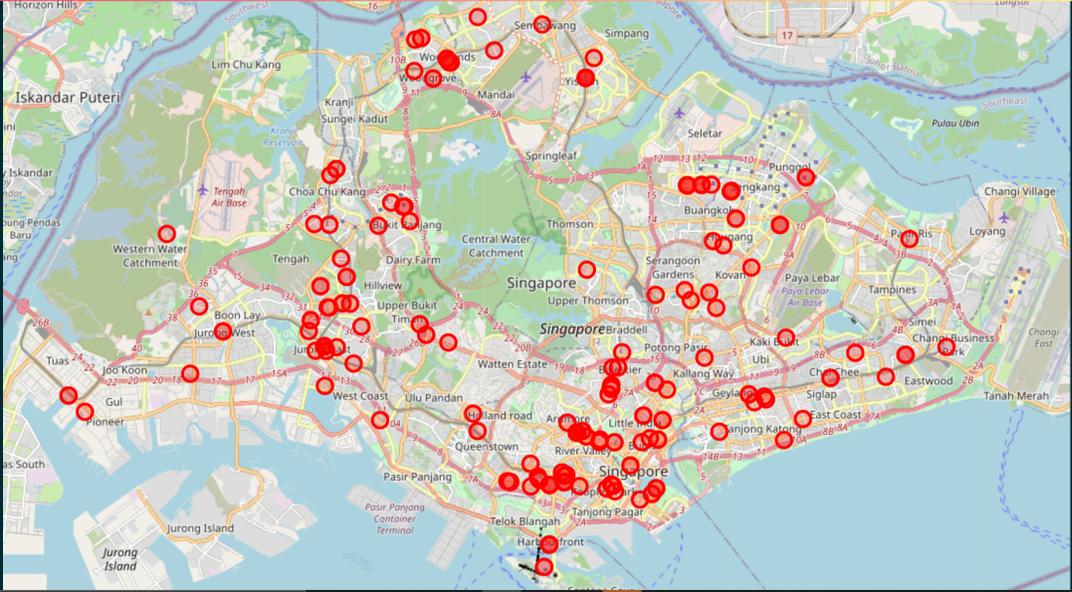




Data table of statistics of every country: Each row of the table represents a country, and each column shows the type of data of each country.

	Name	WHO Region	Cases - cumulative total	Deaths - cumulative total
1	United States of America	Americas	33604822	602820
2	India	South-East Asia	30987880	411989
3	Brazil	Americas	19151993	535038
4	Russian Federation	Europe	5882295	146069
5	France	Europe	5714131	110446
6	Turkey	Europe	5500151	50367
7	The United Kingdom	Europe	5233211	128530
8	Argentina	Americas	4682960	99640
9	Colombia	Americas	4548142	113839
10	Italy	Europe	4275846	127831
11	Spain	Europe	4041474	81043
12	Germany	Europe	3740325	91319
13	Iran (Islamic Republic of)	Eastern Mediterranean	3440400	86391
14	Poland	Europe	2881151	75191
15	Indonesia	South-East Asia	2726803	70192
16	Mexico	Americas	2604711	235277
17	Ukraine	Europe	2242868	52685
18	South Africa	Africa	2236805	65595
19	Peru	Americas	2003567	194606
20	Netherlands	Europe	1755126	17770

Heatmap of active Singapore cases: Each circle shows where each active case in Singapore is located. The exact location of the case can be seen when you click on the circle.



## **Implications and Recommendations**

Our website presents information in a manner that is more user-friendly, such as showing the number of COVID-19 infections via a heat map. We also completed our objective of helping users stay aware of the pandemic's situation be it globally or just in particular countries, by having graphs for each country showing infection cases and vaccinations and showing their trend. However, we have also identified some improvements that we can make on our project.

These are the improvements that we identified:

- Making our website available in more languages such as Chinese
- The information can be made even more accurate by having a system to scrape more data and identify data points that may be unreliable.
- If the data is available, we can also make heat maps for each country individually showing the number of cases and vaccinations in each part of the country.
- A global heat map for the vaccination rate in each country will be very helpful in visualising the data for the number of vaccinations in each country

## Conclusion and Reflections

### Jared's reflection

I realised that if the “why” is strong enough, the “how” doesn't matter. Our group felt strongly about creating this technological prototype, but the path we needed to take was not clear. We set out on this journey anyways and learnt so much along the way: how web scraping works, how data is represented, user design, and doing what we each do best to complete this project. Steve Jobs once said, “You can only connect the dots looking backwards. You can never connect them looking forward.” With that, I thank my group mates for being so cooperative and fun to work with throughout the year, my mentor for giving advice when we needed help, and the school for giving us this opportunity to complete this project.

### Jia Feng's reflection

Through this project, I have learnt to apply the programming skills I have gathered throughout the years into something that is of good use to the people around the world. Our project not only taught me technical skills such as web scraping and web design, but it has also taught me communication skills and the skills needed to work efficiently with the group members to complete the project. We had to adapt to the numerous challenges we faced such as the situation of the pandemic worsening by finding solutions to ensure we could work together and finish the project efficiently. Lastly, by completing this project, it has also given me a better idea on how the different countries have handled this pandemic, and the great impacts this pandemic had on people's lives.

### Junyao's reflection

After working on this project, I realised how powerful technology can be in the hands of a skilled programmer. By creating a web scraper, I realised that the amount of data that can be accessed within just a few days is extremely vast. Additionally, this project also helped me get a better sense of just how devastating COVID-19 is all around the world and has made me appreciate that Singapore is relatively safe. Lastly, I also learned how to work better in a group. It was more efficient for us to split up and work on separate parts of the project than to do everything together. Thus, we also had to make sure to communicate with each other often so that there will be no problems when assembling the final product, when we share the data that the web scraper gathered to the website to visualise.

## Zewei's reflection

This year's project was an extremely enriching experience. Through this project, I have learnt how powerful coding can be. From just typing a few lines of code, a virtual map can be created to educate and present to users COVID-19 data, information and statistics. The vast amount of coding materials online such as on YouTube and the Internet has allowed me to realise that there is so much I can do and learn on my own. I have gained in depth insight on the capabilities of Python through plugins such as Streamlit, Folium and Plotly which helped build the map. Processes such as data scraping, data filtering and data presentation, though tedious, showed me that as long as there is determination, there is a way. Working with my projectmates was also such a joy. From splitting up tasks to solving problems together in Google Meet calls. Even though it was difficult to do project work with all the safe management measures and COVID-19 restrictions, it showed me that coordination and communication is key to working together successfully.

## **Bibliography**

1. *COVID Live Update: 189,216,272 Cases and 4,075,592 Deaths from the Coronavirus - Worldometer.* (n.d.). Worldometers. Retrieved July 15, 2021, from <https://www.worldometers.info/coronavirus/>
2. *WHO Coronavirus (COVID-19) Dashboard.* (n.d.). World Health Organisation. Retrieved July 15, 2021, from <https://covid19.who.int/>