

Medical institutions analysis in ► Singapore

Capstone Project

IBM Data Science Professional Certificate

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Introduction



Worked part-time for an Insurance company in Singapore, 90% of their customers were expatriates. So people who were new in Singapore with very few knowledge about the medical system there.



There was an important need for our customers to be advised on the medical system and to know where they could have the easiest access to medical services.



Problematic: Get an evaluation of the access to medical services of each neighbourhoods of Singapore

Data acquisition and Resources

- ▶ Neighborhoods of Singapore obtained from Wikipedia using Scrapping
- ▶ Geopy was used to obtain the geolocation of every neighbourhoods
- ▶ Foursquare API was used to get the medical venues in Singapore
- ▶ Visualization was done with Matplotlib for the graphs and Folium library for the map
- ▶ Scikit-learn python library was used for analysis machine learning algorithm

Neighbourhoods Visualization

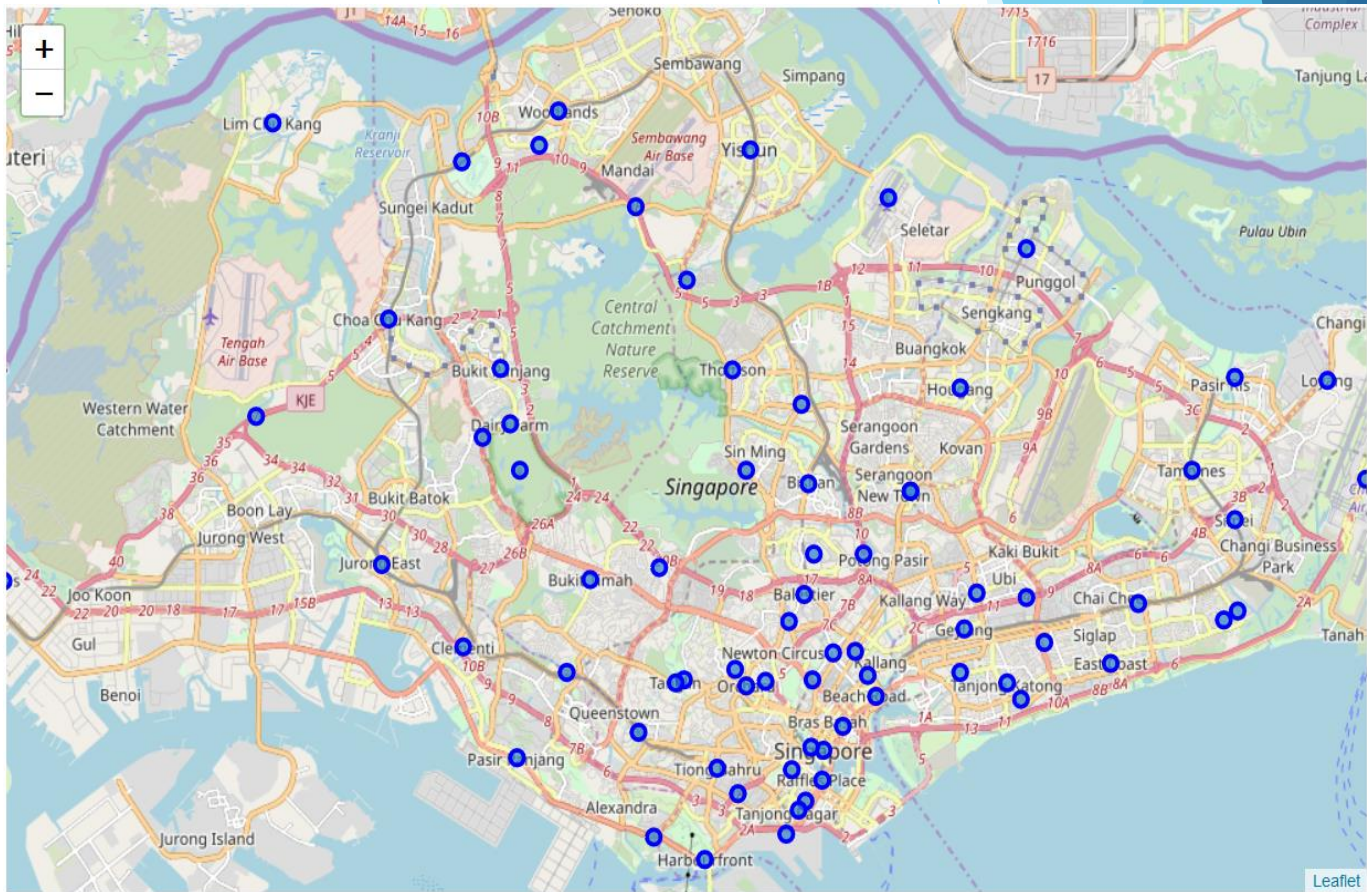
Postal districts [\[edit \]](#)

This table lists the postal districts:^[2]

Postal district	Postal sector (1st 2 digits of 6-digit postal codes)	General location
01	01, 02, 03, 04, 05, 06	Raffles Place, Cecil, Marina, People's Park
02	07, 08	Anson, Tanjong Pagar
03	14, 15, 16	Bukit Merah, Queenstown, Tiong Bahru



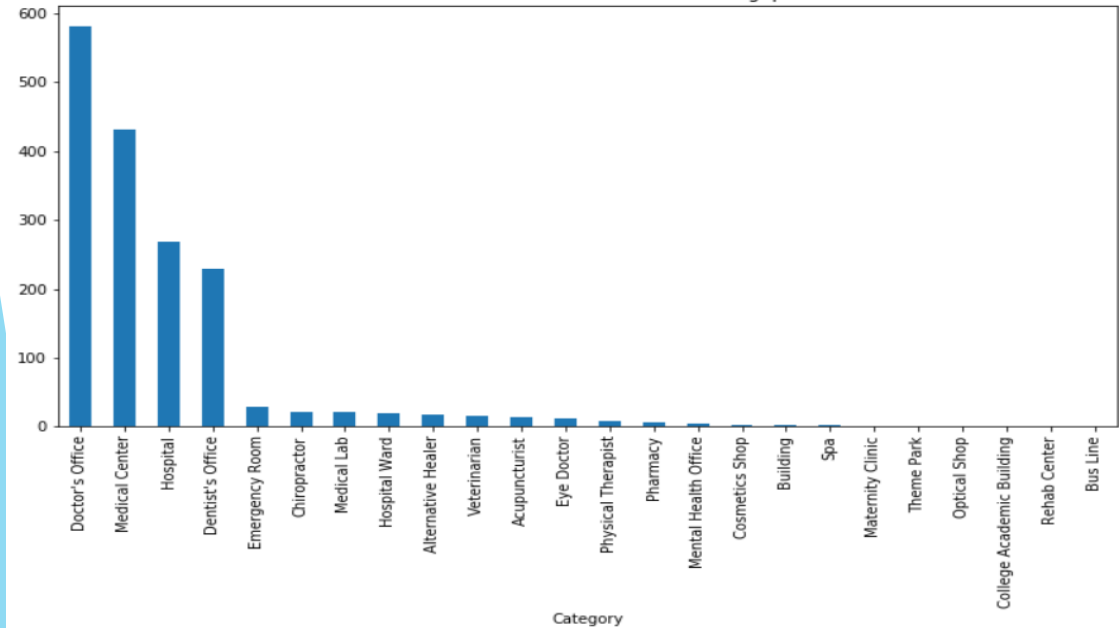
	Postal District	Neighborhood	Latitude	Longitude
1	01	Raffles Place	1.283595	103.851568
2	01	Cecil	1.278716	103.847738
3	01	Marina	1.290475	103.852036
4	01	People's Park	1.285810	103.844160
5	02	Anson	1.271363	103.842698



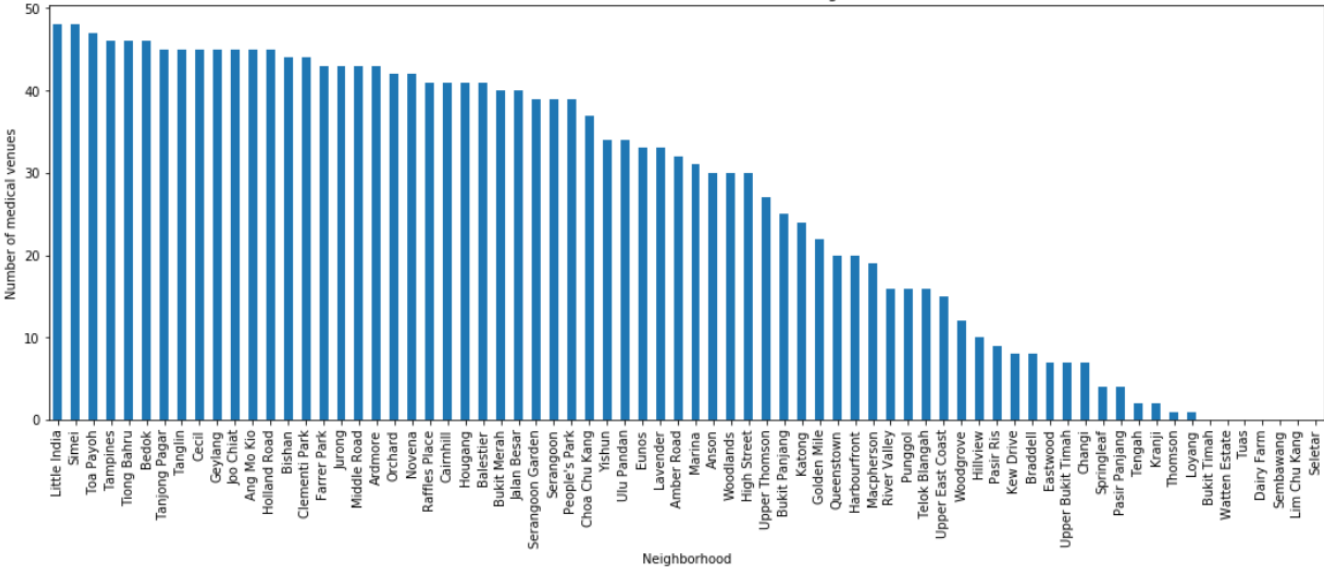
Exploratory Data Analysis

	Postal_District	Neighborhood	Neighborhood_Latitude	Neighborhood_Longitude	Venue	lat	Ing	Category
0	1	Raffles Place	1.283595	103.851568	In Touch Physio	1.283503	103.851163	Medical Center
1	1	Raffles Place	1.283595	103.851568	Fullerton Healthcare	1.283049	103.851697	Medical Center
2	1	Raffles Place	1.283595	103.851568	Oc Medical Raffles Place	1.284126	103.851050	Medical Center
3	1	Raffles Place	1.283595	103.851568	Lee & Lee (Dental Surgeons) Pte Ltd	1.282806	103.851980	Dentist's Office
4	1	Raffles Place	1.283595	103.851568	Raffles Medical Centre	1.284661	103.851553	Medical Center

Distribution of the medical venues in Singapore

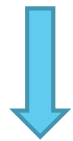


Distribution of medical venues around each neighborhood



Data Pre-processing and Normalization

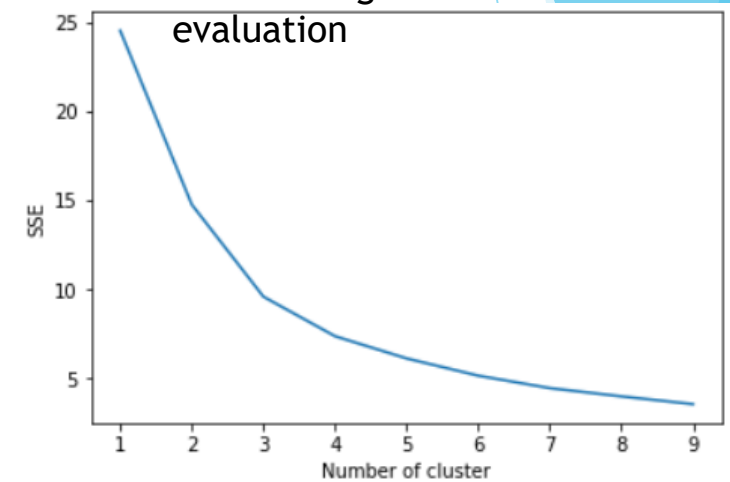
	Neighborhood	Dentist's Office	Doctor's Office	Emergency Room	Hospital	Medical Center
0	Amber Road	6	19	1	1	5
1	Ang Mo Kio	8	15	0	1	21
2	Anson	7	17	0	0	6
3	Ardmore	11	12	0	1	19
4	Balestier	0	4	3	29	5



Data
Normalization

	Neighborhood	Dentist's Office	Doctor's Office	Emergency Room	Hospital	Medical Center
0	Amber Road	0.137897	0.305060	0.171296	-0.097656	-0.121032
1	Ang Mo Kio	0.280754	0.162202	-0.162037	-0.097656	0.640873
2	Anson	0.209325	0.233631	-0.162037	-0.128906	-0.073413
3	Ardmore	0.495040	0.055060	-0.162037	-0.097656	0.545635
4	Balestier	-0.290675	-0.230655	0.837963	0.777344	-0.121032
5	Bedok	0.709325	0.126488	-0.162037	-0.128906	0.498016

K-means algorithm
evaluation



Result
tab

Postal District	Neighborhood	Latitude	Longitude	Cluster Labels	1st Most Common Venue	2nd Most Common Venue	3rd Most Common Venue	4th Most Common Venue	5th Most Common Venue	Dentist's Office	Doctor's Office	Emergency Room	Hospital	Medical Center
1	Raffles Place	1.283595	103.851568	1	Dentist's Office	Doctor's Office	Medical Center	Hospital	Emergency Room	9	18	0	0	13
1	Cecil	1.278716	103.847738	1	Medical Center	Dentist's Office	Doctor's Office	Hospital	Emergency Room	9	19	0	1	15
1	Marina	1.290475	103.852036	1	Dentist's Office	Medical Center	Doctor's Office	Hospital	Emergency Room	9	10	0	2	9
1	People's Park	1.285810	103.844160	1	Medical Center	Doctor's Office	Dentist's Office	Hospital	Emergency Room	4	19	0	0	14
2	Anson	1.271363	103.842698	0	Doctor's Office	Dentist's Office	Medical Center	Hospital	Emergency Room	7	17	0	0	6
2	Tanjong Pagar	1.276571	103.845848	1	Dentist's Office	Medical Center	Doctor's Office	Hospital	Emergency Room	11	19	0	1	14
3	Bukit Merah	1.280628	103.830591	4	Hospital	Emergency Room	Medical Center	Doctor's Office	Dentist's Office	0	4	1	29	6

Result

