

**FIT5147**

# **Data Visualization Project Report**

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## **Introduction**

In this project, two problems are exploded. Firstly, the casualties and injury degrees of different types of car accidents can be seen in the map, and amounts of car accidents in different areas can be checked, too. Secondly, the amounts of car accidents in urban and rural areas and different time zones (separated by every hour) could be found through consulting heatmap. Furthermore, the amounts of car accidents with drunk driving also can be checked.

## **Design**

First of all, amounts of different types of car accidents would be quantitatively analyze and counted, and then these would be arranged, based on months, times, casualties, car accident types, amounts and whether with drunk driving.

## **Five Design Sheet**

In the sheet 1(Figure 1), I particularly design the searching and finding of the map, and the data of bar chart, line chart and pie chart are visualized mutually. These data in heatmap also can be distinguished by colored from amounts of car accidents in different months and time zones.

In the sheet 2(Figure 2), I try to analyze and place data of heatmap rationally and also add some options to help users can easily choose the data which they want during analyzing process. There two main types of data. The first type is the amount of car accident in cities. The second type is the quantity of car accident in rural areas. These data are divided by every hour. The severity of every car accident is defined by casualty percentage of every car accident. Thus, the dark and light color can be used to differentiate between the amounts of car accident in each month. Finally, adding the variable of drunk driving, users can tell the amount and casualty of car accidents with drunk driving.

In the sheet 3(Figure 3), because the data of this project does not suit line charts, I picked the data from the bar chart and pie chart to visualize. User can tell the different types of casualties, fatal, injury, non-injury, from different types of car accidents. With visualizing the casualties of car accidents in different areas, users can choose the data which they want and need directly.

In the sheet 4(Figure 4), I mainly demonstrate the data in the map. The different sizes of circles mean the amounts of car accidents. The larger circles are, the more amounts of car accident happened. User can click the circles and then receive the details of car accidents. Due to map visualized, users can catch the location of car accidents quickly and clearly.

In the sheet 5(Figure 5), because previous charts need to be analyzed and integrated, I choose to combine bar chart and pie chart and try to place the injury levels (fatal, injure and non-injure ) which combine with maps to the right side of pages. Besides, the map shows the amounts and locations of car accidents by the sizes of circles, and the circles also are categorized into three different colors. Users can utilize this function to gain the information of the severity of car accidents and click different options to select the type of car accident they want. For instance, if user only want to click "Fatal " option and cancel the other options, and thus, the map would only show the circles of fatal car accidents. The left side of the page would also demonstrate the data based on the clicked options. As the result, users could check the data quickly and clearly. Furthermore, placing the heatmap beneath, users can check the ratio and trend of car accident in different areas and whether with drunk driving during different months and in different time zones. Because the code is hard to be demonstrated, I adjusted the final design sheet slightly. The pie chart, the original chart on the left side, was replaced with the area chart. User can observe the amount of car accidents of different types and in the different areas. They can also gain more data of certain areas through clicking these areas. Furthermore, in terms of the heatmap, I placed the new map which integrated with heat map beneath. Thus, it would become more accessible to users.

# SHEET 1

## 2018 Traffic accident in VIC

• Accident time

• Accident Date

• Data

• Type of accident

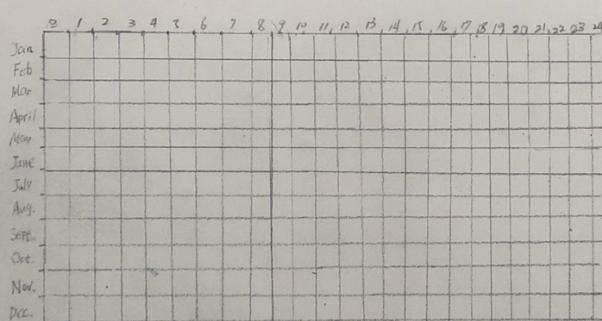
• Alcohol time

• Day of week

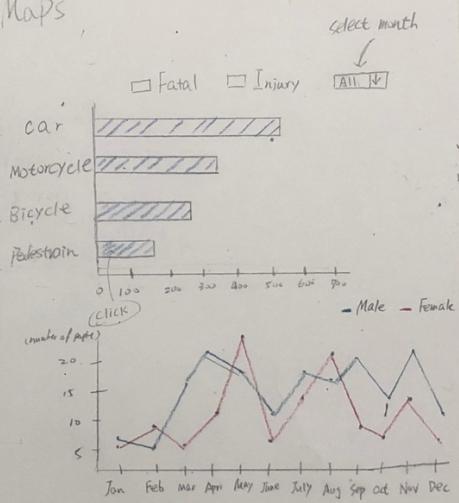
Visualization

• Charts

• Maps



Each cell represents the percentage of crashes involving the selected factor, occurring during the given month and time



Date : 02/11/2018

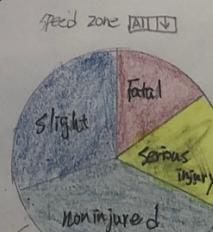
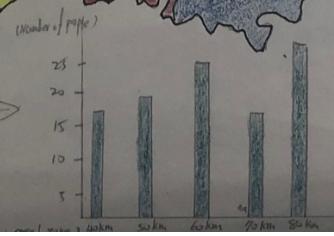
Time : 13:40:00

Total injure People : 2

Reason : Collision with vehicle



The total number of injured  
in different speed zone



Proportion of different types of injury

Figure1: Five Design Sheet - Sheet 1

## SHEET 2

Title: The time of the car accident in each month of 2018

Author: Yi Hsiao

Date: 23/05/2019

Task: Heatmap

### Operations

- Ability to select data in different area  
(All, Urban, Rural)

### ALCOHOL time

- (Yes, No)

- Using different color to show the number of accident

### Advantages

- Clearly show accident distribution and difference from each area
- Data is adjustable, users can able to see the data they want to see.

### Disadvantages

- Only see the number of accident through the color, can not know the actual data

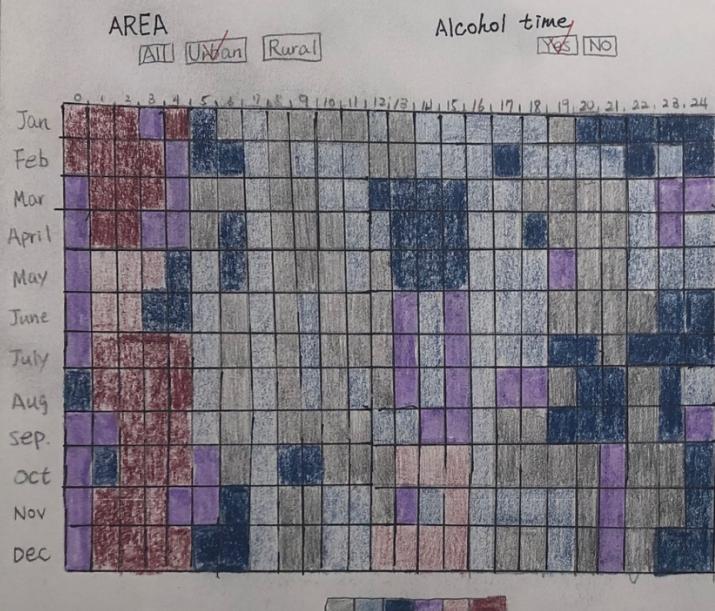
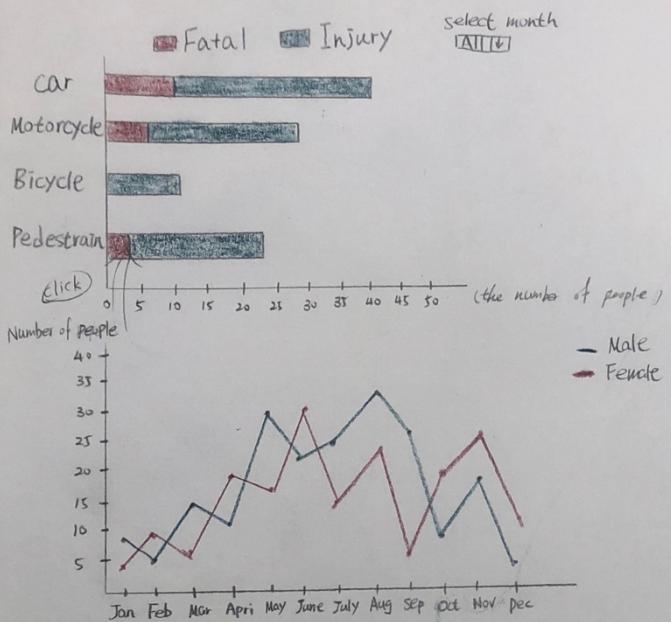


Figure2: Five Design Sheet - Sheet 2

### SHEET 3



Title: The number of injured or fatal in different types of ~~accident~~ accident in 2018

Author: Yi Hsiao

Date: 23/05/2019

Task: Bar chart, Line chart  
Pie chart

#### Operations

- Ability to select month in 2018
- Click the bar can see this type the number of fatal or injured of male and female in 2018
- Ability to select speed zone to see proportion of different types of injured
- Click the pie chart to see that type of injured number of people in 2018

#### Advantages

- clearly shows the data
- use variety of charts to express more clearly

#### Disadvantages

- Unable to show a clear amount of data, only see the ~~trend~~.

Figure3: Five Design Sheet - Sheet 3

# SHEET 4

Title: Details of the car accident through the map

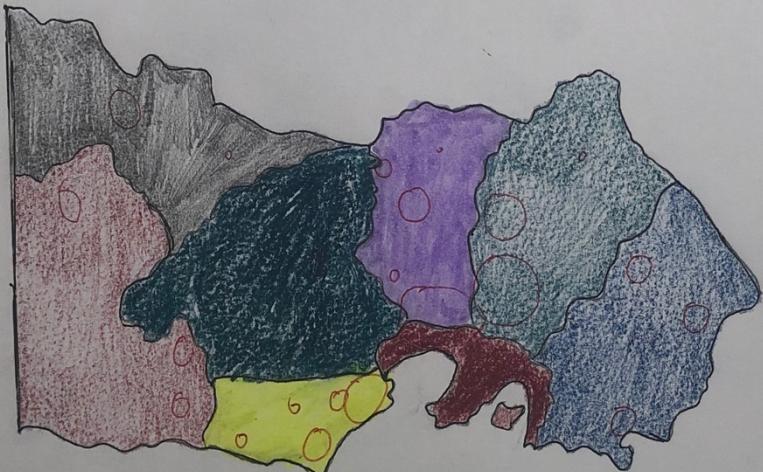
Author: Yi HSiao

Date: 28/05/2019

Task: Map

## Operations

- The circles on the map  
 represents the intensity of the car accident in the area
- Click circles can see ~~the~~ details in that area



Date: 02/11/2019

Time: 13:40:00

Total injure people: 2

Male: 1 Female: 1

Reason: Collision with vehicle

## Advantages

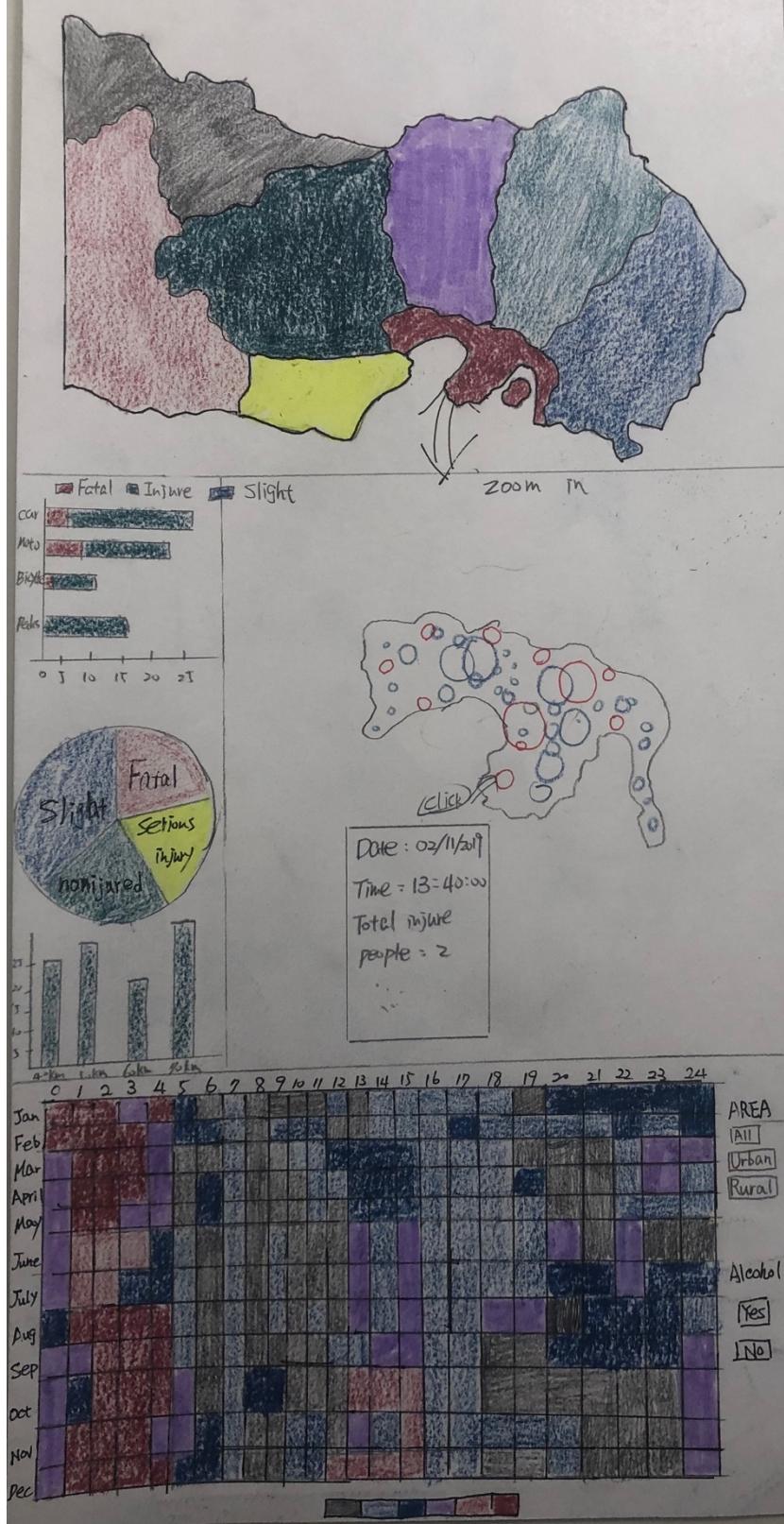
- The zoom function of the map allows the user to know where the accident occurred
- Displaying details allows user to quickly find the information they want

## Disadvantages

- The huge amount of data cause the data to messy on the map.

Figure4: Five Design Sheet - Sheet 4

## SHEET 5



Title : Data Visualization integration

Author: Yi Hsiao

Date : 24/05/2019

Task: Stage 1 : map

Stage 2 : bar chart  
line chart

Stage 3 : Heatmap

### Operations

- Integrate maps with bar chart for visual interaction analysis
- Click circles on the map to get detail information
- In stage 3, utilize area and Alcohol time to visualize data interaction

### Detail

- In stage 1, users able to see ~~different type~~ proportion of different types of injured on the map (stage 2)
- In stage 2, users can see more detail information
- In stage 3, the ~~color~~ depth can clearly see the number of traffic accidents in different months and ~~the~~ different time

Figure5: Five Design Sheet - Sheet 5

## User Guide

Use Brackets software to run the code and see the view on the instant viewer. After loading the interface. You can follow the guides below.

Firstly, when users watch the heatmap in the website, they have six options to visualize the data. If they do not want to use, they can click the upper left corner of pages to close.

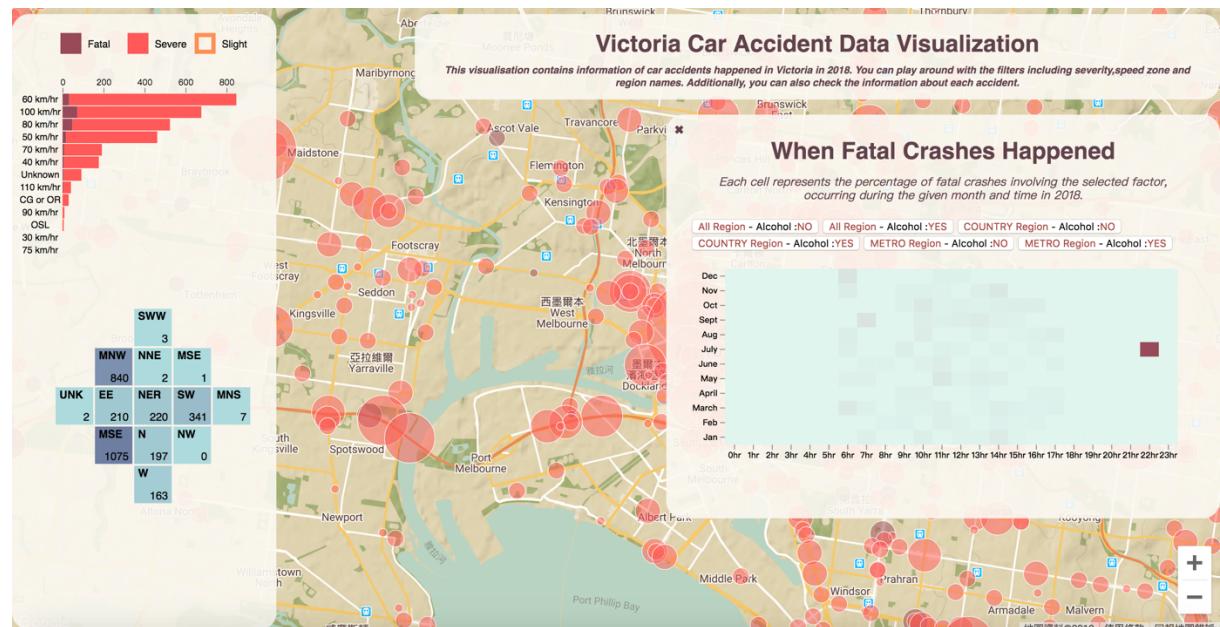


Figure6: Data Visualization – 1

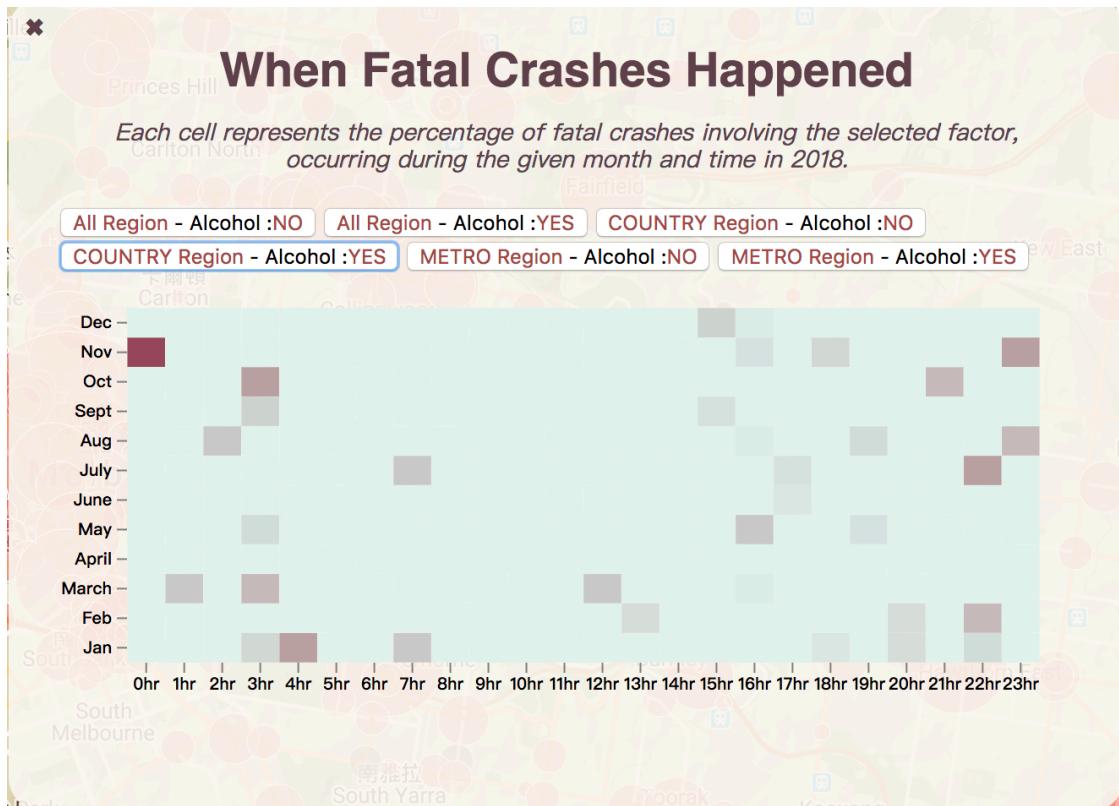


Figure7: Data Visualization – 2

Then, users can watch the three different types of car accidents, Fatal, Severe and Slight, from the upper left side of pages. They can select different types of car accidents to observe and the map would change by the different selected conditions.

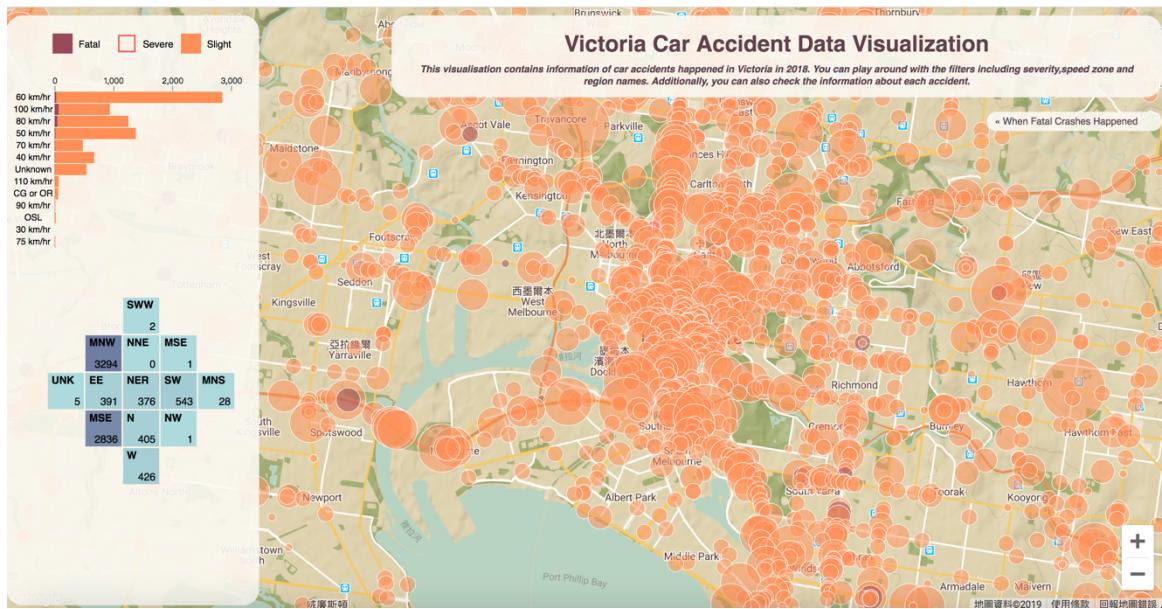


Figure8: Data Visualization – 3

Users can observe the amounts of car accidents in different areas through the charts at lower left side of pages. Besides, maps would only show the data of area which is clicked. The users also can see the accurate data of car accident types in different speeds when moving mousse to the upper bar chart.

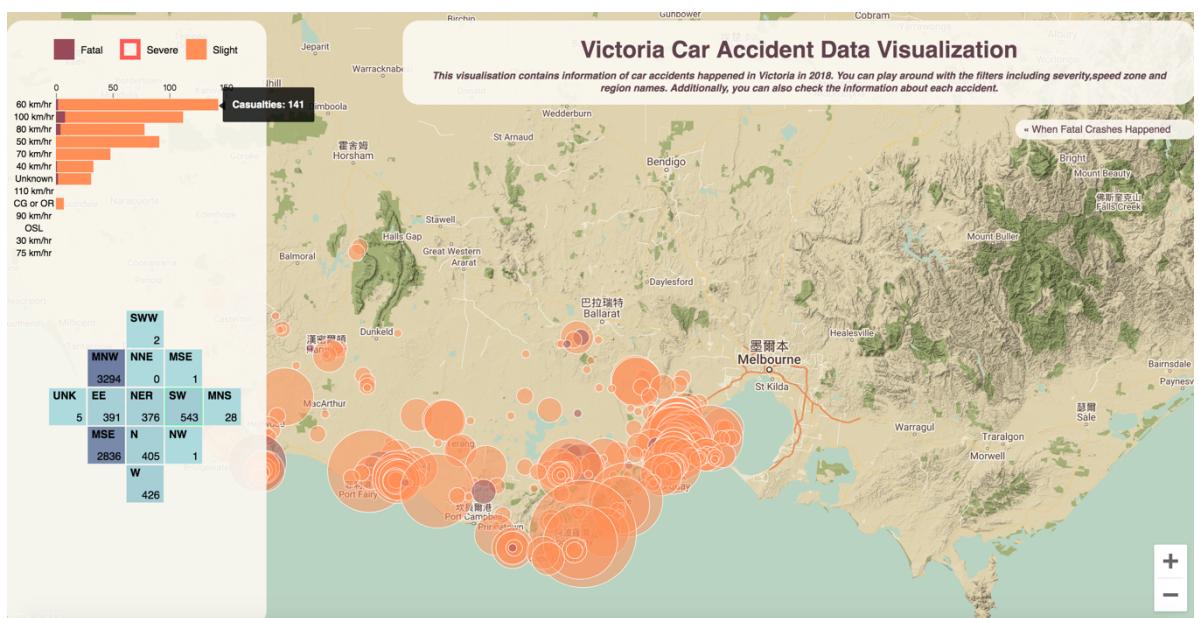


Figure9: Data Visualization – 4

Finally, users can also utilize the visualized date on the map. When users click the right side of these circles, it would demonstrate the details of car accidents.

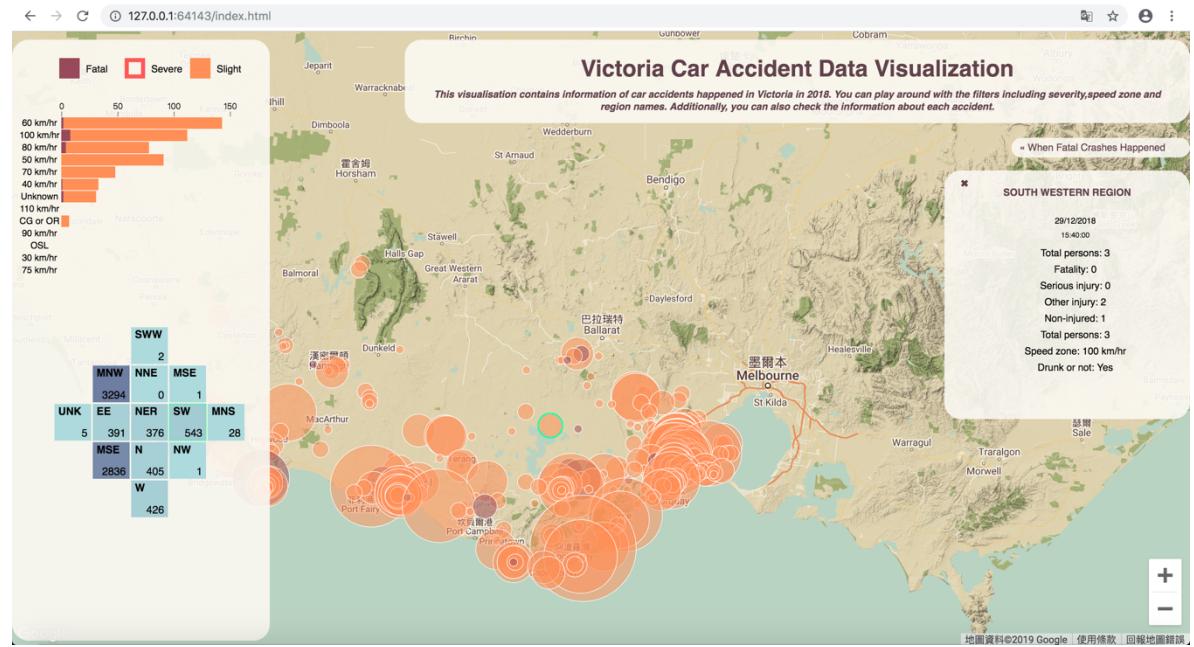


Figure10: Data Visualization – 5

## **Conclusion**

In the design of this report, I integrate concepts of these five design sheets into the sheet 5, and these data can be visualized mutually. It took lots of time to analyze data due to the various data. Besides, during the process of arranging website design and computer languages, I spent plenty of time on typesetting, producing charts because of utilizing D3. In the future, I should spend more time on learning the HTML language. I actually learn and receive plenty of related skills and knowledge through this experience of producing visualized data mutually. In this class, I learn many concepts of charts and it also offers me more options to visualize data.

## References

### **What I Learned from Analyzing and Visualizing Traffic Accidents Data**

<https://towardsdatascience.com/what-i-learned-from-analyzing-and-visualizing-traffic-accidents-data-7cd080a15c15>

### **New York City Motor Vehicle Collision Data Visualization**

<https://nycdatascience.com/blog/student-works/new-york-city-motor-vehicle-collision-data-visualization/>

### **Visualizing TFL Accident Data**

<https://lucyia.github.io/tfl-accidents/>

### **Customizing heatmap in d3.js**

[https://www.d3-graph-gallery.com/graph/heatmap\\_style.html](https://www.d3-graph-gallery.com/graph/heatmap_style.html)