

# CAPSTONE PROJECT: BATTLE OF THE NEIGHBOURHOODS

## INTRODUCTION

Singapore is a small country with a very competitive market for the food and beverage business. According to the 2016 Singstat.gov.sg report<sup>1</sup>, there are 7,679 food establishments in Singapore. Given that operating cost is high for such business, it is vital for those who are keen to open up a new restaurant to consider certain factors like rental or location of the restaurant. As the choice of location is an important decision for prospective restaurateur, this report will analyse the optimum location in Singapore for them to consider opening their restaurant at.

<sup>1</sup><https://www.singstat.gov.sg/modules/infographics/-/media/472BC5D302D645F6A93C10092EF95CFF.ashx>

## DATA

Information on towns and population with latitude and longitude are downloaded. This is readily available from Data.gov.sg portal (<https://data.gov.sg/dataset/estimated-resident-population-living-in-hdb-flats>). The latest data available is based on 2018 figures so we will focus on the population numbers in 2018.

## METHODOLOGY

As the population data is from 2008-2018, there'll be removal of rows for those from 2008-2017. The most recent data will be taken. Then the data will be sorted by "population" in descending order.

I will be using Foursquare API to explore neighbourhood towns in Singapore. The explore function can be used to get the most common venues in each town as well as the restaurant type. Thereafter these will be used to group neighbourhoods into clusters. The k-means clustering algorithm was chosen for the analysis. Folium will then be used to visualise the neighbourhoods and the clusters.

getNearbyVenues will be used to extract Venue Id, Venue Name, Coordinates and Category Name for the dataframe.

getVenuesByCategory will be performed for Category ID: 4d4b7105d754a06377d81259 (Food Venues) which we will be able to retrieve the information on the most common food venues for each neighbourhood towns.

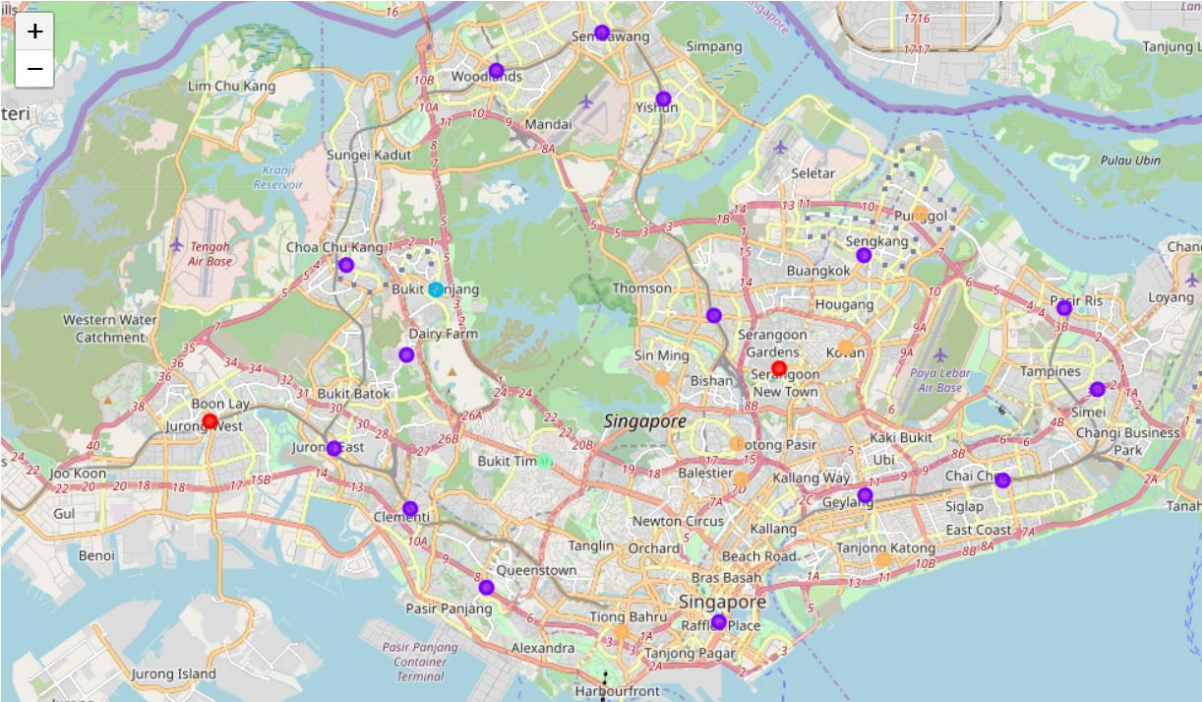
One Hot Encoding is also used to analyse each town's nearby venues.

RESULTS

Categorised Table on Most Common Venues in the Neighbourhood. This is to check if there are already a lot of restaurants in each neighbourhood. Sorted from highest population to the lowest.

Town	Latitude	Longitude	population	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
Jurong West	1.3404	103.7090	257600	0	Asian Restaurant	Fast Food Restaurant	Japanese Restaurant	Chinese Restaurant	Coffee Shop	Dessert Shop	Café	Bookstore
Woodlands	1.4382	103.7890	242800	1	Coffee Shop	Café	Shopping Mall	Asian Restaurant	Japanese Restaurant	Food Court	Clothing Store	Frozen Yogurt Shop
Tampines	1.3496	103.9568	231800	1	Plaza	Cosmetics Shop	Grocery Store	Fast Food Restaurant	Sandwich Place	Basketball Court	South Indian Restaurant	Housing Development
Sengkang	1.3868	103.8914	213200	1	Coffee Shop	Basketball Court	Bus Station	Grocery Store	Metro Station	Convenience Store	Hotel	Hookah Bar
Yishun	1.4304	103.8354	197300	1	Chinese Restaurant	Italian Restaurant	Fried Chicken Joint	Supermarket	Food Court	Hainan Restaurant	Coffee Shop	Furniture / Home Store
Bedok	1.3240	103.9302	191300	1	Coffee Shop	Chinese Restaurant	Asian Restaurant	Food Court	Japanese Restaurant	Sandwich Place	Dessert Shop	Supermarket
Hougang	1.3612	103.8863	179100	4	Chinese Restaurant	Food Court	Noodle House	Coffee Shop	Asian Restaurant	Café	Snack Place	Bakery
hoa Chu Kang	1.3840	103.7470	168500	1	Coffee Shop	Asian Restaurant	Fast Food Restaurant	Bus Station	Italian Restaurant	Sushi Restaurant	Pharmacy	Playground
Bukit Merah	1.2819	103.8239	144300	4	Chinese Restaurant	Coffee Shop	Japanese Restaurant	Convenience Store	Asian Restaurant	Bus Line	Bus Station	Residential Building (Apartment / Condo)
Ang Mo Kio	1.3700	103.8496	141600	1	Coffee Shop	Food Court	Japanese Restaurant	Snack Place	Dessert Shop	Supermarket	Bubble Tea Shop	Sandwich Place
Punggol	1.3984	103.9072	138700	4	Bus Station	Basketball Court	High School	Indian Restaurant	Chinese Restaurant	Cafeteria	Fruit & Vegetable Store	Frozen Yogurt Shop
Bukit Panjang	1.3774	103.7719	120100	2	Park	Food Court	Miscellaneous Shop	Grocery Store	Diner	Market	Noodle House	Food

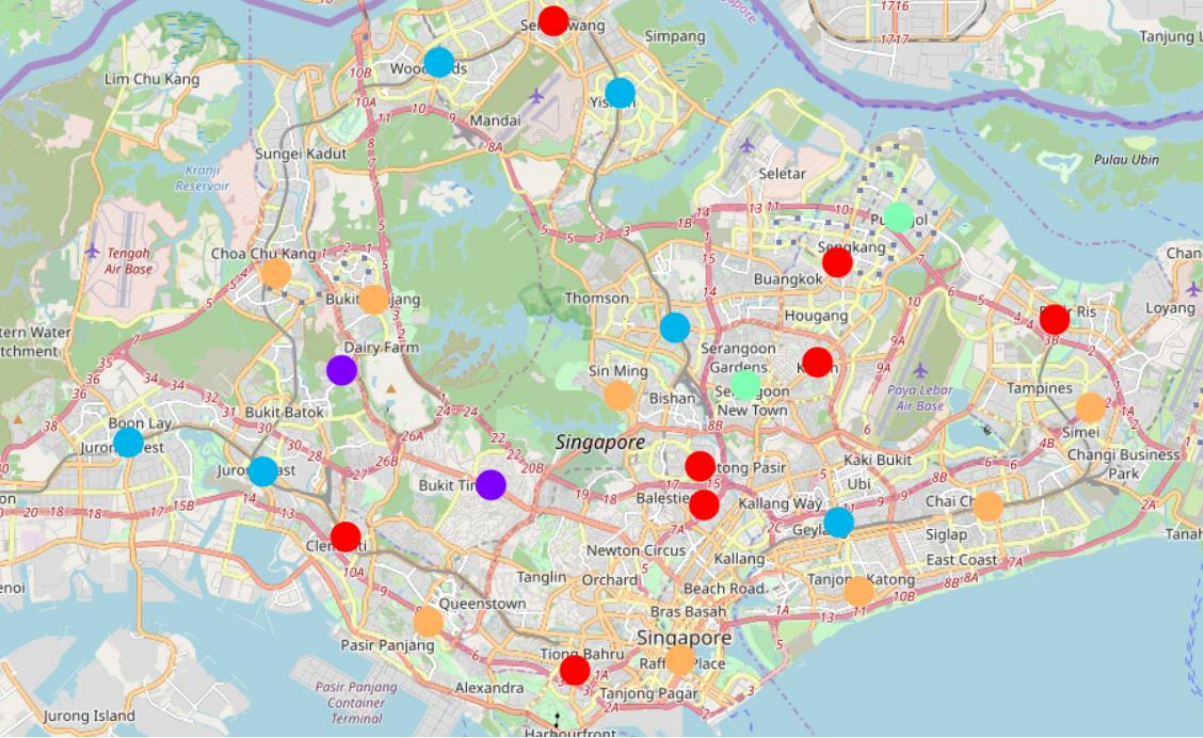
Folium Map showing Clusters



Categorised Table on Most Common FOOD Venues in the Neighbourhood. This is to check what types of restaurants are most common in each neighbourhood. Sorted from highest population to the lowest.

	Year	Latitude	Longitude	population	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
Town													
Jurong West	2018	1.3404	103.7090	257600	2	Asian Restaurants	Fast Food Restaurants	Food Courts	Bubble Tea Shops	Chinese Restaurants	Snack Places	Noodle Houses	
Woodlands	2018	1.4382	103.7890	242800	2	Food Courts	Japanese Restaurants	Fast Food Restaurants	Bubble Tea Shops	Sushi Restaurants	American Restaurants	Italian Restaurants	Juice Bars
Tampines	2018	1.3496	103.9568	231800	4	Coffee Shops	Fast Food Restaurants	Sandwich Places	Bakeries	Burger Joints	Restaurants	Cafés	Ice Cream Shops
Sengkang	2018	1.3868	103.8914	213200	0	Food Courts	Chinese Restaurants	Coffee Shops	Food Trucks	Diners	Bakeries	Cafés	Ice Cream Shops
Yishun	2018	1.4304	103.8354	197300	2	Food Courts	Fried Chicken Joints	Bubble Tea Shops	Chinese Restaurants	Ramen Restaurants	Sushi Restaurants	Juice Bars	
Bedok	2018	1.3240	103.9302	191300	4	Coffee Shops	Food Courts	Chinese Restaurants	Thai Restaurants	Japanese Restaurants	Sushi Restaurants	Fast Food Restaurants	Ice Cream Shops
Hougang	2018	1.3612	103.8863	179100	0	Chinese Restaurants	Food Courts	Coffee Shops	Asian Restaurants	Noodle Houses	Cafés	Bakeries	
Choa Chu Kang	2018	1.3840	103.7470	168500	4	Coffee Shops	Noodle Houses	Fast Food Restaurants	Cafés	Chinese Restaurants	Restaurants	Food Courts	Bakeries
Bukit Merah	2018	1.2819	103.8239	144300	0	Food Courts	Chinese Restaurants	Coffee Shops	Noodle Houses	Japanese Restaurants	Asian Restaurants	Fast Food Restaurants	Ice Cream Shops
Ang Mo Kio	2018	1.3700	103.8496	141600	2	Food Courts	Fast Food Restaurants	Bubble Tea Shops	Noodle Houses	Asian Restaurants	Coffee Shops	Dessert Shops	
Punggol	2018	1.3984	103.9072	138700	3	Asian Restaurants	Coffee Shops	Chinese Restaurants	Noodle Houses	Bakeries	Food Trucks	Indian Restaurants	
Bukit Panjang	2018	1.3774	103.7719	120100	4	Coffee Shops	Food Courts	Chinese Restaurants	Noodle Houses	Vietnamese Restaurants	Ice Cream Shops	Seafood Restaurants	Ice Cream Shops
Bukit Batok	2018	1.3500	103.7827	115200	4	Cafés	Coffee	Indian	Pizza	Chinese	American	Bakeries	

Folium Map showing Clusters



## CONCLUSION

Using the results above, potential restaurant owners may wish to consider to open their eateries based on the following factors:

- location to be a town where the population is one of the highest.
- although Jurong West is the most populous town in Singapore, their top 7 venues are all food-related establishments, which would mean it is too competitive to open any restaurants there at the moment. Other towns with less common food venues should be considered.
- The 2<sup>nd</sup> result table also shows the type of food establishments are most common in each town. It is not advisable for prospective owners to open another similar type of restaurant in a town where it is most commonly available to avoid competition (e.g. Asian Restaurants in Jurong West)

The above provides a general guide to prospective restaurant owners on the town and restaurant type that owners can consider or avoid. However, there are also many other factors to consider that are not discussed in this analysis for sake of simplicity.

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