Exploring Suburbs of Melbourne

Nabeel Khan

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Motivation

- In big cities, it is important to find a reasonable suburb to live. The reasonable suburb is the one
  - with minimal or zero crime rate, and
  - is not very far from the main city center
- People especially immigrants have no access to this information
  - And, property agents lack this knowledge or hide it to make sales

Project Goal

- In this project, I report
  - Top 5 suburbs of Melbourne to live
    - Best suburb with the least crime rate
    - Five common venues for the suburbs (for more insights)
  - Worse 5 suburbs of Melbourne
    - So people can avoid those areas
  - Geospatial crime distribution

- Goal is to give insights to immigrants so they can choose a suburb to settle down in Melbourne

Crime Data Acquisition

- I downloaded the crime stats from the website
  - The crime stats have only postal codes and lack suburb information
  - I used a table from Wikipedia page to extract the suburbs information
  - I merged the suburbs information with the crime stats
    - I also performed some data cleaning (some records were duplicated)
    - The final data looks like this

Postcode	SuburbName	MeanCrimes	SumCrimes
3000	Melbourne CBD	22600.6	113003
3002	East Melbourne	875.6	4378
3003	West Melbourne	549.8	2749
3006	Southbank, South Wharf	2396.6	11983
3008	Docklands	1149.6	5748

Note: Mean and Sum Crimes are computed for 2011-2015 years

Venues Information

- For any suburb, it is important to know the nearby important venues, such as schools, or beaches.
- In this project, I have focused on the following important near by venues for each suburb
  - Schools
  - Parks
  - Restaurants
  - Train Stations
- The reason of selecting these venues (features) is that these venues play an important part in daily life activities
  - I used a radius of 3 km to search the number of these venues for each suburb
  - I also computed the distance of each suburb from the Melbourne city center. Data looks like

Postcode	SuburbName	MeanCrimes	SumCrimes	Latitude	Longitude	DistCityCenter	Schools	Parks	Stations	Restaurants
3000	Melbourne CBD	22600.6	113003	-37.814182	144.959801	2.306228	25	9	15	43
3002	East Melbourne	875.6	4378	-37.812498	144.985885	1.756813	22	9	13	41
3003	West Melbourne	549.8	2749	-37.810448	144.920430	5.557517	30	23	13	42
3006	Southbank, South Wharf	2396.6	11983	-37.825345	144.956682	2.050896	25	10	9	45
3008	Docklands	1149.6	5748	-37.817542	144.939492	3.717285	24	11	9	42

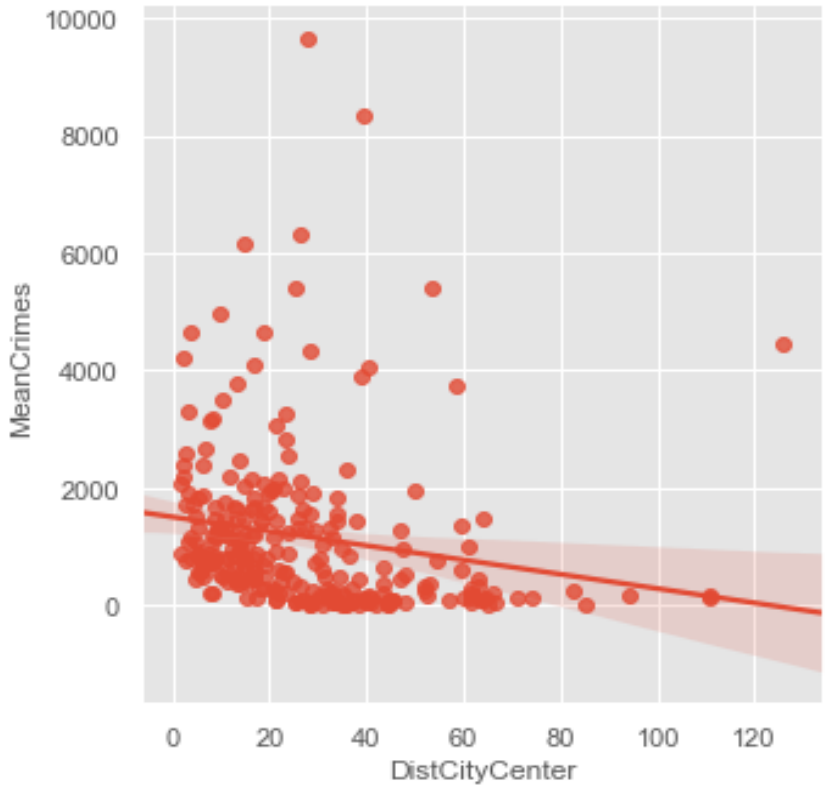
Analysis -Correlation

- The correlation map does not indicate relationship of crimes with any features

	MeanCrimes	SumCrimes	DistCityCenter	Schools	Parks	Stations	Restaurants
MeanCrimes	1	1	-0.183453	0.178109	0.127003	0.15876	0.152568
SumCrimes	1	1	-0.183453	0.178109	0.127003	0.15876	0.152568
DistCityCenter	-0.183453	-0.183453	1	-0.705124	-0.681563	-0.606453	-0.650545
Schools	0.178109	0.178109	-0.705124	1	0.818195	0.847687	0.870224
Parks	0.127003	0.127003	-0.681563	0.818195	1	0.71623	0.798049
Stations	0.15876	0.15876	-0.606453	0.847687	0.71623	1	0.812533
Restaurants	0.152568	0.152568	-0.650545	0.870224	0.798049	0.812533	1

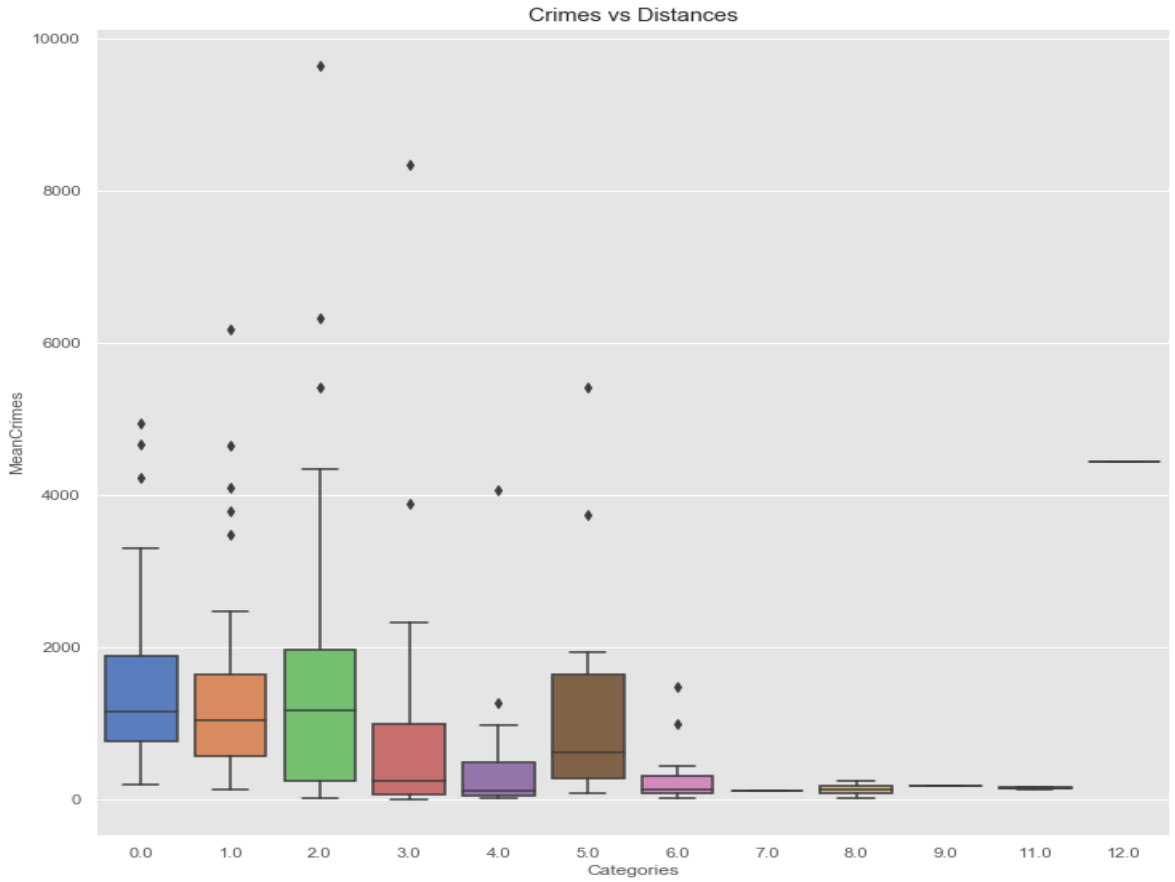
Analysis –Regression Plot

- The regression plots indicate that crimes decrease as we move away from the city center



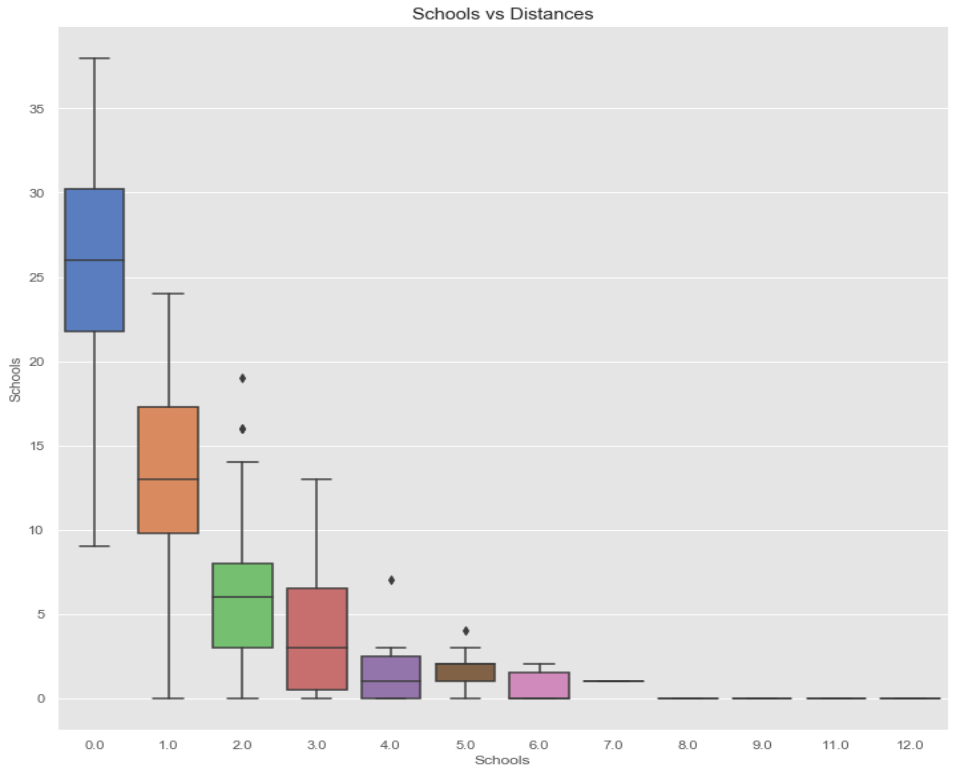
Analysis – Box plot

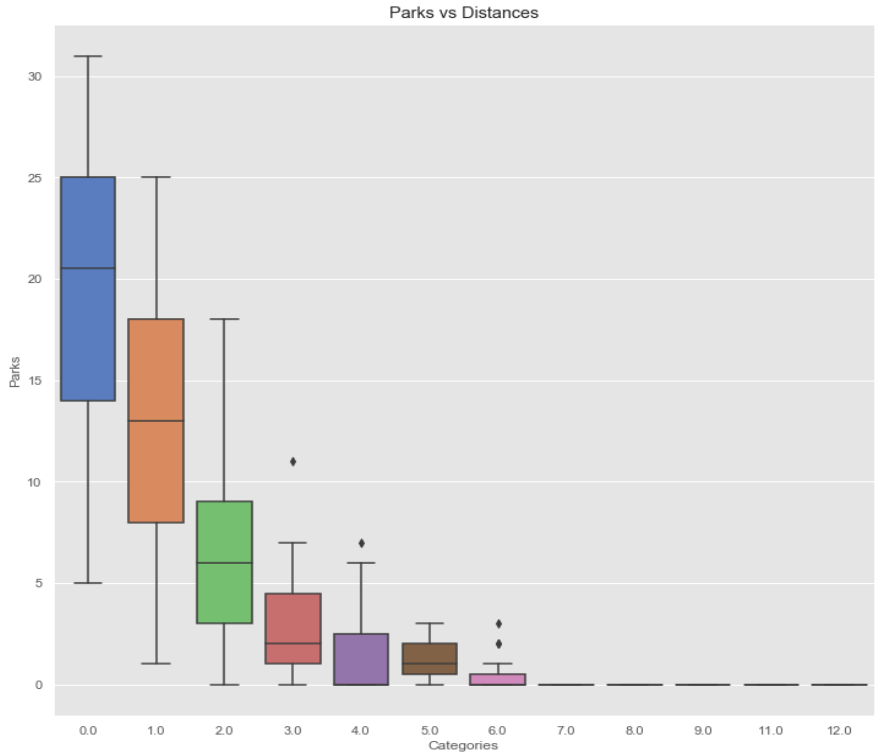
- For a thorough analysis, I decided to use the box plot
  - I performed binning i.e., I grouped the distance from city center into bins or categories
  - Such as 1st bin covers 0-10 km, 2nd bin covers 10-20 km and so on
- We can see that crimes tend to decrease as we move away from city center



Analysis – Box plot (A)

- The frequency of near by venues also decrease as we move away from the city center
  - Similar pattern observed for all venues

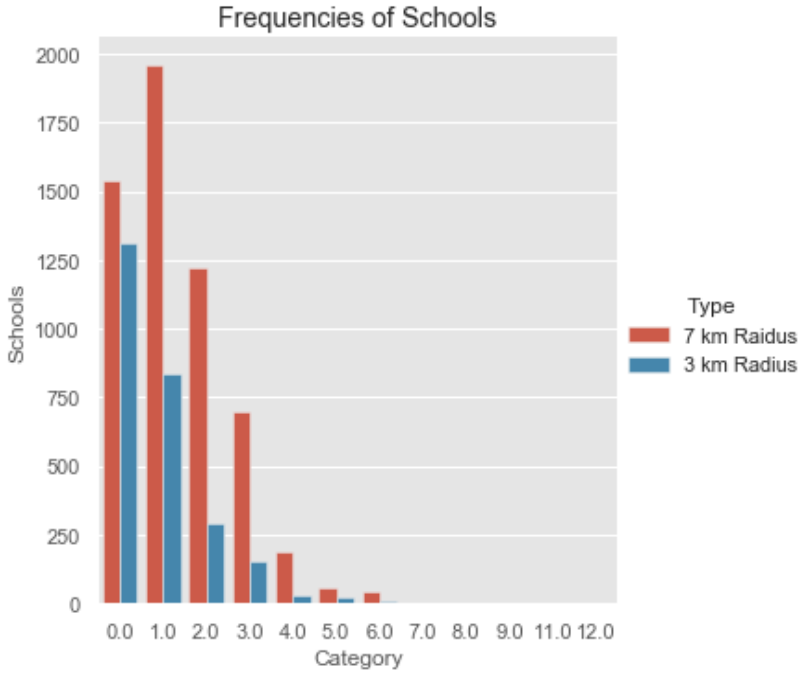


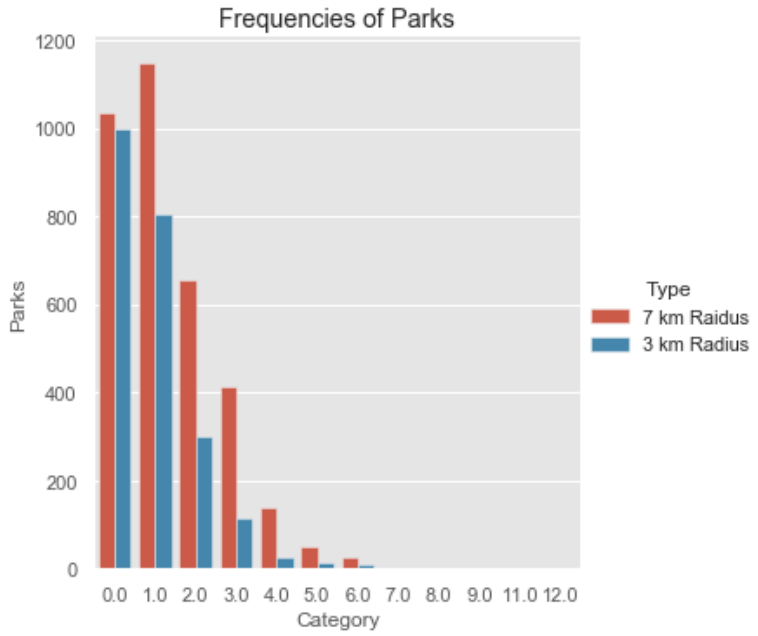


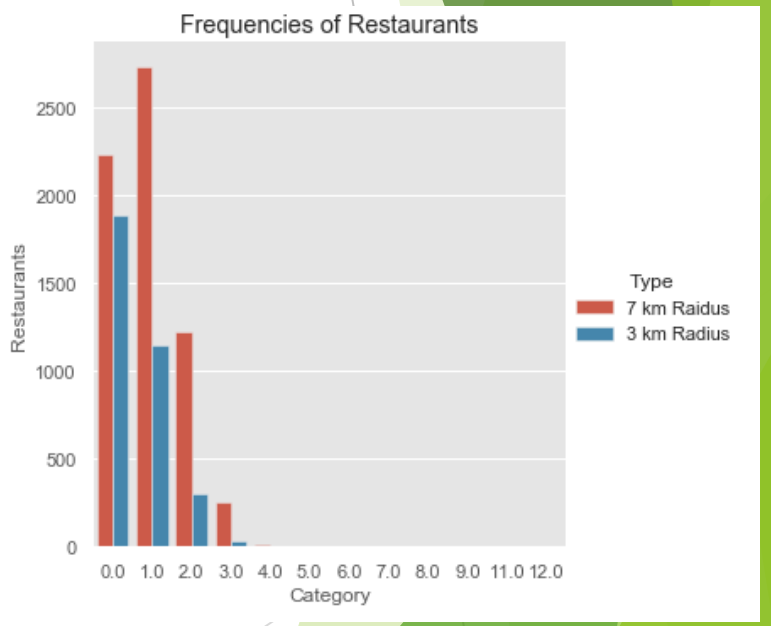
In other words, you need to drive more to go to venues if you live far away from city center
Please see the bar plots in the next slide for validation

Analysis – Bar Plot

- I increased the search radius from 3 to 7 km and then calculated the frequencies of venues for each suburb
  - We can clearly see that frequencies of venues increase (compared to 3 km) as expected
  - In other words, someone has to travel a bit to reach to the venues



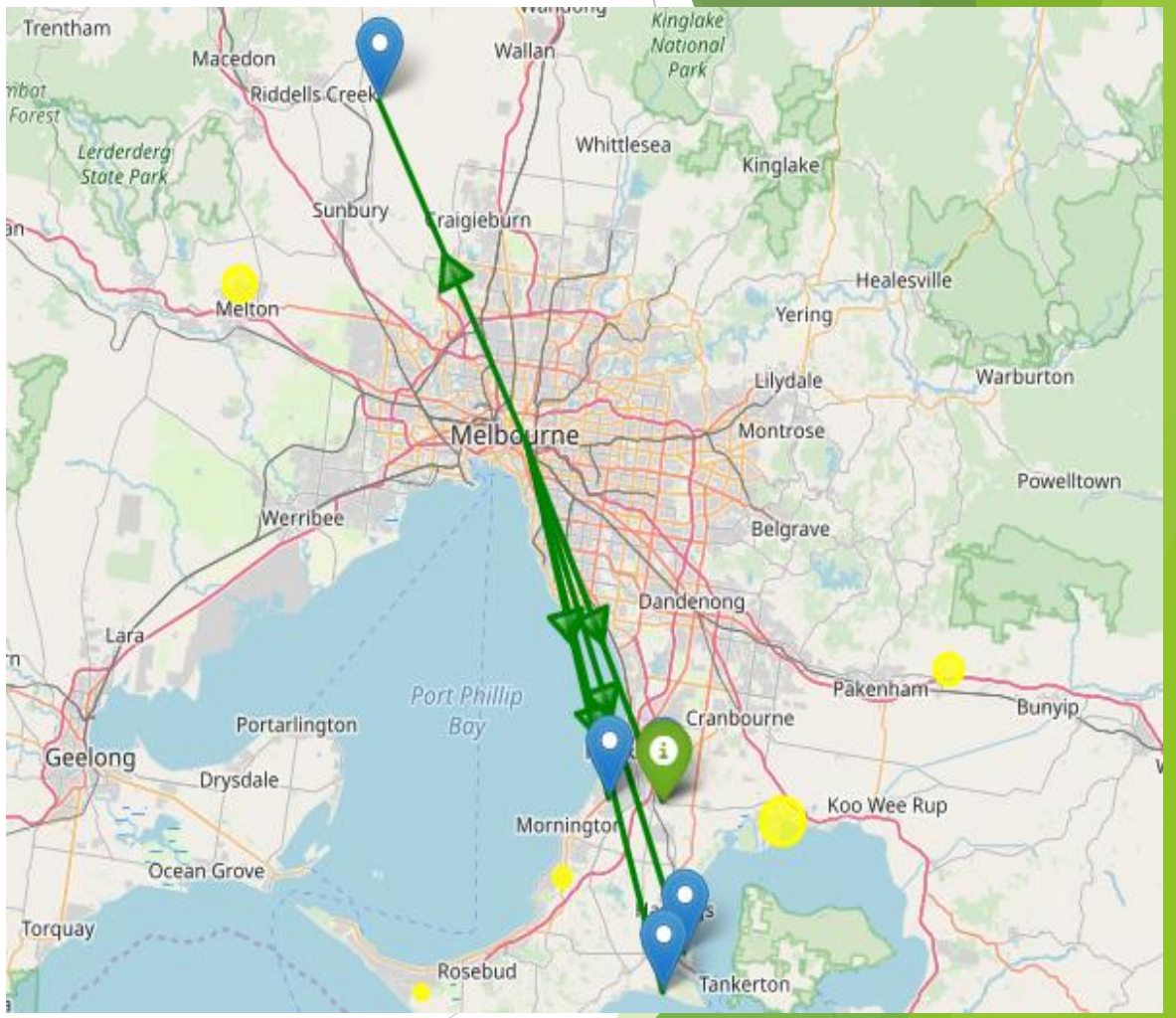




Results – Best Suburbs

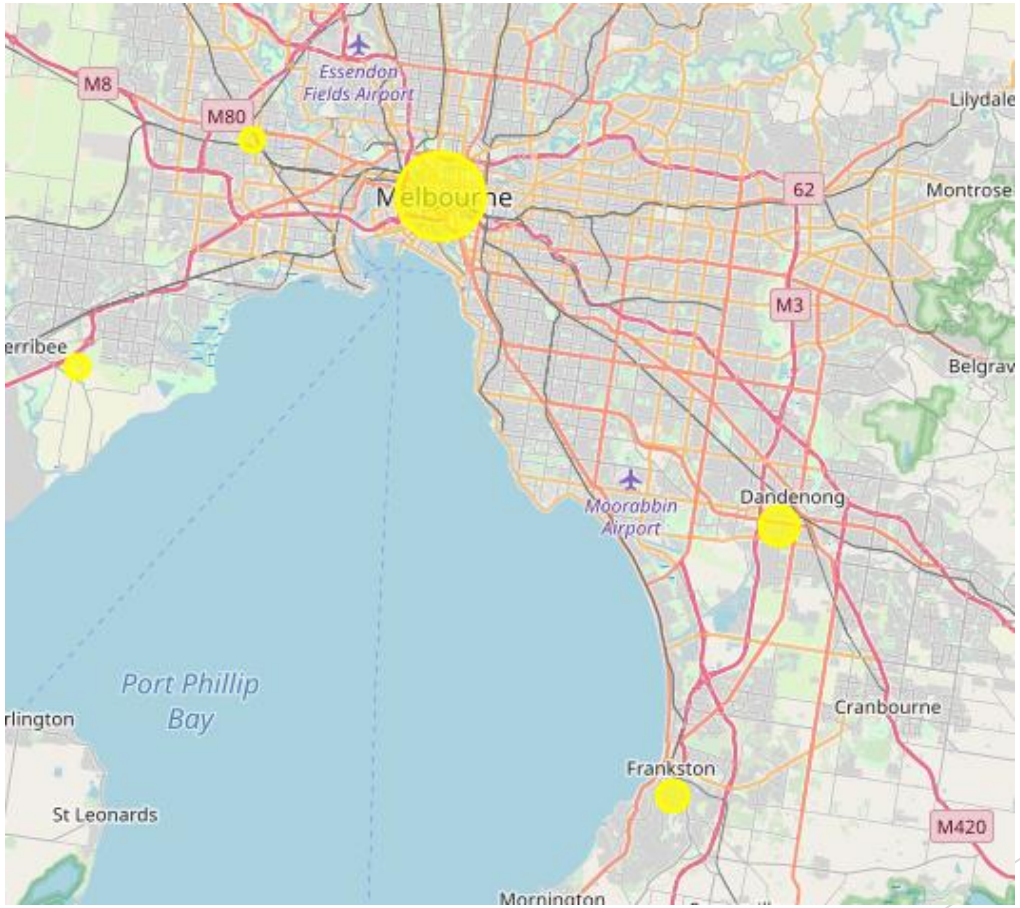
- Top 5 suburbs with the least crime rates
  - The best suburb is highlighted in yellow colour

SuburbName	MeanCrimes	SumCrimes	Latitude	Longitude	DistCityCenter
Koo Wee Rup North	6.8	34	-38.195056	145.173962	44.273578
HMAS Cerberus	10.4	52	-38.392347	145.172650	65.045797
Main Ridge	11.2	56	-38.193810	145.095732	41.983425
Clarkefield	20.0	100	-37.465415	144.769603	44.332088
Merricks, Point Leo, Shoreham	32.6	163	-38.352358	145.202950	61.551920



Results – Worse Suburbs

- Worse 5 suburbs with the highest crime rates
  - The worse suburbs are highlighted in yellow colour
  - **The city center is found to be one with the highest crime rates**



Conclusion

- Avoid living in the city center due to very high crime rates.
  - This may be true for all major cities in the world
- Try to live a bit away from the city center, such as 30 -70 km away from the city center
  - Because the crime rates are lower than the city center
- The only drawback of living far away from the city center is that
  - Some commute will be required to reach to the venues

Limitations

- The focus of the project is kept to 4 venues
  - Extend the focus to more venues in the future, such as grocery store, or beaches
- This project does not give any consideration to the housing prices
  - Something to do in the future by linking crimes with housing prices
- The crime stats range from 2011-2016
  - Better to find another source of data with the latest stats