The Visualization Project for Nightlife in Melbourne

Student Name: Xinyue Huang

Student ID: 30070139

Tutorial ID: Lab 39

Tutor Name: Jeffery Liu

Contents

Introduction

This visualization project aims to introduce the nightlife businesses in Melbourne, though trying to answer the following questions:

- Where or which area is the density of nightlife places in Melbourne?
- Which type of nightlife business occupies the major portion of the market?
- How large of nightlife places is prevailing?

These questions mainly focus on the three respective factors namely Area, Type and Size of nightlife business, therefore, audiences, especially businessmen who tend to open a nightlife place in future, could have an initial picture of the nightlife commerce in Melbourne through exploring this visualization project.

Design

Summary of Five Design Sheets

The whole design process was mainly developed following the methodology of Five Design Sheet (Roberts, Headleand, & Ritsos, 2016). On Brainstorm Sheet, surrounding the main three keywords namely "Area", "Type" and "Size", respective visualization components were considered, filtered, and refined. Eventually, the ideas for the visualization could be summarized as following (showed as Table 1):

Table 1 Summary of Brainstorm Ideas

Focused Interest	Visualization Components
Area	Pareto Chart (containing lines and bars)
	Choropleth Map
	Dot Density Map
Type	Stacked Bar Chart
	Pie Chart
Size	Line Chart
	Histogram

In terms of users' respective focused interest, this dataset could be explored and visualized the following three design ways which are separately on sheet two, three and four. On Sheet Two, it mainly focuses on the area interest and illustrate the density of nightlife places and the changing trend. On each component of sheet two, there are some interactions provided for visualizing more details (illustrated as Table 2).

Table 2 The Designed Components on Sheet Two

Visualization Components	Goals of Components	Interaction on Components

Pareto Chart	To show nightlife places' changing trend from 2002 to 2018.	Users could select an area to look at the changing trend for that particular area.
Choropleth Map	To illustrate the geographical distribution of nightlife places in small blocks in 2018.	Users could move mouse around in the map to see basic information for a specific area.
Dot Density Map	To details the clusters of nightlife places within various areas.	-

On Sheet Three, the visualization mainly focuses on exploration of the second core interest "Type" including the proportion of different types and the relationship between areas and types. Therefore, it could illustrate the prevailing types of nightlife business and the type diversity of different areas. On this sheet, the components could also have some interactions which are listed as following (illustrated as Table 3).

Table 3 The Designed Components on Sheet Three

Visualization Components	Goals of Components	Interaction on Components
Stacked Bar Chart	To display the changing trend for different types of nightlife places between 2002 and 2018.	Users could pick up a particular type to filter the bar.
Pie Chart	To show the proportion of different types of nightlife places in 2018	User could select an area to look at the proportions for that particular area.

On Sheet Four, the visualization would mainly show the numeric distribution of nightlife places with various sizes and the influence of areas on the selection of size range. On each component of sheet four, there are some interactions offered for visualizing more details which were listed as the Table 4.

Table 4 The Designed Components on Sheet Four

Visualization Components	Goals of Components	Interaction on Components
Line Chart	To show the changing trend for various sizes of nightlife places during these seventeen years.	Users could pick up a particular size range to see the changing trend for that size range.
Histogram	To illustrate the numeric distribution of different sizes of nightlife places in 2018 which would be grouped by type.	User could select an area to look at the numeric distribution for that particular area.

With the consideration of the fact that different users would have different requirements on the focus interest aspects, the design on Sheet Five is to organise the three exploration ways together. Since the question answered by Stage one could be the most popular one that audience want to explore first. Then the Stage Two and Three could let users learn about the influence of areas on the selection of types and sizes of nightlife places. Therefore, audience would not only have a clear answer about the clusters of

nightlife places, but also could have an idea about their type diversity and their prevailing businesses' size range.

Table 5 The Final Designed Components on Sheet Five

Visualization Components	Goals of Components	Interaction on Components
Pareto Chart	To show nightlife places' changing trend from 2002 to 2018.	Users could select an area to look at the changing trend for that particular area.
Choropleth Map	To illustrate the geographical distribution of nightlife places in small blocks in 2018.	Users could move mouse around in the map to see basic information for a specific area.
Dot Density Map	To details the clusters of nightlife places within various areas.	-
Stacked Bar Chart	To display the changing trend for different types of nightlife places between 2002 and 2018.	Users could pick up a particular type to filter the bar.
Pie Chart	To show the proportion of different types of nightlife places in 2018	User could select an area to look at the proportions for that particular area.
Line Chart	To show the changing trend for various sizes of nightlife places during these seventeen years.	Users could pick up a particular size range to see the changing trend for that size range.
Histogram	To illustrate the numeric distribution of different sizes of nightlife places in 2018 which would be grouped by type.	User could select an area to look at the numeric distribution for that particular area.

When it comes to the layout of the whole visualization project, it would be a linear format in one page and all of components would be ordered according to their focused interest. User could scroll up and down to look through the web page and play around with interaction effects on each component.

The Final Design

In fact, during the implementation, the final design could be slightly different from the design on Sheet Five. Here are six small differences which could enhance the quality of the final project.

Firstly, the header "Nightlife in Melbourne" and the subtitles "Popular Area", "Popular Type" and "Common Size" (showed as Figure 1) are added at the beginning of the web page which did not mention in the original design. The reason why adding these headers is that they can tell users this project is about nightlife in Melbourne which will be visualised in three aspects: the area, type and size of nightlife businesses. Without headers, users would be confused about what information these visualization components imply here.

Figure 1 The Header of Web Page

Secondly, the order of components gets slightly changed. On each sheet of the original design, the chart of trend shows up before another component. For example, on Stage One, the Pareto Chart is ahead of the choropleth map (illustrated as Figure 2). However, the web page illustrates that the choropleth map could always catch users' attention before the Pareto Chart. So, the map could be a nice start for users to engage in the project (showed as Figure 3). Moreover, after changing this order, I realised that the start could be as much as simple so that users could have a motivation to explore the next one. Therefore, the dot density map got removed. Similarly, the order in the Stage Two and Stage Three get reversed (the original versions are respectively showed as Figure 4 and 6 while the changed versions are illustrated as Figure 5 and 7 separately.) Since the Pie chart and the Histogram could provide the latest situation for an area which could be the more interesting questions for users than the changing trend for successive years.

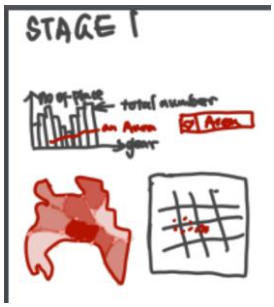

Figure 2 Stage One Layout in FDS

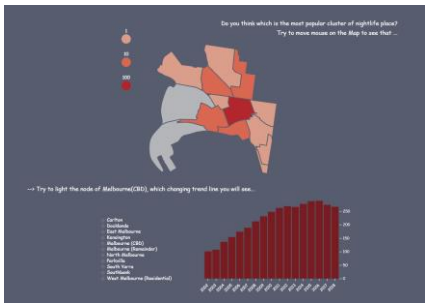

Figure 3 Modified Stage One Layout

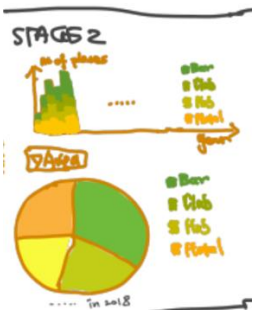

Figure 4 Stage Two Layout in FDS

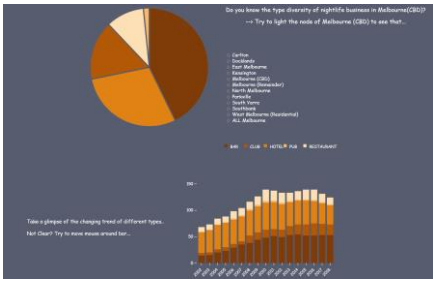

Figure 5 Modified Stage Two Layout

Figure 6 Stage Three Layout in FDS

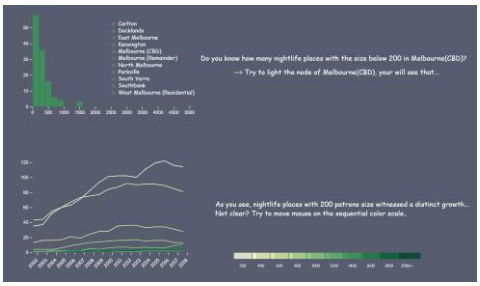

Figure 7 Modified Stage Three Layout

Thirdly, in order to make the project more narrative, the title of each chart was changed to hint sentences which could guide users to explore the project. For instance, nearby the choropleth map, there is a question for users and the next line is to give users a hint to find the answer, which could let user

engaged into exploration of the project (showed as Figure 8). Also, on stage two and stage three, there are also some similar sentences for instructions.

Figure 8 The Hint Sentence

The fourth one is to ignore the type classification on each bar in the Histogram (the old design is showed as Figure 9 while the new one is as Figure 10). When filtering data by area, each bar would become extremely short, then the discrimination of types cannot be seen clearly by users' eyes, so the comparison between various types could not bring valuable information and the sections on each bar would also distract users' attention. Therefore, ignoring type dimension could help users to pay attention to the area influence on the size range of nightlife business.

Figure 9 The Histogram in FDS

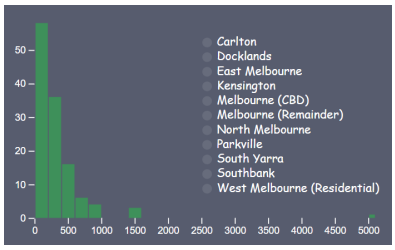

Figure 10 The Modified Histogram

When it comes to the changes on interaction effects, firstly, the selection of area on Pareto Chart, Pie chart and Histogram is to use a dropdown button in the previous design (showed as Figure 11) while in the implementation, it changed to hover and light the node of area (showed as Figure12). In order to keep the layout clear and neat, it could be better that screen has only one window, while dropdown button would not be harmonious with the whole layout style.

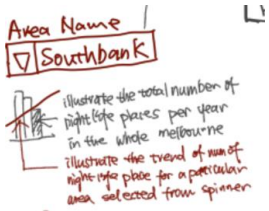

Figure 11 The Selection Interaction in FDS

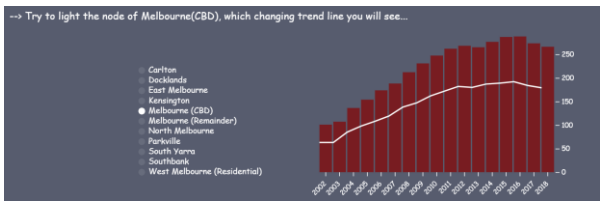

Figure 12 The Modified Selection Interaction

Secondly, on the stacked chart, the interaction slightly differentiates with the original design. The interaction design is to filter the data by ticking a type and some basic information will show up (showed as Figure 13), however, the view of stacked bar chart with tooltips would become dense where bars and texts would be closed and even overlapped, then it is hard to distinguish which bar get tooltip. Then,

the interaction got changed to hover and highlight the rectangles for different types (illustrated as Figure14), which could make user to compare the height of rectangle with the y axis.

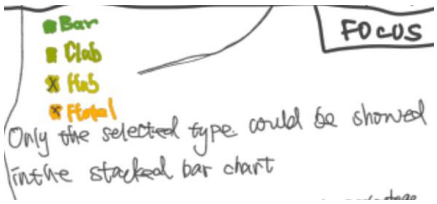

Figure 13 The Filter Function in FDS

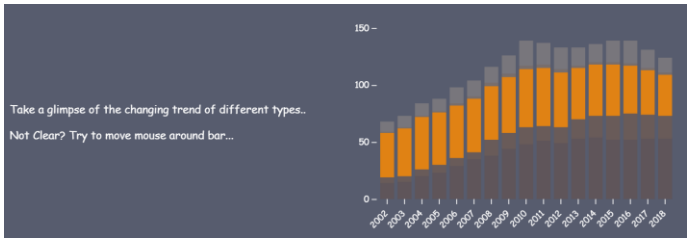

Figure 14 The Modified Filter Function

Overall, after enhancing the design, this project becomes more narrative. There are clear titles about topic, the hint lines to instruct users friendly and neater layout to display information clearly. However, in my view, there could be one more enhancement. The dot density map was removed in order to well organise the linear format, but it could still be a decent way to illustrate the influence of streets, area, and landmarks on the clusters of nightlife places. Then, it could be better to put dot density map in the pop-up window which would display the density map for an area after user clicking that area on the choropleth map and also it can be closed after viewing the map. Therefore, this way could not only keep the layout neat but also keep the dot density map design.

Implementation

During the implementation stage, here are two main working steps namely the data pre-process and the data visualization. The first step is to pre-process the dataset. The main tool is Pandas packages with python. As the fact that different methods of visualization require the dataset format which could be extremely different. Therefore, it becomes necessary to prepare well-organised data formats for respective visualization components before implementation.

As for the choropleth map in Stage One, the required datasets are the Geojson file of Melbourne city map (‘Small Areas for Census of Land Use and Employment (CLUE) | Open Data | Socrata’, 2020.) and the dataset with the attribute “CLUESmallArea” and the number of places in each area in 2018 which were filtered and transformed from the original dataset (‘Bars and Pubs, with Patron Capacity | Open Data | Socrata’, 2020) by Pandas in python (showed as Figure 15).

	CLUESmallArea	numberofplaces
0	Carlton	13
1	Docklands	15
2	East Melbourne	2
3	Kensington	3
4	Melbourne (CBD)	179
5	Melbourne (Remainder)	1
6	North Melbourne	12
7	Parkville	3
8	South Yarra	1
9	Southbank	24
10	West Melbourne (Residential)	3

Figure 15 Table for Choropleth Map

When it come to the Pareto Chart, it actually combined the Line chart and Bar chart together of which the visualization methods required data format are slightly different. Therefore, there are two tables prepared respectively for these two parts (illustrated as Figure 16 and 17). And apparently, the data rows are only grouped by Census Year for Bar Chart while by both of Small Area and Census Year for Line Chart.

	CensusYear	NumberOfPlaces
16	2002	97
15	2003	103
14	2004	131
13	2005	148
12	2006	167
11	2007	181
10	2008	204
9	2009	222
8	2010	238
7	2011	252
4	2012	258
6	2013	255
2	2014	266
1	2015	276
0	2016	277
3	2017	263
5	2018	256

Figure 16 Table for line part of the Pareto Chart

	CLUESmallArea	CensusYear	NumberOfPlaces
0	Carlton	2002	10
1	Carlton	2003	13
2	Carlton	2004	13
3	Carlton	2005	15
4	Carlton	2006	15
...	...	...	...
181	West Melbourne (Residential)	2014	4
182	West Melbourne (Residential)	2015	4
183	West Melbourne (Residential)	2016	3
184	West Melbourne (Residential)	2017	3
185	West Melbourne (Residential)	2018	3

Figure 17 Table for bar part of the Pareto Chart

In the stage two, the data attribute asked by Pie Chart is related to Small Area while the attribute asked by Stacked Bar Chart is associated with Census Year (showed respectively as Figure 18 and 19). But both of them need to pivot the "typeofplace" attribute into the columns.

	CLUESmallArea	BAR	CLUB	HOTEL	PUB	RESTAURANT
0	Carlton	0.0	1.0	3.0	0.0	1.0
1	Docklands	4.0	3.0	1.0	0.0	1.0
2	East Melbourne	1.0	0.0	0.0	0.0	0.0
3	Kensington	0.0	1.0	0.0	1.0	0.0
4	Melbourne (CBD)	40.0	12.0	21.0	0.0	7.0
5	Melbourne (Remainder)	0.0	0.0	1.0	0.0	0.0
6	North Melbourne	1.0	1.0	6.0	0.0	1.0
7	Parkville	1.0	1.0	1.0	0.0	0.0
8	South Yarra	0.0	0.0	1.0	0.0	0.0
9	Southbank	6.0	1.0	0.0	1.0	3.0
10	West Melbourne (Residential)	0.0	0.0	2.0	0.0	0.0
11	ALL Melbourne	53.0	20.0	36.0	2.0	13.0

Figure 18 Table for the Pie Chart

	CensusYear	BAR	CLUB	HOTEL	PUB	RESTAURANT
0	2002	14	5	39	1	9
1	2003	15	5	42	1	10
2	2004	20	6	46	1	11
3	2005	23	7	46	1	11
4	2006	29	7	46	2	14
5	2007	35	6	47	2	14
6	2008	38	14	47	3	14
7	2009	44	14	49	3	16
8	2010	48	15	51	3	22
9	2011	51	13	51	3	19
10	2012	49	14	48	3	19
11	2013	53	17	45	2	16
12	2014	54	19	45	2	16
13	2015	52	21	45	2	19
14	2016	52	23	42	2	20
15	2017	53	21	39	2	16
16	2018	53	20	36	2	13

Figure 19 Table for the Stacked Bar Chart

In the stage three, histogram asked the attributes of Small Area, Number of patrons and Type of Place which could directly put into the method (showed as Figure 20) while the Line Chart need the pre-

define the size range as one of attributes and calculate the result of number of place within different size range before executing the method (showed as Figure 21).

	CLUESmallArea	Numberofpatrons	typeOfPlace
3339	Melbourne (CBD)	100	BAR
3344	Melbourne (CBD)	370	BAR
3345	Melbourne (CBD)	190	CLUB
3346	Melbourne (CBD)	100	BAR
3347	Melbourne (CBD)	375	BAR
...	...	...	...
3586	Southbank	650	BAR
3589	South Yarra	245	HOTEL
3590	Melbourne (Remainder)	120	HOTEL
3591	West Melbourne (Residential)	160	HOTEL
3593	West Melbourne (Residential)	150	HOTEL

Figure 20 Table for the Histogram

	CensusYear	Range	NumberofPlaces
0	2002	1	35
1	2002	2	43
2	2002	3	13
3	2002	4	4
4	2002	5	1
...	...	...	...
130	2018	4	13
131	2018	5	11
132	2018	6	4
133	2018	8	3
134	2018	10	2

Figure 21 Table for the Line Chart

After preparing dataset, the second step is to develop the visualization. The tool for this project is D3. The reason for using D3 is that html could be the most common method for ordinary people to look though information on the Internet. More importantly, it would be powerful to support the development of comprehensive design, as it could easily bind data into graphic components.

In order to achieve the goal that the layout should be neat and simple while all necessary information should be illustrated, some insignificant parts of each component have been ignored and the style of x, y scale has been modified from the traditional type. Using the Pareto Chart as the example (illustrated as Figure 22), this style only displays the points on the scale while the line traditionally connecting all of points has been removed. Also, titles and legends got replaced by hint sentences to illustrate the meaning of x, y scale. More importantly, when it comes to the interaction, hint sentences could demonstrate that all of nodes displayed with dark grey colour which could be lighted by some ways.

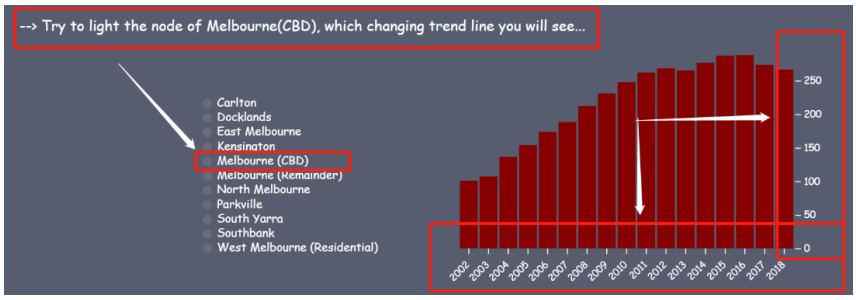

Figure 22 The Implementation Example

When talking about the interaction effects, here is a rule for each function that no matter how users play around with the visualization, there should be a way to turn back to the initial state. Since without that, users could forget the initial information displayed and might lose sights of the goal that the chart want to tell. The major way to turn back is to move the mouse leave away from the component, which is applied on all of charts except for the pie chart. On the pie chart, the rule has been implemented by adding the "All Melbourne" option to turn back to the initial state. Since following the first mentioned

way, if user move out mouse accidentally, the proportion for the selected area will disappear, then users need to light the node again which they might forget. As a result, they have to light node one by one, of which the process might annoy users.

Overall, during the implementation, the process mainly follows the order of data pre-process, chart or map drawing and interaction adding. But after adding some new interaction effects, here would be somethings added or re-painted on the components or hint sentences for the adaption to the updated interactions.

User Guide

When users open the website, the first view of this project would be as following (showed as Figure 23). User could see the title and the main content of this project at the beginning of web page. Then the first component and some hint lines which could instruct users to explore these visualizations. And the way to look though the web page is to simply scroll down and scroll up.

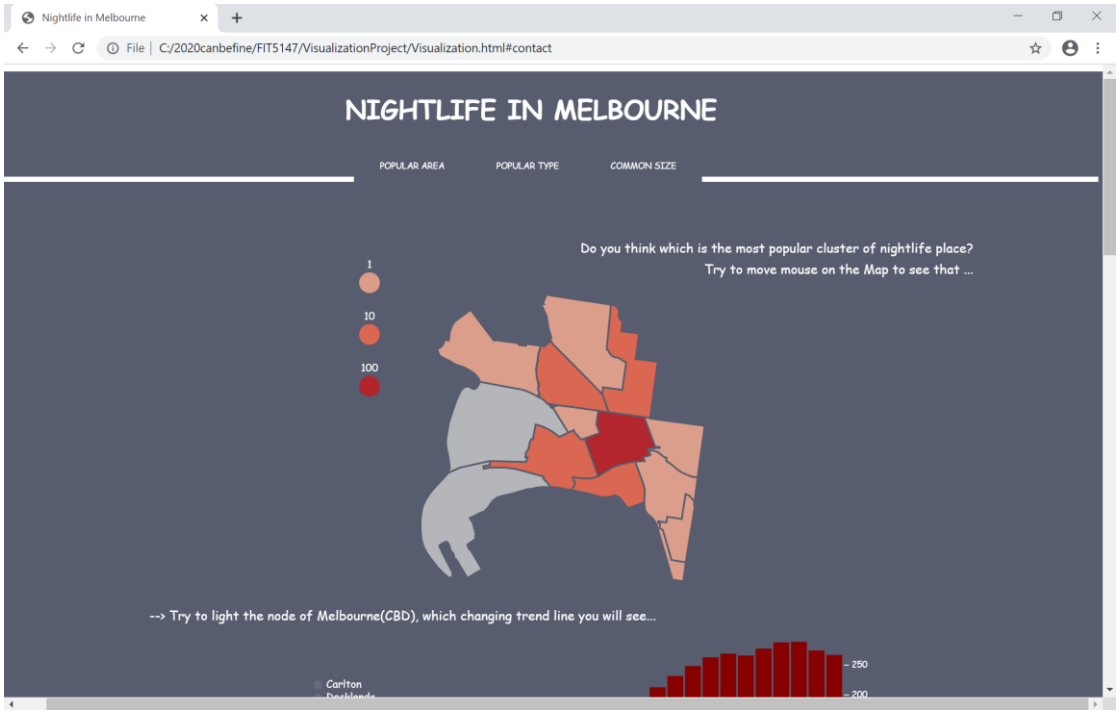

Figure 23 The view of webpage

When scrolling down the page, users could realise that this project separates six components into three groups and tries to show each group in the same screen, then user could explore the similar question easily. For example, the choropleth map and the Pareto chart are mainly to show the area influence on the number of nightlife places (showed as Figure 24), and the Pie chart and Stacked Bar chart mainly display the type diversity of different areas and their changing trend (showed as Figure 25). Also, on the Histogram and Line chart, the size distribution in different area and its line trends could be illustrated together (showed as Figure 26).

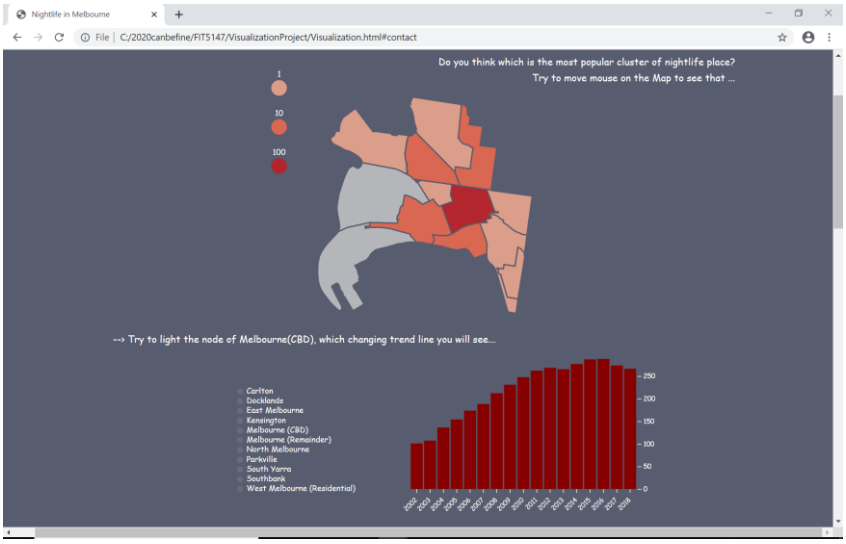

Figure 24 The Screen of the First Group

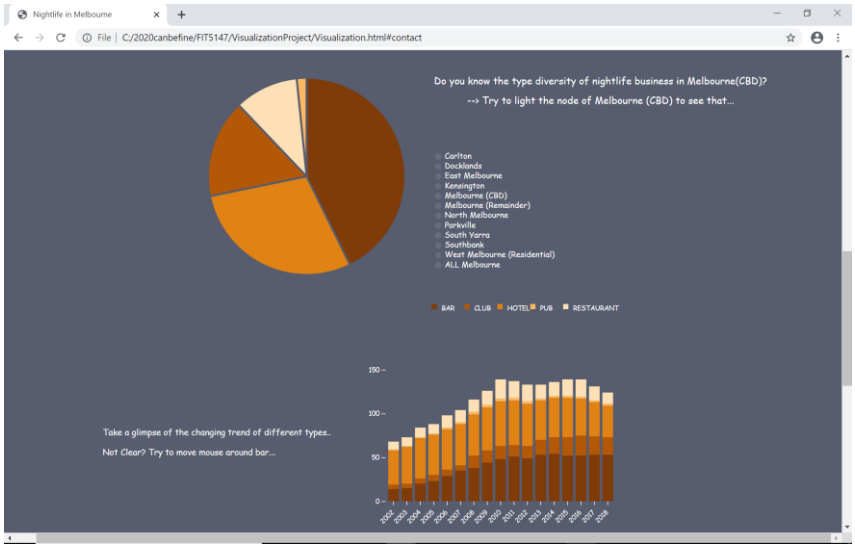

Figure 25 The Screen of the Second Group

Figure 26 The Screen of the Third Group

For the first component, the choropleth map could highlight the area and its name would show up near the map when users hover the map by moving mouse (showed as Figure 27).

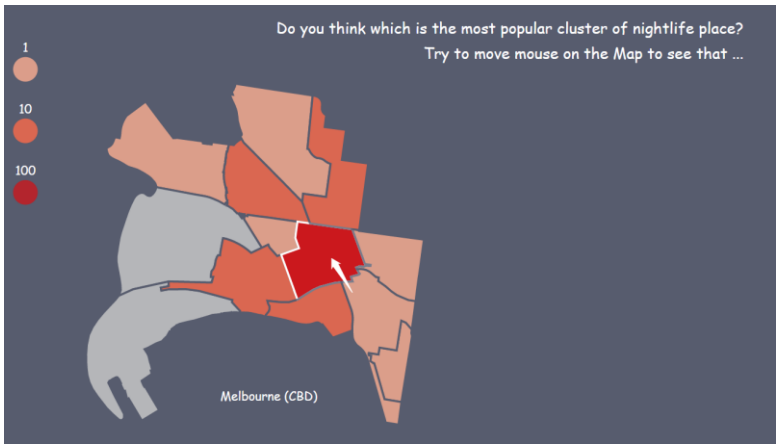

Figure 27 The interaction on the Choropleth Map

For the second component which is the Pareto Chart, user could be allowed to move mouse to light the node of area, then the line trend of number of nightlife places in that area would display on the chart (illustrated as Figure 28). Then users could compare the trend for that area with the trend for the whole Melbourne.

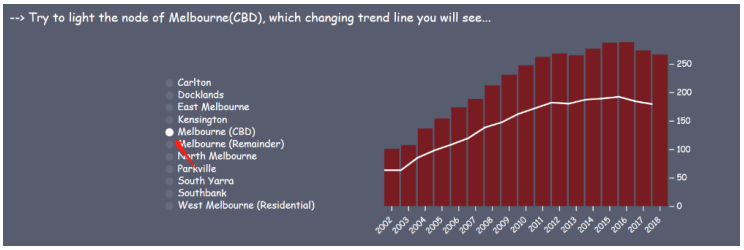

Figure 28 The interaction on the Pareto Chart

Similarly, in the third component, the pie chart, user could select an area to see the proportion of different types of nightlife places by hovering and lighting the node of area (illustrated as Figure 29).

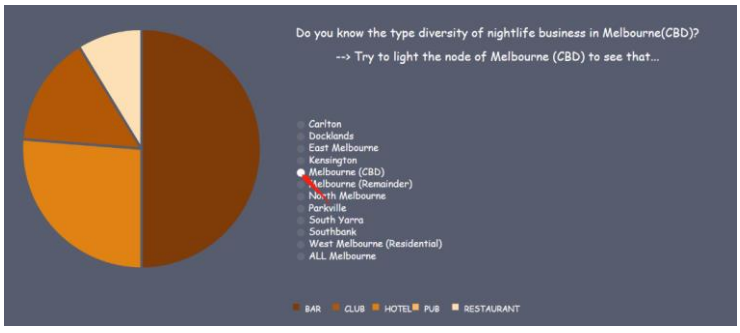

Figure 29 The interaction on the Pie Chart

As for the next component which is the Stacked Bar Chart, users could move mouse over the rectangle in the chart, then rectangles with the same colour could be highlight (illustrated as Figure 30). After

that, users could clearly see the height of rectangles which means the number of nightlife places with that type in a particular year. Also, the numeric changing trend could be more clearly after highlighting.

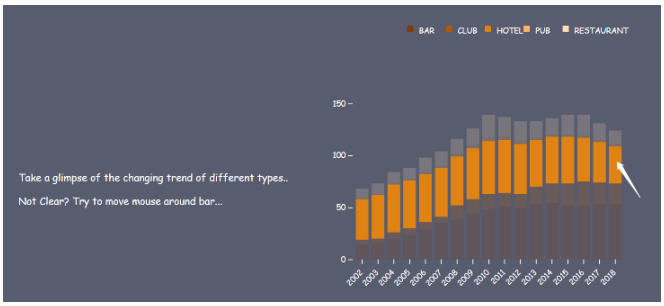

Figure 30 The interaction on the Stacked Bar Chart

When it come to the interaction on the Histogram, the effect is similar with the Pareto chart and the Pie chart. Users` could hover and light the node of area, then the size distribution for that area would be displayed. At the same time, other area name and nodes would disappear, which could help user to focus on the information they want to see (showed as Figure 32).

Figure 31 The Visualised State before Interaction

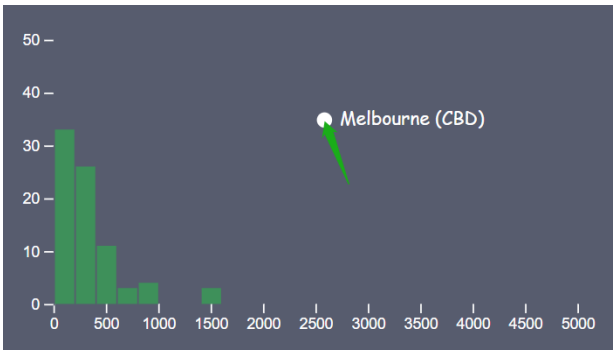

Figure 32 The Visualised State after Interaction

On the last component, the line chart could highlight the line trend for a particular size range when user move mouse and hover the rectangle which represents a particular size range (showed as Figure 34). Then user could see the particular trend clearer while all lines in the chart could be difficultly discriminated.

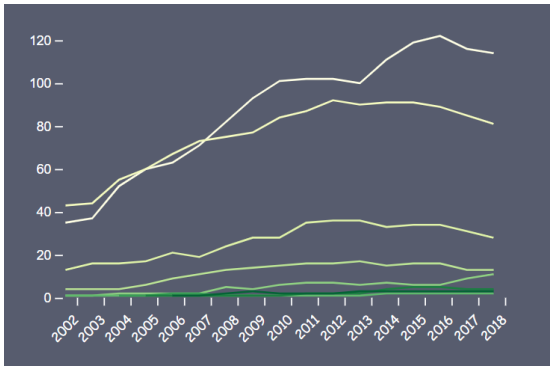

Figure 33 The Visualised State before Interaction

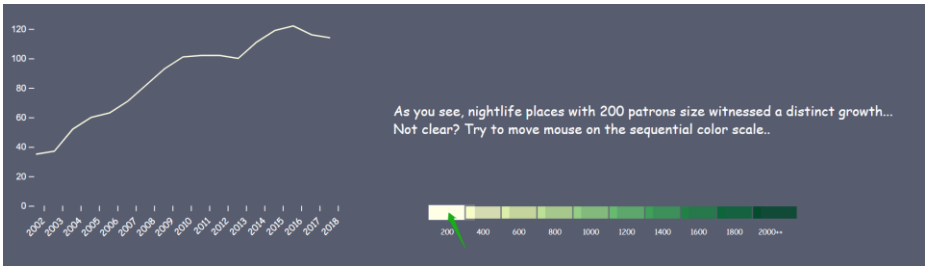

Figure 34 The Visualised State after Interaction

Conclusion

Overall, this project could illustrate the following findings about popular areas and their type diversity as well as their prevailing size choice. Firstly, the most popular area could be Melbourne (CBD) demonstrated in the Choropleth Map. Besides, except CBD, the number of nightlife places in Docklands and Southbank witnessed a slightly increasing trend these years that could be illustrated in the Pareto Chart. Secondly, the proportion of nightlife business types could be various among different areas. For example, in CBD the nearly half of nightlife places could be Bars while more than half of the nightlife places in Carlton are Pubs that users could have a look at the Pie chart. It could imply that a new opened bar could suffer more peer competitions than other types in CBD while in Carlton, it could be Pubs that suffer the peer competition. Moreover, in the Melbourne city, hotels and bars have kept the largest percentage of market with a stable growth (showed in the Stacked Bar Chart), which means that their peer competition could be the most intensive in the whole city. Thirdly, the prevailing size of nightlife places could also be different among different areas which could be demonstrated in the Histogram. For instance, the most common size of nightlife business in CBD is the range from 0 to 200 while in Dockland it could be the range of 200-400. However, in the whole city, the size range between 0 to 200 witnessed an increasing trend for successive years (showed in the Line Chart) which implies that this size of nightlife places could be more adaptable to the business environment in Melbourne. However, due to the absence of dot density map, this project could not illustrate the influence of areas, streets and landmarks on the clusters of nightlife places.

When it comes to my reflection on this project, here are three significant points I learned from this experience. Firstly, hint sentences on Web page could make the project more narrative. Since it could instruct users to engage in the visualization, then users could follow a logical order to explore the project. Also, it could be a brief description of the visualization component, then the component could become simple even without titles, which could allow users to focus on the graphic information. Secondly, similar topic should show up together in a meaningful order and different factors should be ordered in a logical way, that is similar with the fact that a good report should have a decent structure to organise all of sections. Thirdly, pop-up window might be useful for users to do some exploration, which might be added to this project. For example, due to keep the layout neat, the dot density map has been removed during the design. But it could illustrate the valuable information about the connection between clusters

of nightlife business and their surrounding environment such as areas, streets and landmarks. If the dot density map could be moved in the pop-up window and show up after users click a particular area in the Choropleth Map, then users could explore more insights from this project while the layout could still keep neat. Therefore, this project could get more enhancement.

Bibliography

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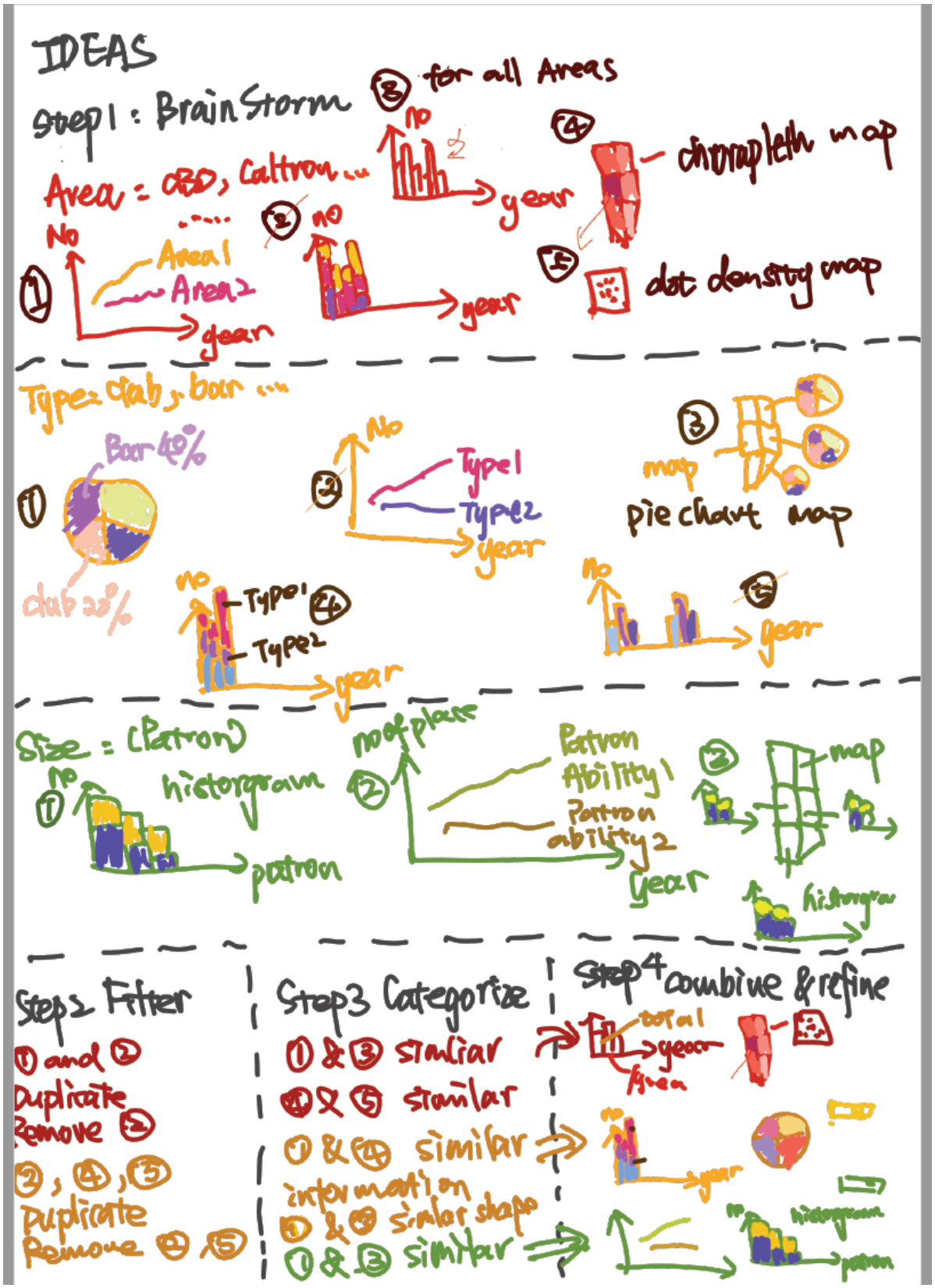
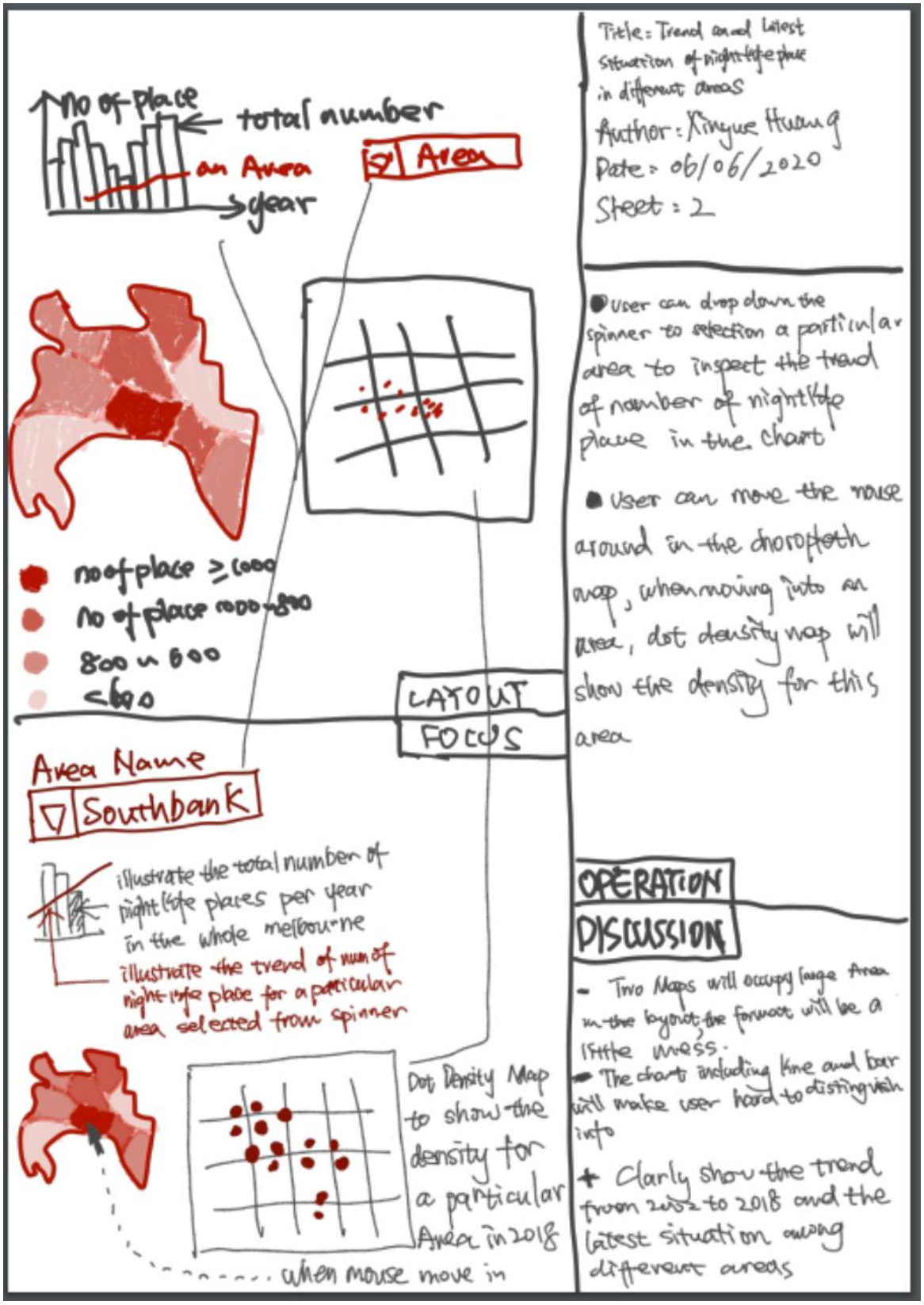
Appendix

1. The Five Design Sheets

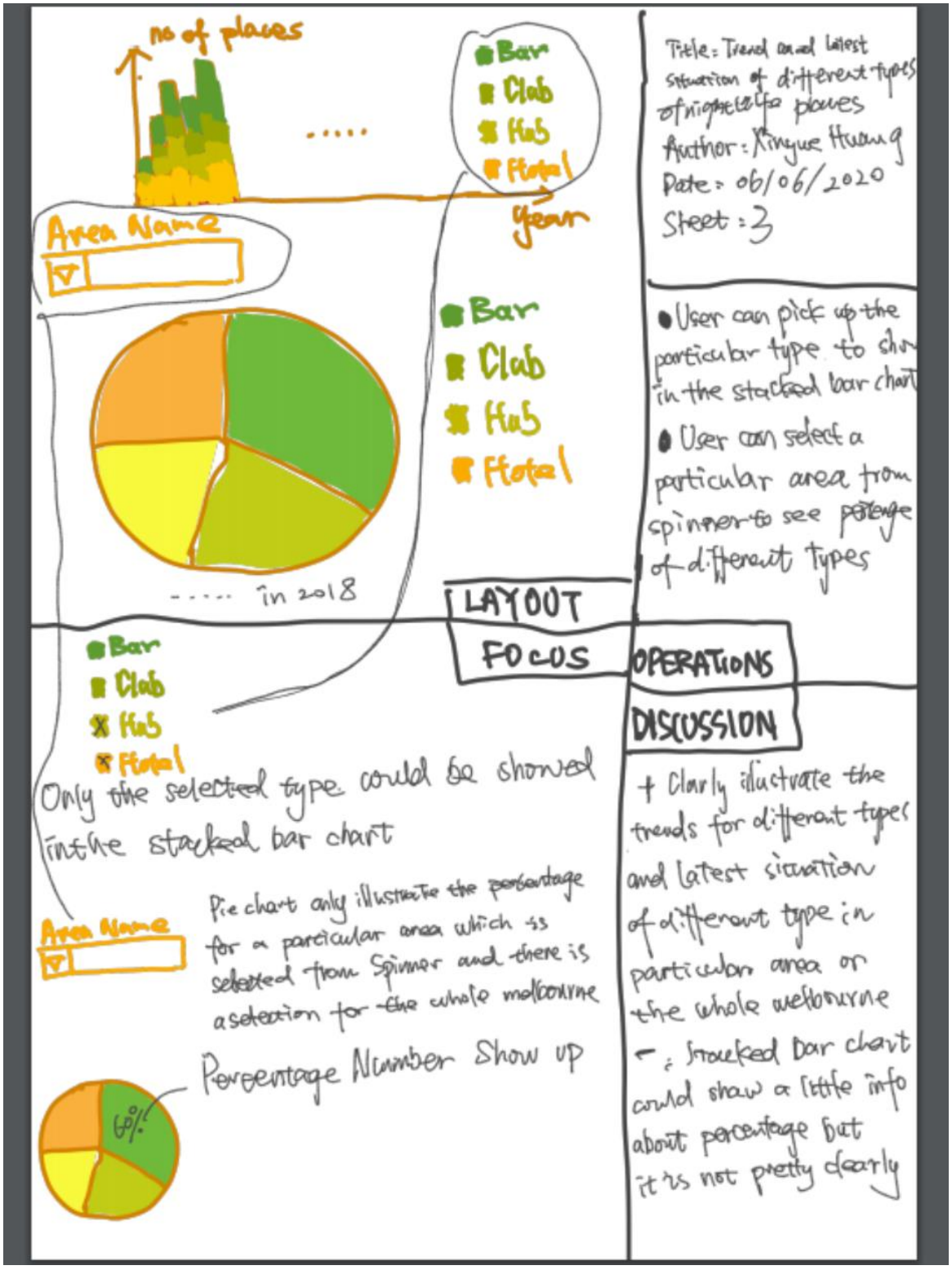
Sheet One



Sheet Two


No of place
total number
an Area
Area
year
Title: Trend and Latest Situation of night-life place in different areas
Author: Xingyue Huang
Date: 06/06/2020
Sheet: 2
no of place ≥1000
no of place 1000-800
800 ~ 600
<600
LAYOUT
FOCUS
Area Name
Southbank
illustrate the total number of night life places per year in the whole melbourne
illustrate the trend of num of night-life place for a particular area selected from spinner
Dot Density Map to show the density for a particular Area in 2018
when mouse move in
User can drop down the spinner to selection a particular area to inspect the trend of number of nightlife place in the chart
User can move the mouse around in the choropleth map, when moving into an area, dot density map will show the density for this area
OPERATION DISCUSSION
- Two Maps will occupy large Area in the layout, the former will be a little mess.
- The chart including line and bar will make user hard to distinguish info
+ Clarly show the trend from 2012 to 2018 and the latest situation among different areas

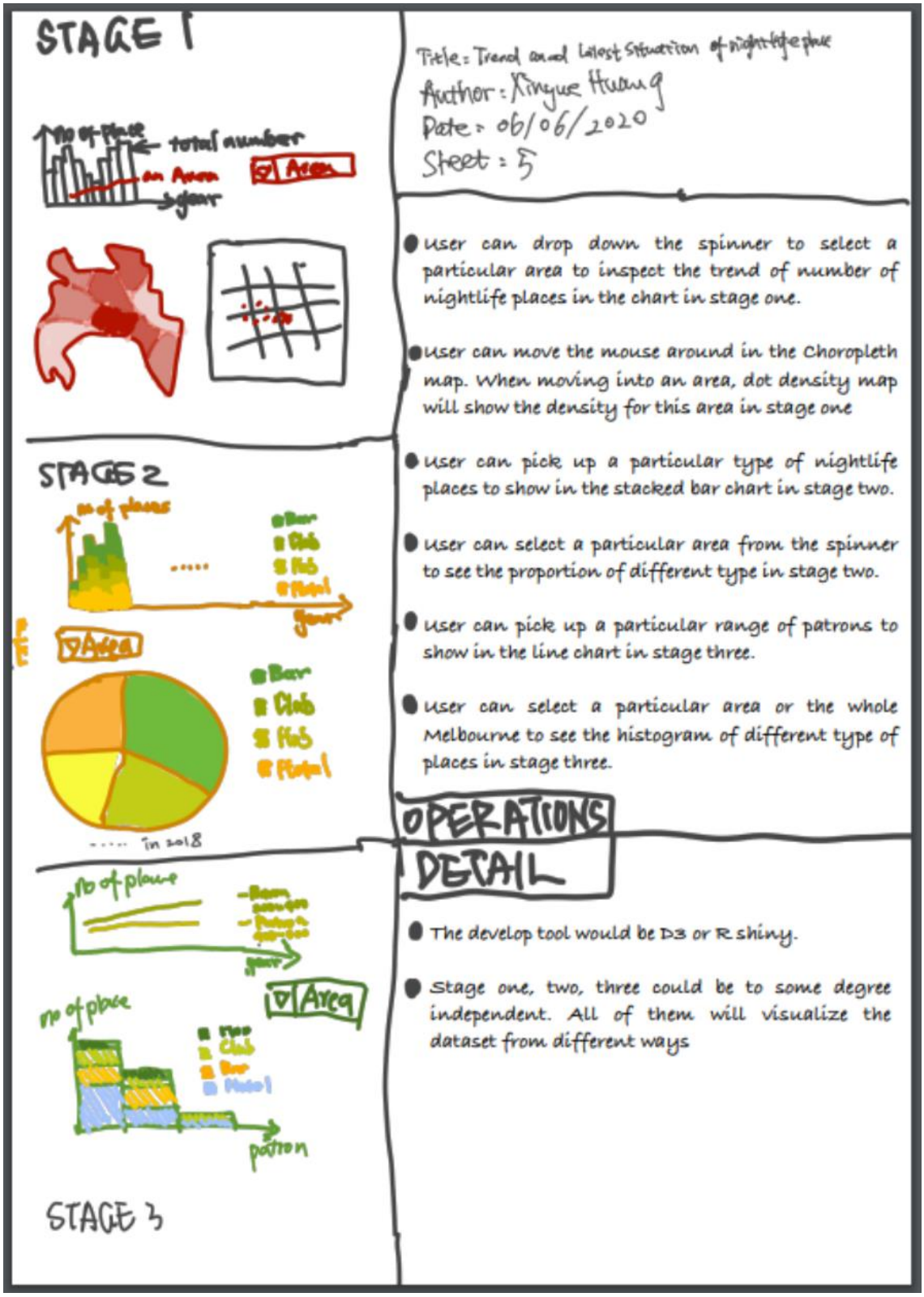
Sheet Three


no of places
Bar
Club
Hub
Hotel
year
Area Name
Bar
Club
Hub
Hotel
in 2018
Bar
Club
Hub
Hotel
Only the selected type could be showed in the stacked bar chart
Area Name
Pie chart only illustrate the percentage for a particular area which is selected from Spinner and there is a selection for the whole melbourne
Percentage Number Show up
60%
Title: Trend and latest situation of different types of nightlife places
Author: Xinyue Huang
Date: 06/06/2020
Sheet: 3
User can pick up the particular type to show in the stacked bar chart
User can select a particular area from spinner to see percentage of different types
LAYOUT
FOCUS
OPERATIONS
DISCUSSION
+ Clearly illustrate the trends for different types and latest situation of different type in particular area or the whole melbourne
- Stacked bar chart could show a little info about percentage but it is not pretty clearly

Sheet Four


no of place
- Patron 200 u 400
- Patron 400-600
year
Area Name
no of place
Hob
Club
Bar
Hotel
Patron
300
400
600
... in 2018
LAYOUT
FOCUS
Only the Selected range of Patrons could be showed in Line Chart
- Patron 200 u 400
* Patron 400-600
Area Name
The histogram only illustrate the distribution of a particular Area or All Melbourne which is selected From Spinner
Title: Trend and Latest Situation of nightlife place with different patrons
Author: Xinyue Huang
Date: 06/06/2020
Sheet: 4
• User can pick up particular range of patrons to show in the Line Chart
• User can select a particular Area or the whole Melbourne to see the histogram of different type of places in 2018
OPERATIONS
DISCUSSIONS
+ : Clearly illustrate the trend of different patron and latest situation
- : Histogram with type of night life places might distract user's focus on the relationship between Area and Patron
- : The size of a type in hist might not be discriminated

Sheet Five


STAGE 1
total number
Area
year
Title: Trend and Latest Situation of nightlife place
Author: Xingyue Huang
Date: 06/06/2020
Sheet: 5
user can drop down the spinner to select a particular area to inspect the trend of number of nightlife places in the chart in stage one.
user can move the mouse around in the Choropleth map. When moving into an area, dot density map will show the density for this area in stage one
STAGE 2
no of places
Bar
Club
Pub
Hotel
year
Area
in 2018
user can pick up a particular type of nightlife places to show in the stacked bar chart in stage two.
user can select a particular area from the spinner to see the proportion of different type in stage two.
user can pick up a particular range of patrons to show in the line chart in stage three.
user can select a particular area or the whole Melbourne to see the histogram of different type of places in stage three.
OPERATIONS DETAIL
no of place
year
Area
Club
Bar
Hotel
patron
STAGE 3
The develop tool would be D3 or R shiny.
Stage one, two, three could be to some degree independent. All of them will visualize the dataset from different ways

2. The code of data pre-process in python

```
import pandas as pd
df = pd.read_csv('layoutOneBarchart.csv')
```

```
df_barchart = df['CensusYear'].value_counts().to_frame().reset_index()
df_barchart.columns = ['CensusYear', 'NumberOfPlaces']
```

```
# Line Part in Pareto Chart
fun_linechart = {'CensusYear' : {'NumberofPlaces': 'count'}}
df_linePart = df[['CensusYear', 'CLUESmallArea']].groupby(['CLUESmallArea','CensusYear']).agg(fun_linechart).reset_index()
df_linePart.columns = ['CLUESmallArea', 'CensusYear', 'NumberOfPlaces']
```

```
# Bar Part in Pareto Chart
df_bc = df_barchart.sort_values('CensusYear', ascending=True)
```

```
# Choropleth Map
df_map = df[['CensusYear', 'CLUESmallArea']]
df_map_one = df_map[df_map['CensusYear'] ==2018]
func_one = {'CensusYear': {'numberofplaces': 'count'}}
df_map_one_pre = df_map_one.groupby('CLUESmallArea').agg(func_one).reset_index()
df_map_one_pre.columns = ['CLUESmallArea', 'numberofplaces']
df_map_one_pre
```

```
# Stacked Bar Chart
df_two_barchart = df[['CensusYear', 'typeOfPlace', 'CLUESmallArea']]
fun_barchart = {'CensusYear' : {'NumberofPlaces': 'count'}}
df_two_bc = df_two_barchart.groupby(['CensusYear', 'typeOfPlace']).agg(fun_barchart).reset_index()
df_two_bc.columns = ['CensusYear', 'typeOfPlace', 'NumberofPlaces']
df_two_bb = df_two_bc[df_two_bc['typeOfPlace'] != 'UNKNOWN']
df_two_bb
df_two_bbb = df_two_bb.pivot( index = "CensusYear", columns='typeOfPlace', values='NumberofPlaces').reset_index()
df_two_bbb.columns = ['CensusYear', 'BAR', 'CLUB', 'HOTEL', 'PUB', 'RESTAURANT']
df_two_bbb
```

```
# Pie chart
fun_piechart = {'CensusYear' : {'NumberofPlaces': 'count'}}
df_two_pie = df_two_barchart[df_two_barchart['CensusYear'] == 2018].groupby(['typeOfPlace', 'CLUESmallArea']).agg(fun_piechar
df_two_pie.columns = ['typeOfPlace', 'CLUESmallArea', 'NumberofPlaces']
df_two_p = df_two_pie[df_two_pie['typeOfPlace'] != 'UNKNOWN']
df_two_p
df_two_pp = df_two_p.pivot(index = "CLUESmallArea", columns='typeOfPlace', values='NumberofPlaces').reset_index()
df_two_pp.columns = ['CLUESmallArea', 'BAR', 'CLUB', 'HOTEL', 'PUB', 'RESTAURANT']
df_ppp = df_two_pp.fillna(0)
df_ppp
new_row = {'CLUESmallArea':'ALL Melbourne', 'BAR':df_ppp['BAR'].sum(), 'CLUB':df_ppp['CLUB'].sum(), 'HOTEL':df_ppp['HOTEL'].s
df_ppp_two = df_ppp.append(new_row, ignore_index=True)
```

```
df_linechartThree = df[['CensusYear', 'Numberofpatrons']]
df_histThree = df[['CensusYear', 'CLUESmallArea', 'Numberofpatrons', 'typeOfPlace']]
```

```
# Line Chart
c = {range(0, 200):1, range(200, 400):2, range(400, 600):3, range(600, 800):4, range(800, 1000):5, range(1000, 1200):6, range
df_linechartThree['Range'] = df_linechartThree['Numberofpatrons'].apply(lambda x: next((v for k, v in c.items() if x in k), 0
fun_linechartthree = {'Numberofpatrons' : {'NumberofPlaces': 'count'}}
df_lc_three = df_linechartThree.groupby(['CensusYear', 'Range']).agg(fun_linechartthree).reset_index()
df_lc_three.columns = ['CensusYear', 'Range', 'NumberofPlaces']
df_lc_three
```

```
# Histogram
df_hist_three = df_histThree[df_histThree['CensusYear'] == 2018][['CLUESmallArea', 'Numberofpatrons', 'typeOfPlace']]
df_h_three = df_hist_three[df_hist_three['typeOfPlace'] != 'UNKNOWN']
df_h_three
```