



WHERE SHOULD I LIVE?

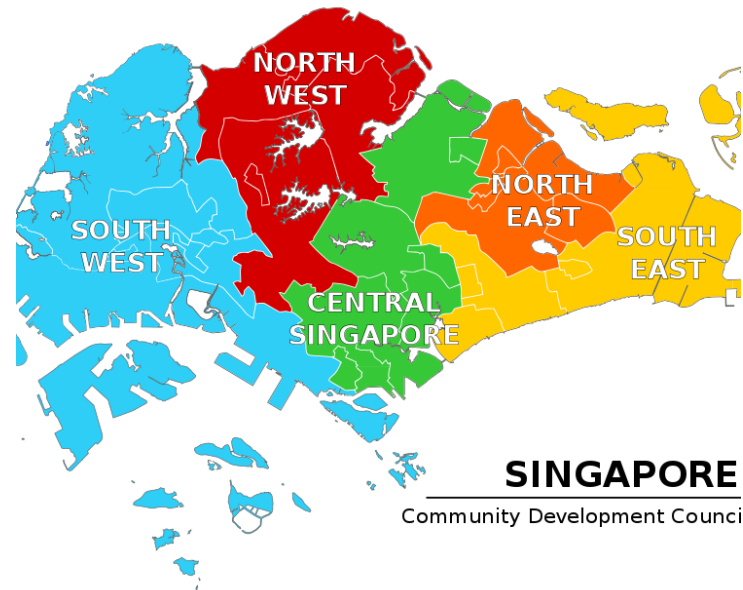
The Battle of the Neighbourhoods:
Singapore Edition

INTRODUCTION TO THE PROBLEM

- ❑ “Where should I live?” – Whether we are moving into a new city or trying to relocate within the city, we ask ourselves and those around us for suggestions.
- ❑ Till now, the approach has been anecdotal, where we locate based on suggestions of our peers or our own ‘hunch’.
- ❑ What this project aims to do is to make it data-driven, by using the power of Foursquare API to find the best place to live.

DATA SOURCES

- ❑ To break down the problem into something manageable for a program to solve, we need to select the right level of detail first. Singapore can be broken based on Regions (5; top image), which can be further subdivided into Planning Areas (55; bottom image).
- ❑ It was decided to use Singapore Planning Areas as it has right level of detail, where a neighbourhood of 0.5 km covers most of the region.



METHODOLOGY

The first step was to trawl the Wikipedia page of Singapore Areas and load it to a Pandas DataFrame so analysis can be carried out on it.

	Name (English)	Malay	Chinese	Pinyin	Tamil	Region	Area (km2)	Population[7]	Density (/km2)
0	Ang Mo Kio	NaN	宏茂桥	Hóng mào qiáo	ஆங் மோ கியோ	North-East	13.94	163950	13400
1	Bedok	*	勿洛	Wú luò	பிடோக்	East	21.69	279380	13000
2	Bishan	NaN	碧山	Bì shān	பீஷான்	Central	7.62	88010	12000
3	Boon Lay	NaN	文礼	Wén lǐ	பூன் லே	West	8.23	30	3.6
4	Bukit Batok	*	武吉巴督	Wǔjí bā dū	புக்கிட் பாத்தோக்	West	11.13	153740	14000

METHODOLOGY

The next step was to find out which all venues are close to each of the regions' centers.

	Name	Latitude	Longitude	Venue ID	Venue	Venue Latitude	Venue Longitude	Venue Category
0	Ang Mo Kio	1.37008	103.849523	4bc30123abf495215220c393	Old Chang Kee	1.369094	103.848389	Snack Place
1	Ang Mo Kio	1.37008	103.849523	4b15f661f964a52012b623e3	FairPrice Xtra	1.369279	103.848886	Supermarket
2	Ang Mo Kio	1.37008	103.849523	4b1ea04ff964a520e21c24e3	MOS Burger	1.369170	103.847831	Burger Joint
3	Ang Mo Kio	1.37008	103.849523	4b5eef6df964a5208b9e29e3	PLAYe	1.369109	103.848225	Hobby Shop
4	Ang Mo Kio	1.37008	103.849523	50712b67e4b0548504446dea	Face Ban Mian 非极面 (Ang Mo Kio)	1.372031	103.847504	Noodle House

METHODOLOGY

Next we find out from the user (such as me), what they feel is important. Here, it is specified that the relative importance of distance to Work Location is 10, and user provides relative weights of other categories. Since we only have Personal Tier Account, the number of Categories are limited so that 500 Premium Call limit is not exceeded.

User Weights	
Category	
Restaurant	10
Supermarket	5
Shopping Mall	5
Bank	5
Department Store	4
Multiplex	4
Convenience Store	4
Bakery	4
Pharmacy	3
Fast Food Restaurant	3
Chinese Restaurant	3
Food Court	3
Pizza Place	2

The we find out how many “Good Venues” from each category are in each Planning Area. A “Good Venue” is defined as having a Foursquare Place Rating of at least 7.0.

Additionally, we limit the number of places we consider under each category to max 5 as it considered having enough variety and additional places have diminishing return.

[illegible]

METHODOLOGY

Now we can calculate a score of each Planning Area against the weights specified by the user. For scoring of distance to Workplace, the formula used is:

$$Score_{work_dist} = 10 \times \frac{D_{max} - d}{D_{max} - D_{min}}, \text{ where}$$

D_{max}
= Distance to workplace for farthest area

D_{min}
= Distance to workplace for nearest area

d = Distance to workplace for planning area in question

Name	Region	Latitude	Longitude	Work Distance	Restaurant	Supermarket	Shopping Mall	Bank	Department Store	Multiplex	Convenience Store	Bakery	Pharmacy	Fast Food Restaurant	Chinese Restaurant	Food Court	Pizza Place	Score
Orchard	Central	1.303427	103.831342	0.050149	1.0	1.0	5.0	0.0	3.0	1.0	0.0	5.0	0.0	1.0	4.0	1.0	1.0	239.007908
Jurong East	West	1.333108	103.742294	0.072091	0.0	1.0	2.0	0.0	2.0	1.0	0.0	1.0	0.0	0.0	5.0	0.0	0.0	128.158014
Marine Parade	Central	1.302689	103.907395	0.121666	0.0	1.0	1.0	0.0	0.0	3.0	0.0	1.0	0.0	0.0	2.0	0.0	1.0	96.237731
Bedok	East	1.323976	103.930216	0.149258	0.0	2.0	0.0	0.0	0.0	0.0	0.0	1.0	0.0	1.0	2.0	2.0	0.0	85.169995
Paya Lebar	East	1.317490	103.892353	0.111368	0.0	2.0	0.0	0.0	0.0	1.0	0.0	0.0	0.0	1.0	1.0	2.0	0.0	76.635901

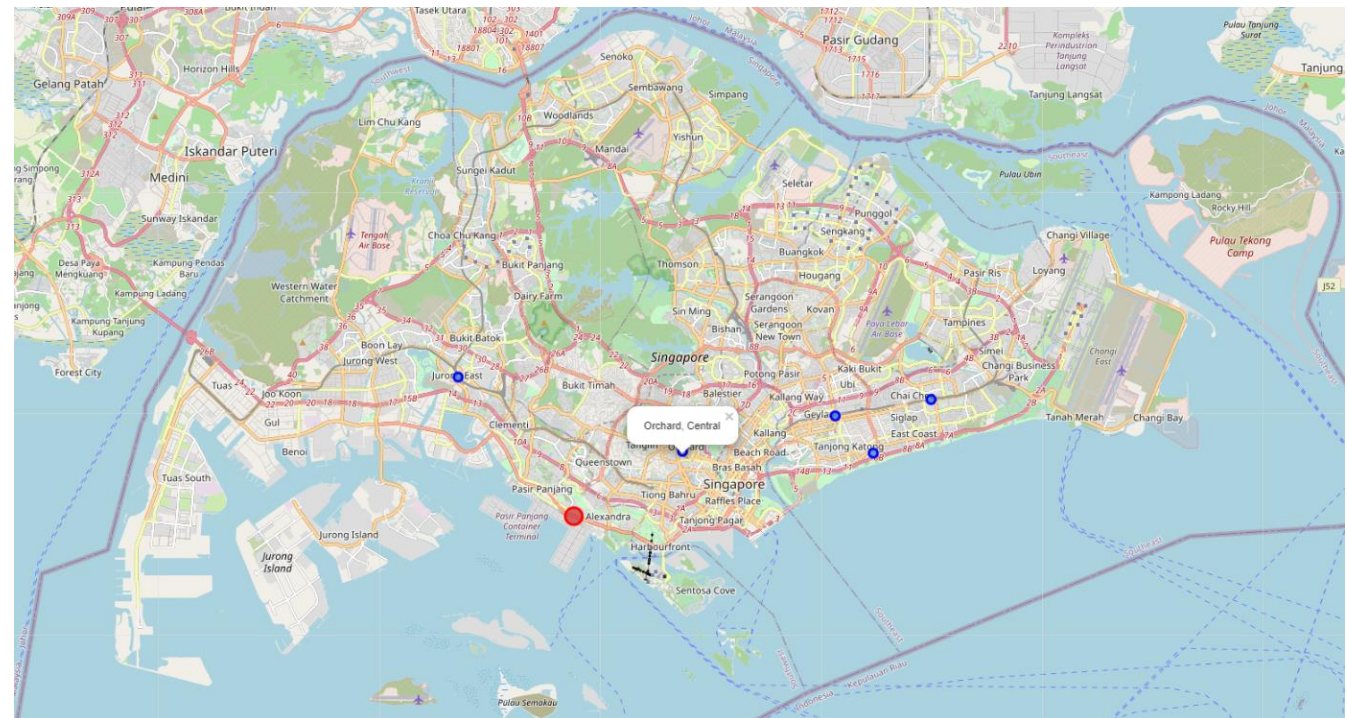
RESULTS

Based on the user's provided preference of various categories and their work location, the following recommendation list was generated by the recommendation program.

The results can also be plotted on a map (using Folium Library) to show where these recommended locations are compared to their work location and in context of the overall Singapore map.

The ranking of best places for you to stay based on your requirements are the following (with their scores in brackets):

- 1 Orchard (239.01)
- 2 Jurong East (128.16)
- 3 Marine Parade (96.24)
- 4 Bedok (85.17)
- 5 Paya Lebar (76.64)



DISCUSSION

- ❑ One of the major limitations of the approach was that the number of venues to analyse rises dramatically with the number of categories selected by the user. For the analysis done, the limitation resulted in limiting the categories to only 13. If this approach is scaled to a full-feature app (either ad-supported or paid), then a paid license would allow us to analyse all possible categories without any limitations.
- ❑ The second limitation is that the outputs seems to very obviously lean towards well-developed areas. However, these areas also tend to be more expensive to live in. Hence, a more robust analysis considering the cost of living in various neighbourhoods can be made. Such data was not available from the publicly available sources, and hence could not be included in the analysis done in this project.

CONCLUSION

- ❑ Based on the analysis conducted, it is determined that by far, Orchard area is best place to live in terms of amenities around, even though it was quite far from the Work Location Provided. This is not surprising as this location is the heart of Singapore with over 20 malls lining its main avenue and having hundreds of good options for all possible categories.
- ❑ The second best location was Jurong East, which is also a major commercial hub with many options for all possible amenities.
- ❑ Overall, it was found that proximity to amenities trumped work commute for all options considered.