The Best Housing Estate in Singapore

Applied Data Science Capstone Project (Week 2)

Introduction

- Large number of foreigners from South East Asia settled down in Singapore as Permanent Resident (PR)
- Majority put up in Housing and Development Board (HDB) public housing flats due to affordability
- PRs are only allowed to buy HDB flats from the resale market
- Home buyers in general prefers flats close to Mass Rapid Transit (MRT) stations, the main form of transportation in the country

Objective

- This project sets out to assist the many PRs from the region to look for ideal housing estate near to the MRT stations. The main considerations in the selection of housing estate are the proximity to the MRT station, types of business near the station and the price of housing flats.

Data

Data 1 – MRT Stations

➤ MRT station data from the Singapore Land Transport Authority

	stn_names	stn_codes	coordinates
0	EUNOS MRT STATION	EW7	[35782.955299999565, 33560.077600000426]
1	CHINESE GARDEN MRT STATION	EW25	[16790.746600000188, 36056.30189999938]
2	KHATIB MRT STATION	NS14	[27962.310800000094, 44352.56799999997]
3	KRANJI MRT STATION	NS7	[20081.697399999946, 45214.54790000059]
4	REDHILL MRT STATION	EW18	[26163.47800000012, 30218.819599999115]
...	...	...	...
180	TELOK BLANGAH MRT STATION	CC28	[25376.846900000237, 28138.96670000069]
181	TELOK AYER MRT STATION	DT18	[29667.621600000188, 29414.58669999987]
182	NEWTON MRT STATION	NS21	[28519.36160000041, 32735.207200000063]
183	CANBERRA MRT STATION	NS12	[27598.621771013826, 47200.24193103178]
184	WOODLANDS NORTH MRT STATION	TE1	[22699.99319899935, 47770.399814307006]

185 rows × 3 columns

Data 1 – MRT Stations

➤ Convert station coordinates to conventional latitude and longitude

	stn_names	stn_codes	latitude	longitude
0	EUNOS MRT STATION	EW7	1.319778	103.903252
1	CHINESE GARDEN MRT STATION	EW25	1.342352	103.732596
2	KHATIB MRT STATION	NS14	1.417383	103.832980
3	KRANJI MRT STATION	NS7	1.425177	103.762165
4	REDHILL MRT STATION	EW18	1.289562	103.816816

Data 2 – Foursquare Locations

➢ Top 50 venues at 400m radius of each MRT station, by Foursquare API

	stn_names	stn_names latitude	stn_names longitude	Venue	Venue Latitude	Venue Longitude	Venue Category
0	EUNOS MRT STATION	1.319778	103.903252	福春叻沙卤面 Laksa & Lor Mee	1.320254	103.904132	Noodle House
1	EUNOS MRT STATION	1.319778	103.903252	GYMM BOXX	1.317912	103.901094	Gym
2	EUNOS MRT STATION	1.319778	103.903252	Mr Bean	1.319703	103.902479	Breakfast Spot
3	EUNOS MRT STATION	1.319778	103.903252	香港街珍達記	1.316703	103.901415	Chinese Restaurant
4	EUNOS MRT STATION	1.319778	103.903252	LiHO	1.319729	103.902512	Bubble Tea Shop

Data 3 – Resale Market Price

➢ Median resale price of HDB flats from the authority

	quarter	town	flat_type	price
0	2007-Q2	Ang Mo Kio	1-room	na
1	2007-Q2	Ang Mo Kio	2-room	-
2	2007-Q2	Ang Mo Kio	3-room	172000
3	2007-Q2	Ang Mo Kio	4-room	260000
4	2007-Q2	Ang Mo Kio	5-room	372000
...	...	...	...	...
7951	2019-Q4	YISHUN	2-ROOM	-
7952	2019-Q4	YISHUN	3-ROOM	265000
7953	2019-Q4	YISHUN	4-ROOM	370000
7954	2019-Q4	YISHUN	5-ROOM	470000
7955	2019-Q4	YISHUN	EXEC	565000

7956 rows × 4 columns

Data 3 – Resale Market Price

➢ Extract only the latest price of 4Q 2019
➢ Remove 1-room and 2-room type which are not sold to PRs

	town	flat_type	price
7802	ANG MO KIO	3-ROOM	270000.0
7803	ANG MO KIO	4-ROOM	397500.0
7804	ANG MO KIO	5-ROOM	614000.0
7808	BEDOK	3-ROOM	275000.0
7809	BEDOK	4-ROOM	380000.0
...	...	...	...
7949	WOODLANDS	EXEC	550000.0
7952	YISHUN	3-ROOM	265000.0
7953	YISHUN	4-ROOM	370000.0
7954	YISHUN	5-ROOM	470000.0
7955	YISHUN	EXEC	565000.0

74 rows × 3 columns

Methodology
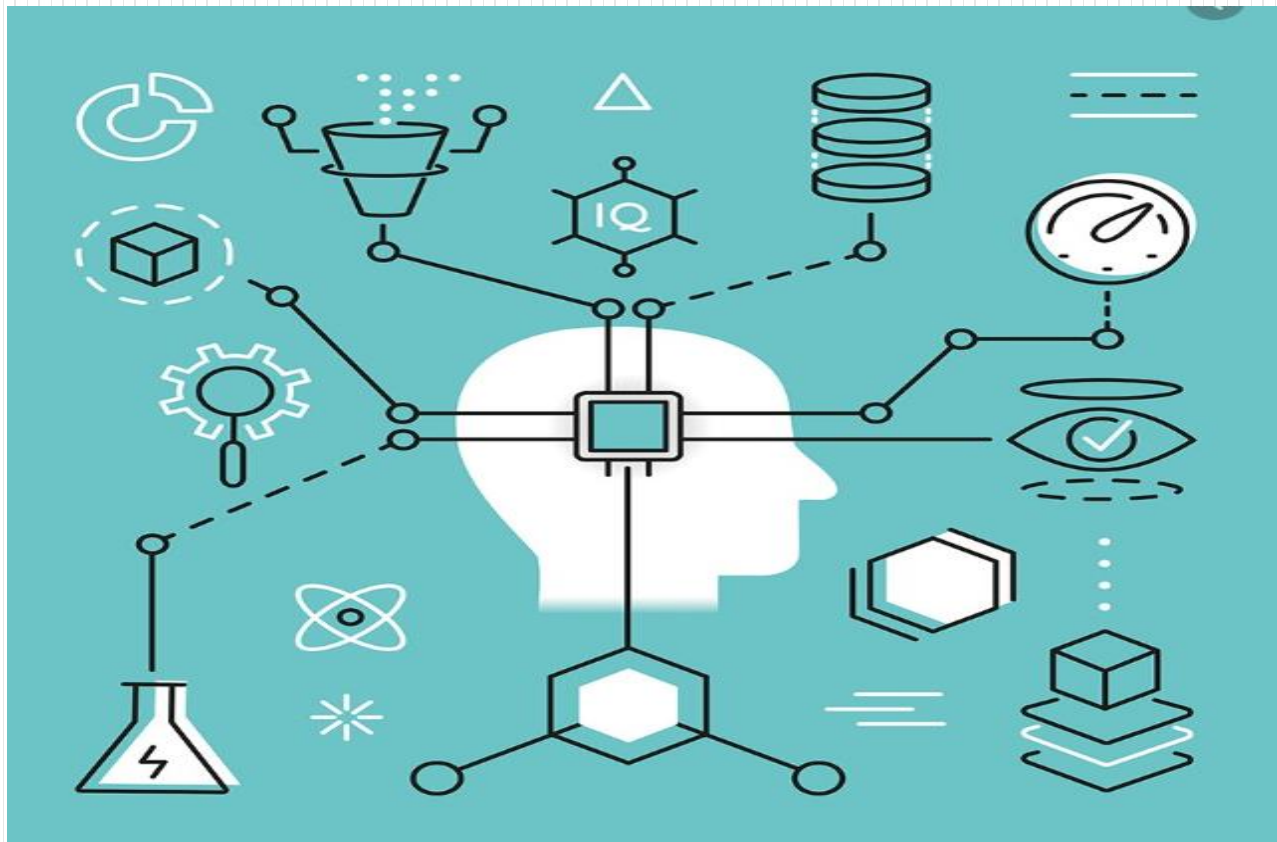
Visualisation of MRT Stations

➢ Plot stations data onto Folium
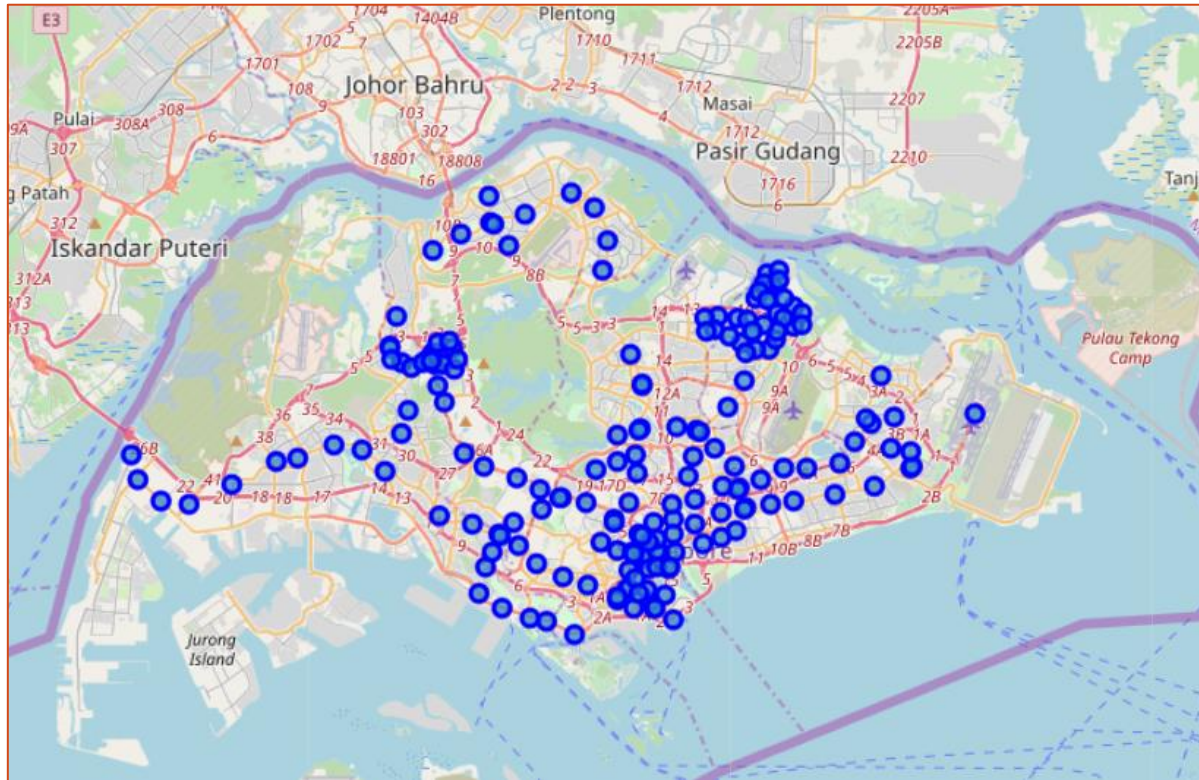
Analyse Stations by Clustering

➢ One hot encoding to venues data

➢ Group identical stations

➢ Create dataframe of ten most common venues at each station

	stn_names	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	ADMIRALTY MRT STATION	Bakery	Supermarket	Bus Station	Plaza	Food Court	Coffee Shop	Paper / Office Supplies Store	Food Truck	Food Stand	Food Service
1	ALJUNIED MRT STATION	Asian Restaurant	Chinese Restaurant	Noodle House	Dim Sum Restaurant	Coffee Shop	Food Court	Vegetarian / Vegan Restaurant	BBQ Joint	Seafood Restaurant	Farmers Market
2	ANG MO KIO MRT STATION	Coffee Shop	Dessert Shop	Food Court	Supermarket	Bubble Tea Shop	Japanese Restaurant	Snack Place	Miscellaneous Shop	Modern European Restaurant	Frozen Yogurt Shop
3	BAKAU LRT STATION	Basketball Court	Supermarket	Fast Food Restaurant	Trail	Sandwich Place	Malay Restaurant	Bus Station	Shoe Store	Japanese Restaurant	Dessert Shop
4	BANGKIT LRT STATION	Food Court	Fruit & Vegetable Store	Park	Noodle House	Bike Trail	Market	Miscellaneous Shop	Coffee Shop	Food & Drink Shop	Fishing Spot

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stn_venues_sorted.shape
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(165, 12)
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# Analyse Stations by Clustering

➢ K-means clustering applied to the new dataframe

➢ Set 5 clusters

|	stn_names	stn_codes	latitude	longitude	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 Venu
0	EUNOS MRT STATION	EW7	1.319778	103.903252	0.0	Chinese Restaurant	Noodle House	Coffee Shop	Seafood Restaurant	Gym	Bubble Tea Shop	Train Station	Vegetarian / Vegan Restaurant	Asia Restaurar
1	CHINESE GARDEN MRT STATION	EW25	1.342352	103.732596	0.0	Chinese Restaurant	Coffee Shop	Asian Restaurant	Indian Restaurant	Train Station	Café	Food Court	Food	Filipin Restaurar
2	KHATIB MRT STATION	NS14	1.417383	103.832980	1.0	Coffee Shop	Asian Restaurant	Supermarket	Food Court	Grocery Store	Park	Shopping Mall	Middle Eastern Restaurant	Trai Statio
3	KRANJI MRT STATION	NS7	1.425177	103.762165	3.0	Stadium	Racetrack	Night Market	Bakery	Lighthouse	Bus Line	Go Kart Track	Food & Drink Shop	Fish Chip Sho
4	REDHILL MRT STATION	EW18	1.289562	103.816816	0.0	Chinese Restaurant	Coffee Shop	Gym	Pool	Park	Hainan Restaurant	Train Station	Vegetarian / Vegan Restaurant	Mala Restaurar

Analyse Stations by Clustering

➢ Visualise clusters
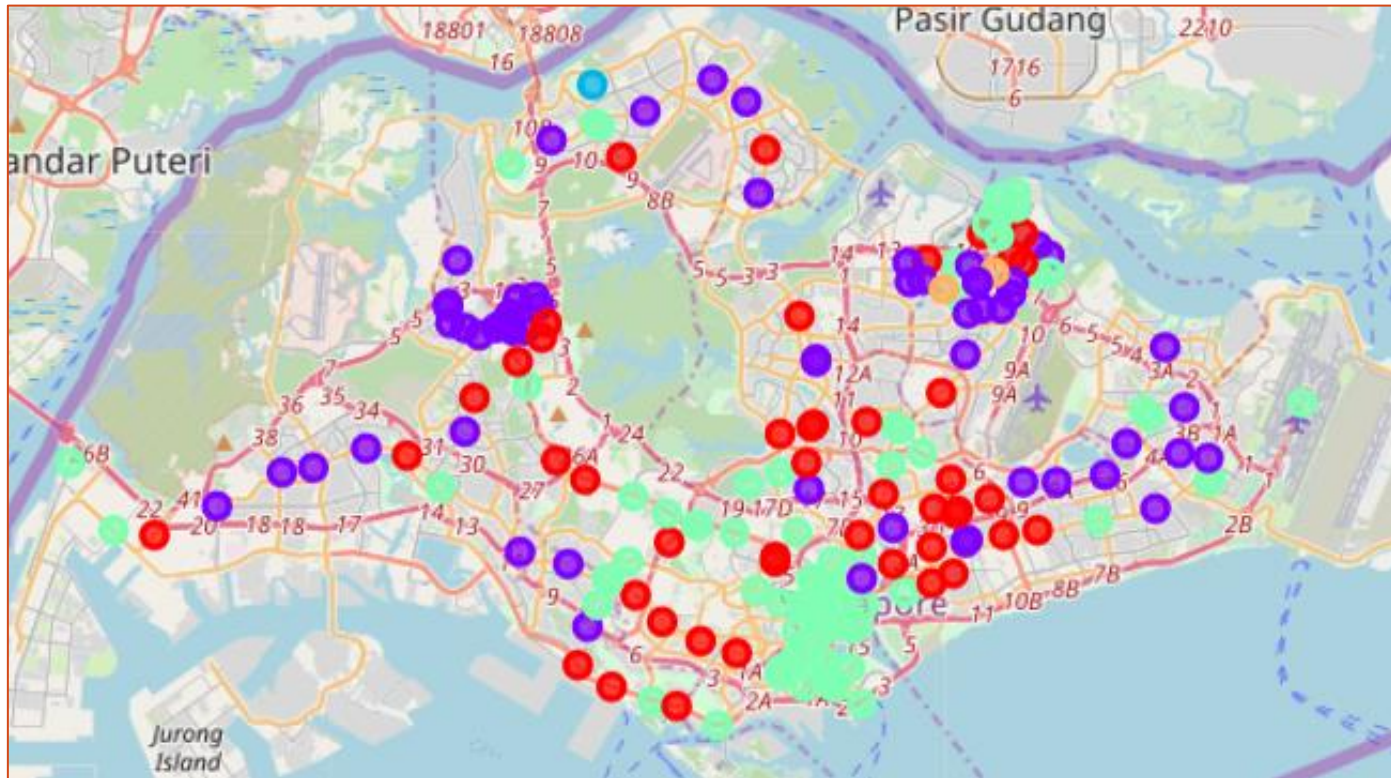
Flats prices analysis

➢ Dataframe of each flat type was plotted to find the town with lowest price

| town	price
SEMBAWANG	470000.0
JURONG WEST	530000.0
CHOA CHU KANG	540000.0
WOODLANDS	550000.0
YISHUN	565000.0
SENGKANG	575000.0
BUKIT PANJANG	621500.0
PASIR RIS	635000.0
HOUGANG	665000.0
TAMPINES	675000.0

Price of Executive flat at 4Q 2019
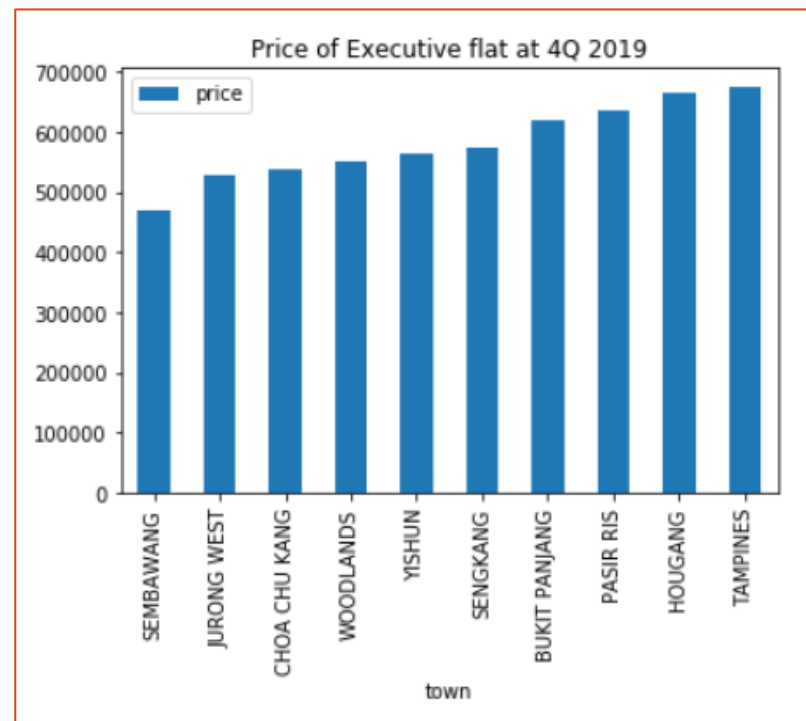
Results

Clustering Results
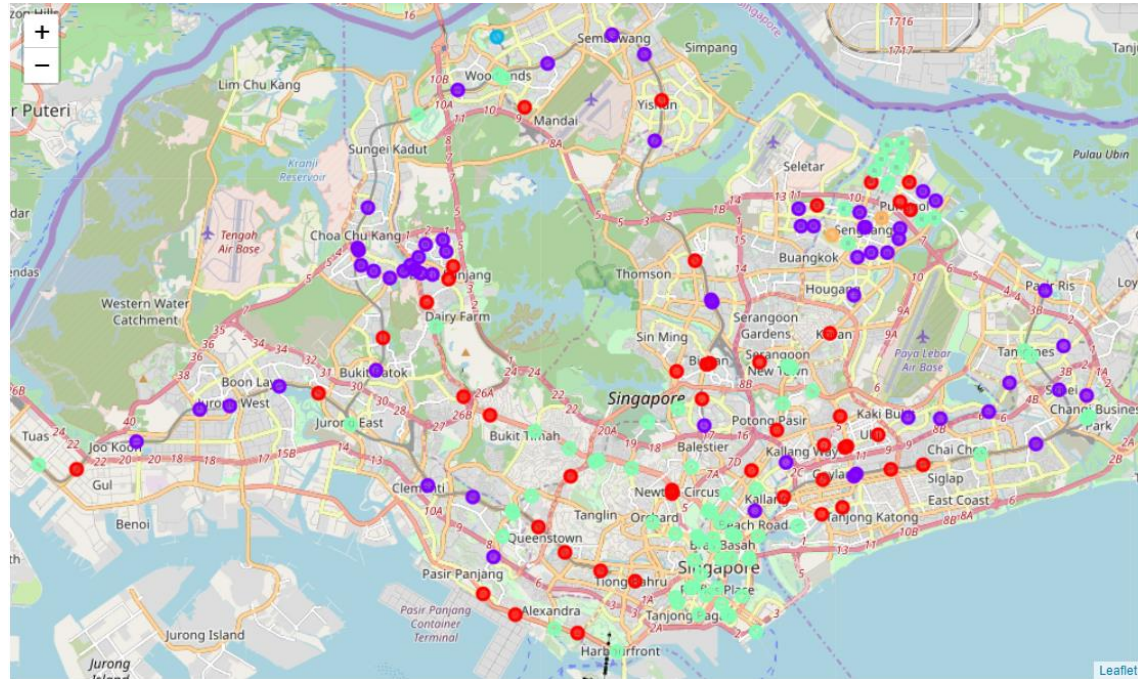
🔴 Cluster 1 food court, coffiee shop, chinese restaurant

🟣 Cluster 2 fast food, dessert shop, supermarket, coffee shop, grocery

🔵 Cluster 3 rest area, indian restaurant, field

🟢 Cluster 4 sports, hotel, japanese restaurant, café, bakery

🟠 Cluster 5 playground, coffee shop, book store, sculpture garden

Most suitable for residential housing

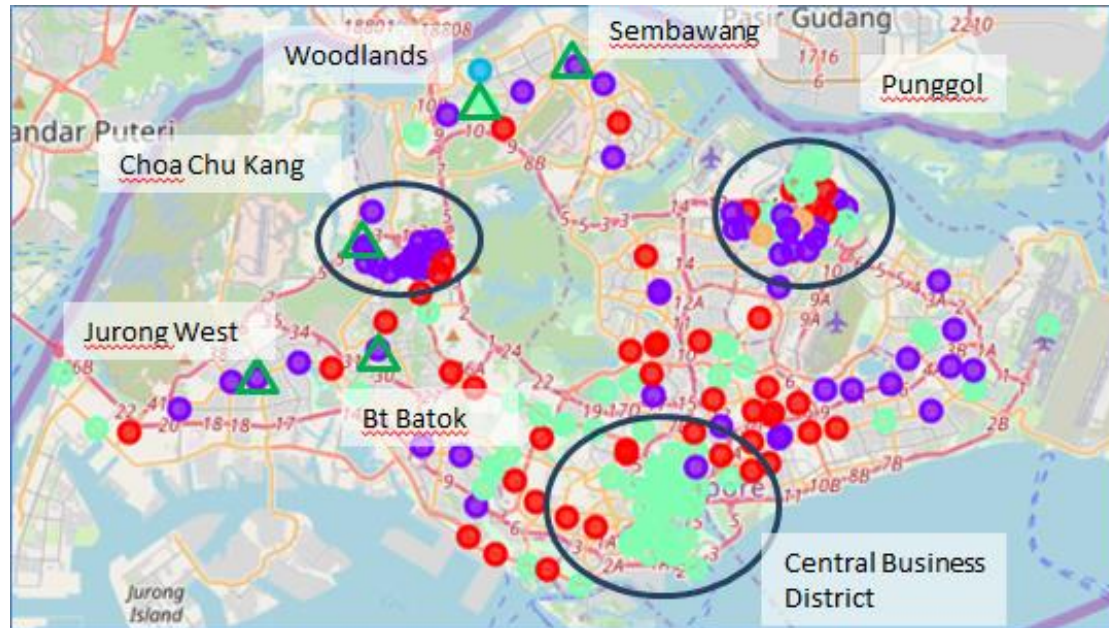# Town with Lowest Flat Price
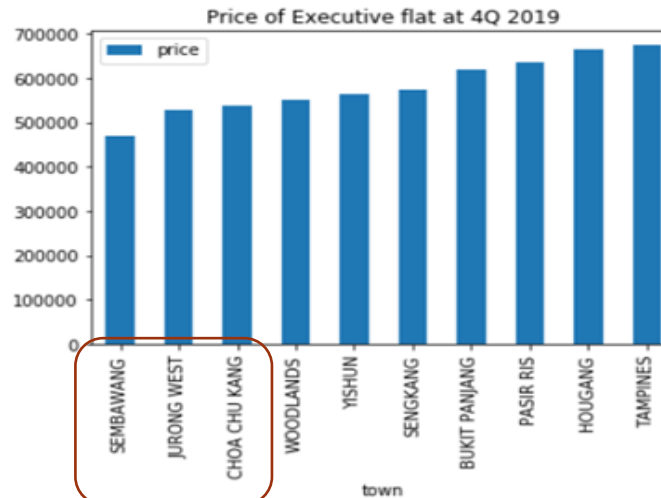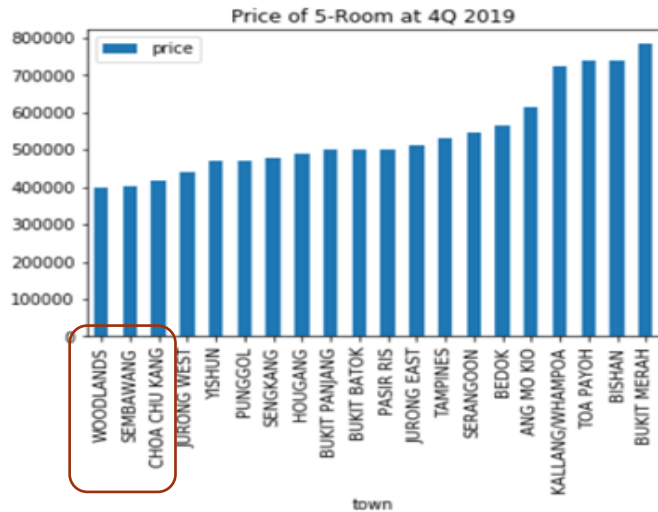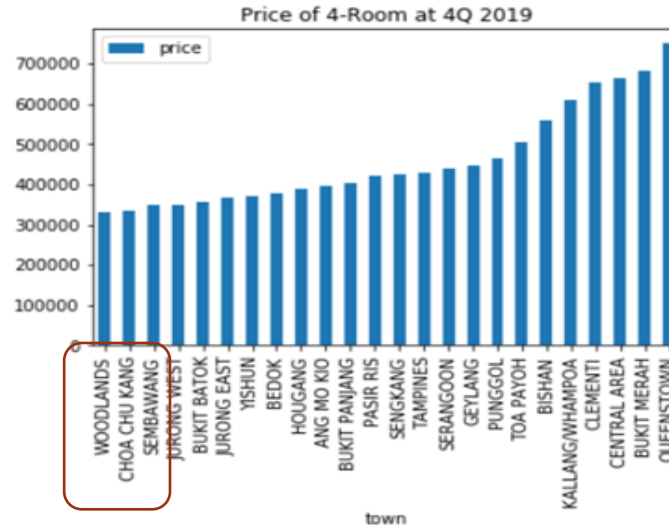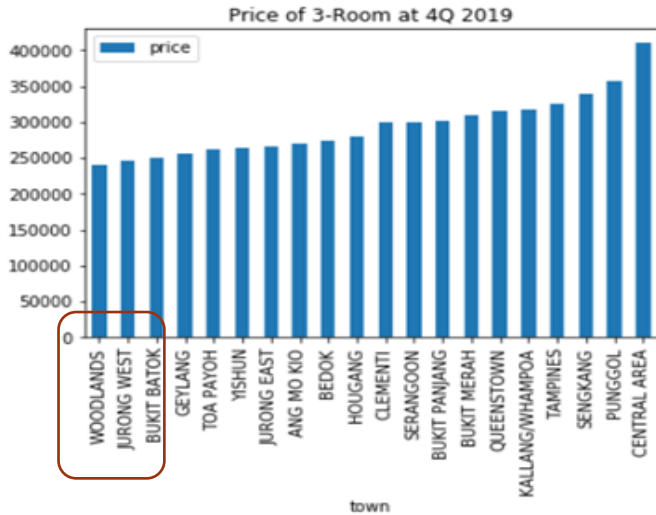
Woodlands

Sembawang

Jurong West

Bukit Batok

Choa Chu Kang

Discussion

Observations

➢ Purple clusters match well with actual public housing estates
➢ Green cluster at South is the Central Business District, more upmarket venues
➢ Purple cluster at North-West is Choa Chu Kang town, relatively mature town, hence all purple (mainly for housing)
➢ Mix colour cluster at North-East is Punggol new town, better planning with variety of venues
➢ Towns with lowest resale price marked with green triangle

Recommendations

➢ The clustering could be done with less (or more) number of clusters to analyse whether a better representation could be achieved

➢ The analysis could be extended to target other group of buyers, such as the locals, to identify housing estate that suit their style of living

Conclusion

➢ This project sets out to assist the many PRs from the South East Asia region to look for ideal housing estate near to the MRT stations

➢ The main considerations in the selection of housing estate are the proximity to the MRT station, types of business near the station and the price of housing flats

➢ The data of stations and the Foursquare venues were analysed and the result showed that four towns in the North and West, i.e. Sembawang, Choa Chu Kang, Bukit Batok and Jurong West, are most suitable for buyers looking for affordable properties with a good mix of venues for residential purpose

Thank you