

# Café Setup in Singapore

April 2019

## 1. Introduction

Singapore is known as a food haven, with many new eateries, restaurants and cafes springing up each year. However, the failure rate is also high. Some commonly cited statistics include:

- Of the 369 cafes, coffee houses and snack bars set up in 2011, over half had shut down by 2014
- Of the 391 cafes, coffee houses and snack bars registered in 2013, approximately a quarter had called it quits by the end of 2014

A variety of reasons have been cited for these high failure rates, such as lack of experience, poor planning and a tight labour market. Location is another key factor that can affect business success.

## 2. Data Description and Data Sources

Using FourSquare data, we hope to provide a budding entrepreneur who is hoping to start a cafe in Singapore with recommendations on where to set up their cafe. To ensure that:

1. There will be adequate foot traffic (and in line with the urban decentralisation plan, e.g. <https://www.population.sg/articles/singapores-urban-planning-in-five-points>),
2. Cafe is easily accessible

the focus will be on identifying which train stations will serve as the most suitable locations for setting up a cafe. Of particular interest is one of the newest train lines - the North-East (Purple) train line. This train line has 16 stations.

It is assumed that an ideal location for a cafe will be one that:

- Does not already have lots of cafes
- Has other eateries

### 2.1 Train station dataset

This dataset was created by user hxchua and uploaded on the dataworld website (<https://data.world/hxchua/train-stations-in-singapore>). The list of train stations was compiled in June 2017. It contains 9 variables and the ones of primary interest for this project are:

- Station Name
- Latitude
- Longitude

An example of this would be:

- Station Name: Boon Keng MRT Station NE9
- Latitude: 1.319396
- Longitude: 103.861679

Note that the latitude and longitude values for the Outram Park station are incorrect and have to be corrected prior to analysis.

## **2.2 FourSquare dataset**

This dataset contains information on the top 10 most common venues for each of the train station locations, within a 300m radius.

Sticking with the example of Boon Keng MRT station NE9, the top 10 most common venues found are: Chinese Restaurant, Asian Restaurant, Bakery, Noodle House, Sandwich Place, Dessert Shop, Food Court, Soup Place, Fast Food Restaurant, Vegetarian/Vegan Restaurant

## **3. Methodology**

Steps taken to create the datasets and conduct the analysis:

- a) Convert the train station dataset from a CSV file to a Pandas dataframe
- b) Retain only the necessary columns, i.e. station name, latitude and longitude (Note: Station name is a combination of the name of the train station as well as its station code)
- c) Overlay the train station locations on a map of Singapore
- d) Obtain FourSquare data (nearby venues - within a 300m radius) for these 16 train stations
- e) Determine the top ten most common venues for each of these train stations
- f) Evaluate what the most suitable locations would be for setting up a new cafe by identifying the train stations where cafes or coffee shops already exist, and ones where there are none
- g) Determine what clusters exist among the train stations using the k-means clustering method and visualise the result on a map

## 4. Results

The extracted train dataset is shown below:

Table 1. Dataset of the 16 train stations on the North-East line

|     | FullName                      | Latitude | Longitude  |
|-----|-------------------------------|----------|------------|
| 17  | BOON KENG MRT STATION NE9     | 1.319396 | 103.861679 |
| 23  | BUANGKOK MRT STATION NE15     | 1.382878 | 103.893104 |
| 37  | CHINATOWN MRT STATION NE4     | 1.284360 | 103.843424 |
| 44  | CLARKE QUAY MRT STATION NE5   | 1.288386 | 103.846552 |
| 53  | DHOBY GHAUT MRT STATION NE6   | 1.299705 | 103.845485 |
| 63  | FARRER PARK MRT STATION NE8   | 1.312360 | 103.854172 |
| 69  | HARBOURFRONT MRT STATION NE1  | 1.265473 | 103.821446 |
| 74  | HOUGANG MRT STATION NE14      | 1.371292 | 103.892364 |
| 89  | KOVAN MRT STATION NE13        | 1.360179 | 103.885050 |
| 97  | LITTLE INDIA MRT STATION NE7  | 1.307198 | 103.848581 |
| 117 | OUTRAM PARK MRT STATION NE3   | 1.280225 | 103.839486 |
| 127 | POTONG PASIR MRT STATION NE10 | 1.331380 | 103.869046 |
| 131 | PUNGGOL MRT STATION NE17      | 1.404547 | 103.902052 |
| 147 | SENGKANG MRT STATION NE16     | 1.391695 | 103.895466 |
| 150 | SERANGOON MRT STATION NE12    | 1.349708 | 103.873564 |
| 184 | WOODLEIGH MRT STATION NE11    | 1.339190 | 103.870808 |

Visually, this is where the train stations are located in Singapore:

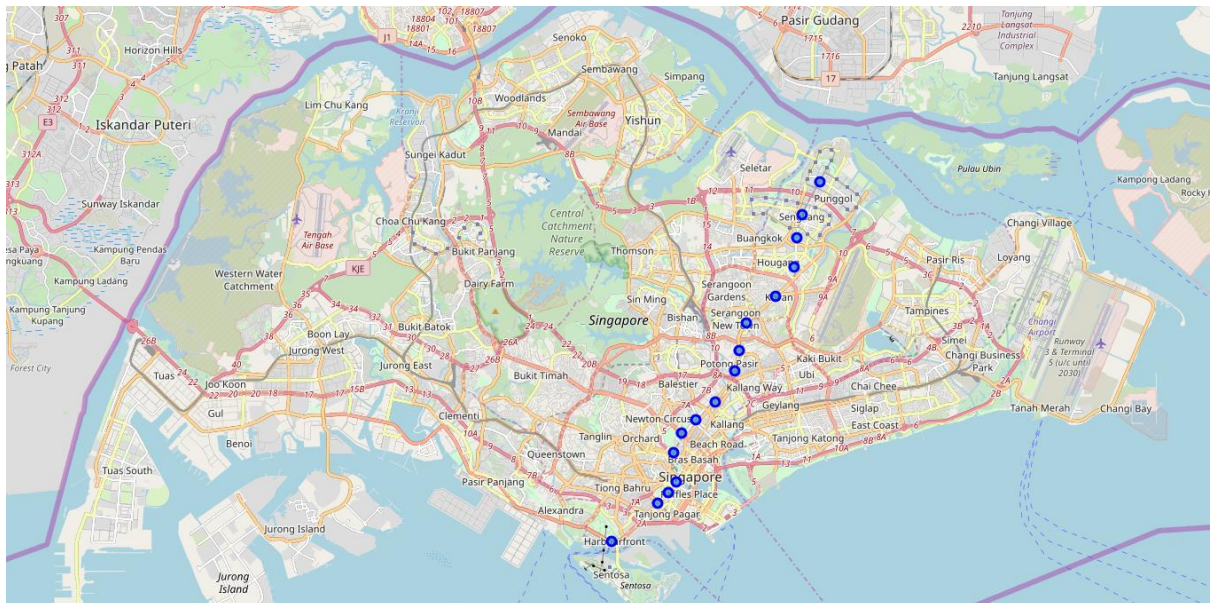


Figure 1. Location of the 16 train stations on the North-East line

FourSquare data provided information on the most common venues within a 300-metre radius of each of the train stations. This information is collated in Table 2 below. Table 2 shows that the Kovan, Hougang and Sengkang train stations have the both cafes and coffee shops mentioned amongst their top 10 most common venues, while close to half (i.e., 7 out of 16) of the train stations do not have either venue type within their top 10. Of these 7, Boon Keng, Serangoon and Buangkok stand out as stations that have higher number of eateries (i.e., 6 to 9).

Table 2. Most common venues within a 300-metre radius of the North-East line train stations

|     | Station                       | 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 Venue | 10th Most Common Venue | Number of Coffee Places | Number of Eateries |
|-----|-------------------------------|----------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|------------------------|-----------------------|-------------------------------|-----------------------|------------------------|-------------------------|--------------------|
| 89  | KOVAN MRT STATION NE13        | 0              | Café                  | Asian Restaurant      | Chinese Restaurant    | Noodle House          | Coffee Shop           | Korean Restaurant      | Soccer Field          | Building                      | Snack Place           | Food Court             | 2                       | 8                  |
| 74  | HOUGANG MRT STATION NE14      | 1              | Supermarket           | Fast Food Restaurant  | Coffee Shop           | Chinese Restaurant    | Food Court            | Bookstore              | Fish & Chips Shop     | Shopping Mall                 | Café                  | Frozen Yogurt Shop     | 2                       | 7                  |
| 147 | SENGKANG MRT STATION NE16     | 1              | Fast Food Restaurant  | Café                  | Food Court            | Coffee Shop           | Metro Station         | Restaurant             | English Restaurant    | Sandwich Place                | Chinese Restaurant    | Shopping Mall          | 2                       | 7                  |
| 117 | OUTRAM PARK MRT STATION NE3   | 1              | Japanese Restaurant   | Australian Restaurant | Chinese Restaurant    | Café                  | Tapas Restaurant      | Dessert Shop           | Cocktail Bar          | Seafood Restaurant            | Nail Salon            | Burger Joint           | 1                       | 8                  |
| 131 | PUNGGOL MRT STATION NE17      | 1              | Chinese Restaurant    | Japanese Restaurant   | Sushi Restaurant      | Food Court            | Multiplex             | Fast Food Restaurant   | Discount Store        | Coffee Shop                   | Ice Cream Shop        | Sandwich Place         | 1                       | 8                  |
| 44  | CLARKE QUAY MRT STATION NE5   | 1              | Hotel                 | Lounge                | Seafood Restaurant    | Yoga Studio           | Spanish Restaurant    | Asian Restaurant       | Bistro                | Bubble Tea Shop               | Café                  | Cocktail Bar           | 1                       | 6                  |
| 97  | LITTLE INDIA MRT STATION NE7  | 4              | Indian Restaurant     | Fruit & Vegetable     | Cantonese Restaurant  | Breakfast Spot        | Market                | Museum                 | Thai Restaurant       | Beer Garden                   | Neighborhood          | Coffee Shop            | 1                       | 6                  |
| 63  | FARRER PARK MRT STATION NE8   | 1              | Hotel                 | Café                  | Indian Restaurant     | Chinese Restaurant    | Clothing Store        | Sporting Goods Shop    | Dumpling Restaurant   | Bubble Tea Shop               | Food Court            | Shopping Mall          | 1                       | 5                  |
| 127 | POTONG PASIR MRT STATION NE10 | 1              | Noodle House          | Food Court            | Snack Place           | Fast Food Restaurant  | Grocery Store         | Convenience Store      | Gym / Fitness Center  | Market                        | Flower Shop           | Coffee Shop            | 1                       | 5                  |
| 17  | BOON KENG MRT STATION NE9     | 0              | Chinese Restaurant    | Asian Restaurant      | Bakery                | Noodle House          | Sandwich Place        | Dessert Shop           | Food Court            | Vegetarian / Vegan Restaurant | Fast Food Restaurant  | Soup Place             | 0                       | 9                  |
| 150 | SERANGOON MRT STATION NE12    | 1              | Ice Cream Shop        | Clothing Store        | Chinese Restaurant    | Japanese Restaurant   | Bubble Tea Shop       | Portuguese Restaurant  | Dessert Shop          | Cosmetics Shop                | Scenic Lookout        | Noodle House           | 0                       | 7                  |
| 23  | BUANGKOK MRT STATION NE15     | 2              | Basketball Court      | Wings Joint           | Fast Food Restaurant  | Bakery                | Food Court            | Metro Station          | German Restaurant     | English Restaurant            | Fish & Chips Shop     | Flea Market            | 0                       | 6                  |
| 37  | CHINATOWN MRT STATION NE4     | 1              | Hostel                | Chinese Restaurant    | Beer Garden           | Seafood Restaurant    | Spa                   | History Museum         | Bed & Breakfast       | Beer Bar                      | Pharmacy              | Flea Market            | 0                       | 4                  |
| 53  | DHOBY GHAUT MRT STATION NE6   | 1              | Yoga Studio           | Soup Place            | Park                  | Movie Theater         | Miscellaneous Shop    | Indonesian Restaurant  | Hotpot Restaurant     | Gym                           | Gift Shop             | General Entertainment  | 0                       | 3                  |
| 69  | HARBOURFRONT MRT STATION NE1  | 1              | Yoga Studio           | Swiss Restaurant      | Plaza                 | Salad Place           | Clothing Store        | Chinese Restaurant     | Shoe Store            | Shopping Mall                 | Multiplex             | Movie Theater          | 0                       | 3                  |
| 184 | WOODLEIGH MRT STATION NE11    | 3              | Bus Station           | Track                 | Bus Line              | Metro Station         | Theater               | Thrift / Vintage Store | Food Court            | Frozen Yogurt Shop            | Yoga Studio           | Furniture / Home Store | 0                       | 2                  |



K-means clustering (using  $k=5$ ) was also applied to the FourSquare data, to determine what the groupings might be across the 16 train stations.

Interestingly, the majority of the train stations – 11 out of 16 – all fall under a single cluster. Boon Keng and Kovan stations from the next biggest cluster, while the remaining train stations – Little India, Buangkok and Woodleigh – have been allocated to their own clusters.

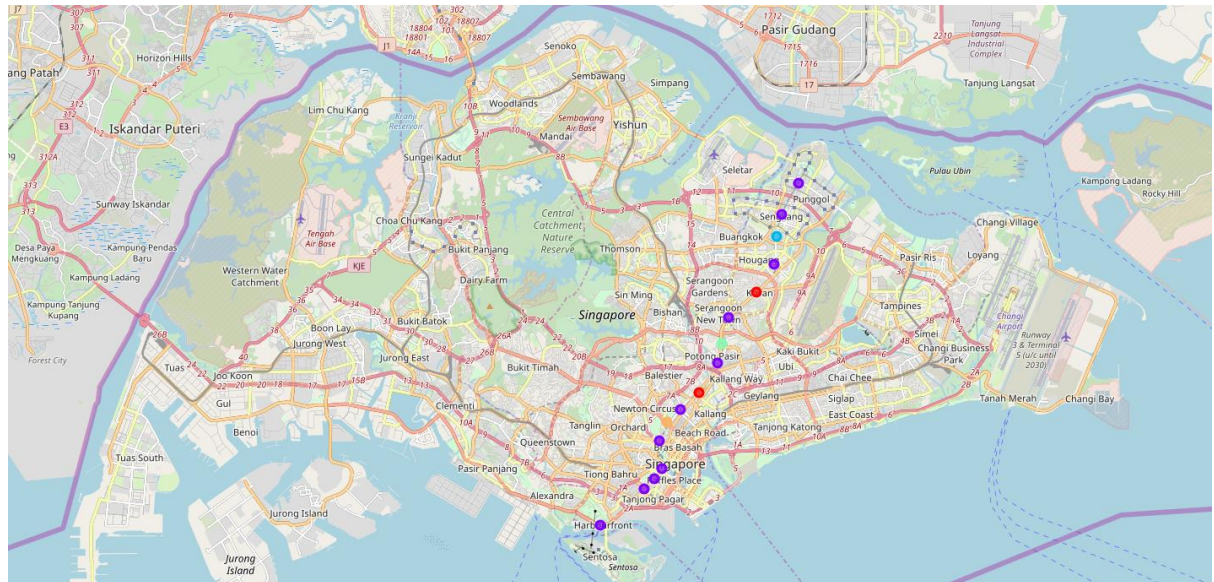


Figure 2. Clustering of the 16 train stations on the North-East line

## 5. Discussion

The table reflects that the majority of train stations on the North-East line already have at least one cafe or coffee shop. In particular, Kovan, Hougang and Sengkang stations have both cafes and coffee shops amongst their top 10 most common venues. Hence, it might be best to avoid setting up a new cafe at these stations, where there are established cafes.

Boon Keng, Buangkok and Chinatown stand out as train stations with a good number of eateries (between 5 to 9) amongst its top 10 most common venues, where there is no mention of cafes or coffee shops. These are likely to be the most promising areas for setting up a new cafe.

## 6. Conclusion

Focussing on the just the North-East train line, FourSquare data suggests that the most promising areas for setting up a new cafe would be the Boon Keng, Buangkok and Chinatown train stations. There are a good number of existing eateries at these stations, but cafes and coffee shops do not currently feature amongst their top 10 most common venues.