Potential Area for a New International Student Apartment in Greater Melbourne

IBM DATA SCIENCE CERTIFICATE CAPSTONE WORK

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The Problem

• Victoria welcomed 220,000 international students in 2019, and majority of those students studied in universities and colleges in Melbourne.

• The living cost is increasing every year in Melbourne for international students. The Australian Government specifies AU$20,290 as the minimum amount required to cover living costs for a 12-month period. In Melbourne, rent for a share house can go up to $300 per week in the city.

• Student apartments are the most reliable means of housing for students, especially if one is completely new to the city and is not familiar with how rental contracts work.

• From the student perspective, a lot of factors come into play when finding the best accommodation, including location and rent. However, this study will focus only on the safety and the general atmosphere of the neighborhood. Distance to universities are also an important factor in choosing a student apartment.

Data

	Local Government Area	Incidents Recorded
0	Banyule	7072
1	Brimbank	15178
2	Darebin	11442
3	Hobsons Bay	5002
4	Hume	15929

In this project, three different datasets will be used to solve the problem - Recorded Crime in Local Government Areas in Greater Melbourne, List of Local Government Area, and Foursquare API. After acquiring them from original and reliable sources, they will be wrangled and cleansed into more useful forms for our further analysis.

❑Recorded Crime in Greater Meblourne Area: url:https://www.crimestatistics.vic.gov.au/sites/default/files/embridge_cache/emshare/original/public/users/202003/7e/f18e69c3e/Data_Tables_LGA_Criminal_Incidents_Year_Ending_December_2019.xlsx

❑The data was simplified as left

Data

❑

Local Government Areas of Greater Melbourne:

url=https://en.wikipedia.org/wiki/Local_government_areas_of_Victoria#Greater_Melbourne

|	Local Government Area	Population	Latitude	Longitude	Unnamed: 4
0	Melbourne	169961.0	-37.81	144.96	NaN
1	Port Phillip	113200.0	-37.85	144.97	NaN
2	Stonnington	116207.0	-37.86	145.03	NaN
3	Yarra	98521.0	-37.80	144.99	NaN
4	Banyule	130237.0	-37.73	145.08	NaN

Data

❏ Foursquare API

• Description: List of top 50 popular places in each borough. However, some suburban areas may have less than 50 places registered on Foursquare.

• Source: Foursquare API

• URL: https://api.foursquare.com

	Neighborhood	Neighborhood Latitude	Neighborhood Longitude	Venue	Venue Latitude	Venue Longitude	Venue Category
0	Melbourne	-37.81	144.96	Shortstop Coffee & Donuts	-37.811240	144.961000	Donut Shop
1	Melbourne	-37.81	144.96	Brick Lane	-37.811341	144.959816	Café
2	Melbourne	-37.81	144.96	ABC Chicken	-37.810077	144.958490	Korean Restaurant
3	Melbourne	-37.81	144.96	Rose Garden (玫瑰苑燒臘飯店)	-37.808830	144.960400	Chinese Restaurant
4	Melbourne	-37.81	144.96	Games Laboratory	-37.811726	144.959950	Hobby Shop

Methodology

❑ Which area is Safer?

• Combining the Recorded Crime data and the List of Local Government Areas data, the number of average monthly crime records per 1000 people was calculated

• When we visualize the boroughs by total number of crimes and by the ratio of crime to population, it is noticeable that Melbourne City is actually the most dangerous area.
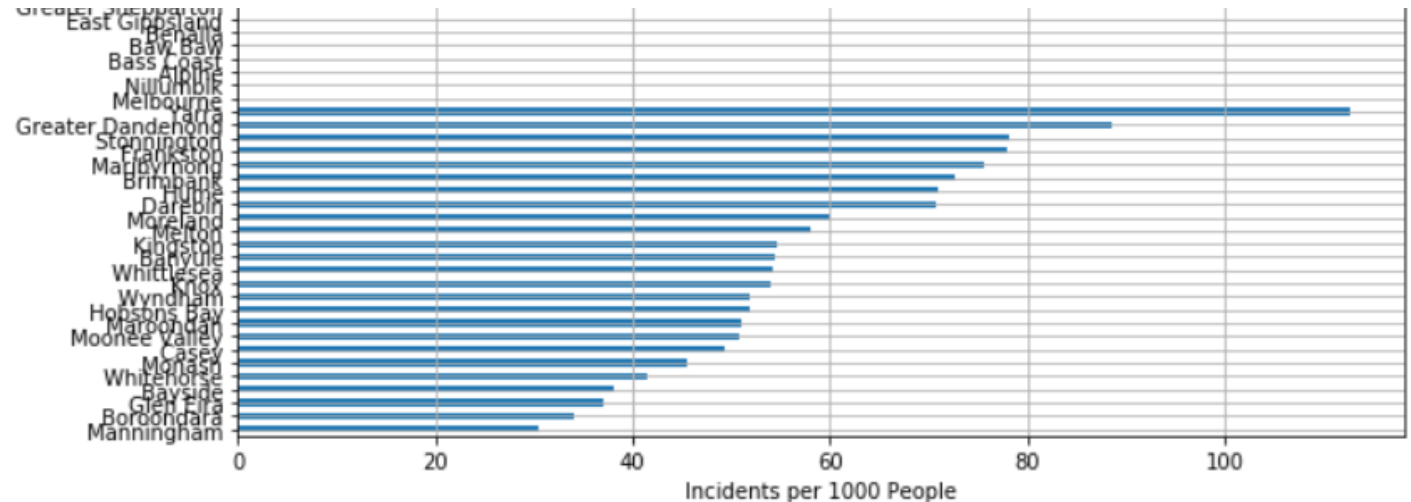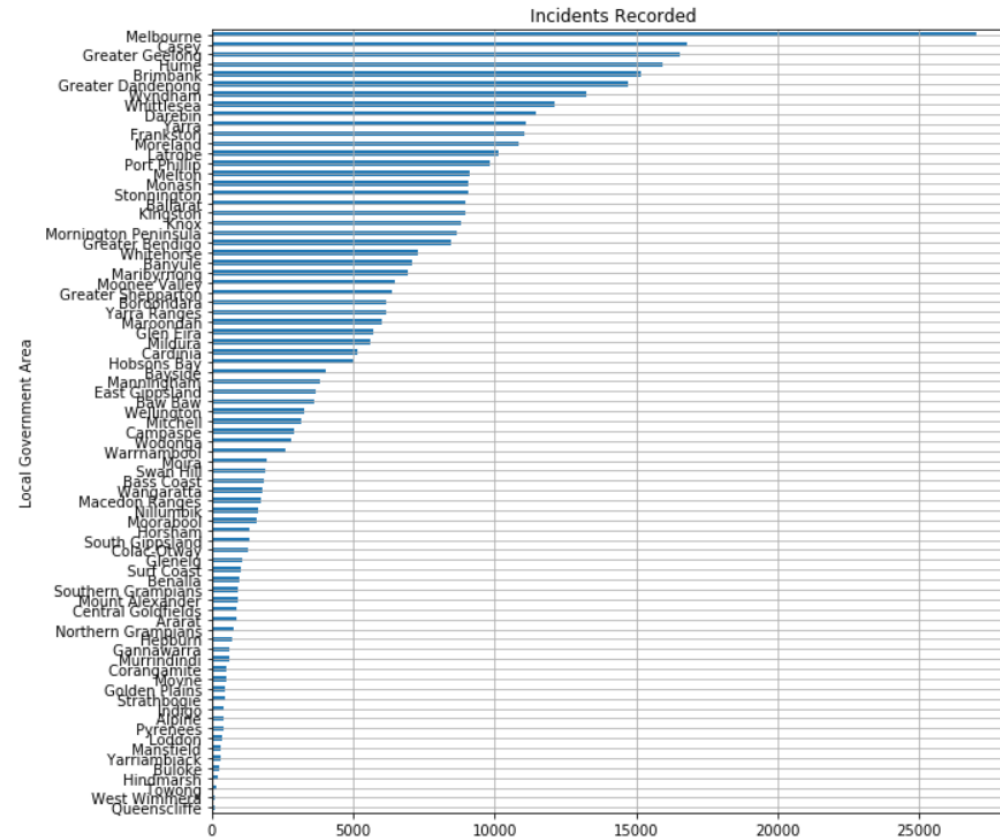
	Neighborhood	1st Most Common Venue	2nd Most Common Venue	3rd Most Common Venue	4th Most Common Venue	5th Most Common Venue	6th Most Common Venue	7th Most Common Venue	8th Most Common Venue	9th Most Common Venue	10th Most Common Venue
0	Banyule	Café	Wine Bar	Fast Food Restaurant	Dessert Shop	Dim Sum Restaurant	Dive Bar	Dog Run	Donut Shop	Dry Cleaner	Dumpling Restaurant
1	Bayside	Convenience Store	Sandwich Place	Liquor Store	Dog Run	Gym	Video Store	Asian Restaurant	Fast Food Restaurant	Dessert Shop	Dim Sum Restaurant
2	Boroondara	Gym	Pizza Place	Park	Café	Light Rail Station	Electronics Store	Dessert Shop	Dim Sum Restaurant	Dive Bar	Dog Run
3	Brimbank	Train Station	Wine Bar	Fast Food Restaurant	Department Store	Dessert Shop	Dim Sum Restaurant	Dive Bar	Dog Run	Donut Shop	Dry Cleaner
4	Casey	Theater	Wine Bar	Fast Food Restaurant	Department Store	Dessert Shop	Dim Sum Restaurant	Dive Bar	Dog Run	Donut Shop	Dry Cleaner

Methodology

Cluster Analysis: Popular venues

- **From the top 50 venue data we have acquired from Foursquare, we used one hot encoding method to find out what venue categories are most popular.**

- **Venues from the same areas were grouped by borough names and popular categories were discovered by frequency.**

Cluster 0 : Food and Leisure area (café, restaurant, bar, …)

	Local Government Area	Unnamed: 4	CrimeToPop	Cluster Labels	1st Most Common Venue	2nd Most Common Venue	3rd Most Common Venue	4th Most Common Venue	5th Most Common Venue	6th Most Common Venue	7th Most Common Venue	8th Most Common Venue	9th Most Common Venue	10th Most Common Venue
0	Banyule	NaN	54.301005	0.0	Café	Wine Bar	Fast Food Restaurant	Dessert Shop	Dim Sum Restaurant	Dive Bar	Dog Run	Donut Shop	Dry Cleaner	Dumpling Restaurant
44	Greater Dandenong	NaN	88.564307	0.0	Gas Station	Café	Wine Bar	Fast Food Restaurant	Dessert Shop	Dim Sum Restaurant	Dive Bar	Dog Run	Donut Shop	Dry Cleaner
83	Shire of Nillumbik	NaN	NaN	0.0	Café	Wine Bar	Fast Food Restaurant	Dessert Shop	Dim Sum Restaurant	Dive Bar	Dog Run	Donut Shop	Dry Cleaner	Dumpling Restaurant

Methodology

Cluster Analysis: K-Means Clustering

• Based on the common venue categories, areas were grouped into five clusters.

• Each clusters were then given a name based on the characteristics they display.

• Only two clusters came out with significant features.

Cluster 1 : Comprehensive area (restaurant, gym, train station, shops …)

Results

	Local Government Area	Safety	Atmosphere	Score
18	Boroondara	0.955992	0.9	1.855992
29	Monash	0.818521	0.9	1.718521
8	Moonee Valley	0.753442	0.9	1.653442
26	Maroondah	0.749077	0.9	1.649077
3	Hobsons Bay	0.740133	0.9	1.640133
22	Knox	0.714552	0.9	1.614552
7	Melton	0.664194	0.9	1.564194
9	Moreland	0.642945	0.9	1.542945
1	Brimbank	0.486003	1.0	1.486003
12	Wyndham	0.740015	0.7	1.440015
2	Darebin	0.509393	0.9	1.409393
5	Maribyrnong	0.449869	0.9	1.349869

❑ Upon different analysis, we were able to discover the best neighborhoods based on our criteria of safety and atmosphere.

❑For safety, we normalized crime to population ratio and reversed the score so that 1represents the neighbourhood with least crime per person.

❑For atmosphere, we gave an arbitrary score to each cluster based on personal preference, as preference is not easy to quantify without subjectivity. Highest score was given to Comprehensive Area (Cluster 1)

❑Then by adding the two scores, we were able to find the area with the highest scores, Boroondara.

Conclusion

From this analysis, we have found that the five areas below are the best places to build a student apartment, based on safety and atmosphere of the neighborhood. The top five areas all belong to the comprehensive area, with many restaurants, shops and other services. Therefore, what differentiates them is the safety score, which was calculated from incidents recorded crimes per 1000 people.
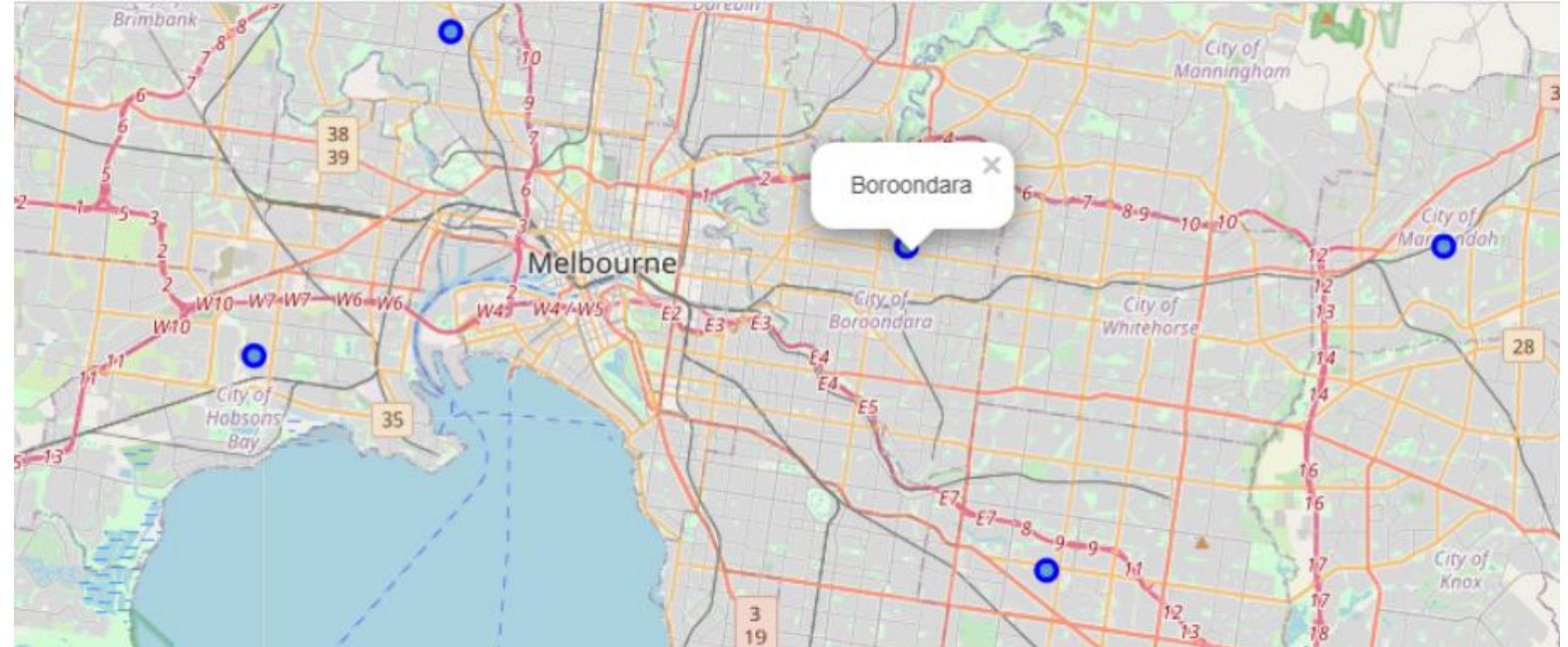
Limitations and recommendation for future study

❑However, when we map the top five neighborhoods to live in, it is easily noticeable that they are all located in far out suburbs. This is due to many limitations this research holds.

❑Among numerous factors that determine a good neighborhood, we only took into

❑consideration what type of venues are popular and how many crime incidents are recorded for the sake of simplification. This means that serious crimes like homicide was treated the same as a comparatively petty crime like shoplifting. Moreover, the number of stores in the neighborhood may be as important as what type of stores there are.

❑To overcome the limitations of this study, we will need further data such as distance to city center, housing prices or ratio of the number of stores to population. Also, taking crime categories into factor and weighting them differently may be helpful.

Thanks for your time!