

# Business Problem

## Introduction

Hong Kong, it is the top list of world's favorite city for tourism, also well known as shopping and food paradise. It has a relatively low tax rate compare to other Asian cities and have a wide variety of cloths, grocery and luxury goods, etc. Therefore, it attracts tourists all over the world to shop. Hong Kong also famous as food paradise, it brings all cuisines together from all over the world. The below are the brief information about Hong Kong Tourism:

- There are about 58 million tourist visiting Hong Kong each year
- Average spending is about USD\$ 820 per person
- they would spend average 3.2 nights in Hong Kong

The transportation in Hong Kong is mainly relied on MTR, which is the underground metro. Tourists visiting Hong Kong are recommended to use MTR to get around to the major districts.

A foreign hotel group plans to expand their business to Hong Kong, they would like to build a hotel targeting for leisure tourists for shopping and foodies. The purpose of this project is to find the best location along the MTR station to build a hotel for the target customers.

## Objective

This will study in detail about the area classification using Foursquare data based on MTR station location. Then use machine learning to segmentation data and clustering.

## Data

MTR coordinates information

The data for MTR stations coordinates is from MTR website. It has been restructured to excel file and upload to my github. Please visit the below link for more information.

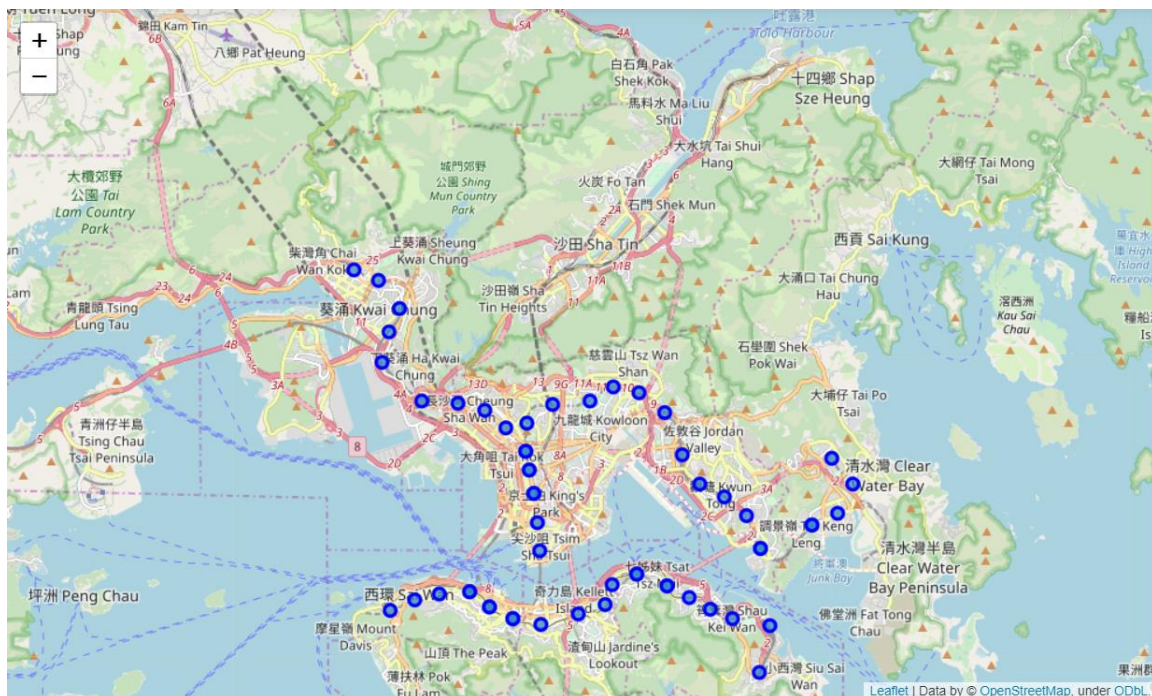
[https://github.com/BaoBao0406/Data-Science-Course/blob/master/IBM%20Data%20Science%20Course/Data%20Science%20Capstone/Final\\_Project/MTR%20station%20Coordinates.xlsx](https://github.com/BaoBao0406/Data-Science-Course/blob/master/IBM%20Data%20Science%20Course/Data%20Science%20Capstone/Final_Project/MTR%20station%20Coordinates.xlsx)

## Methodology

The below are the data for MTR station name, Line, Longitude and Latitude.

	線	站名	Station Name	Line	Longitude	Latitude
0	荃灣	荃灣站	Tsuen Wan	Tsuen Wan Line	114.1178	22.3736
1	荃灣	大窩口	Tai Wo Hau	Tsuen Wan Line	114.1250	22.3708
2	荃灣	葵興站	Kwai Hing	Tsuen Wan Line	114.1312	22.3632
3	荃灣	葵芳站	Kwai Fong	Tsuen Wan Line	114.1279	22.3569
4	荃灣	荔景站	Lai King	Tsuen Wan Line	114.1261	22.3484
5	荃灣	美孚站	Mei Foo	Tsuen Wan Line	114.1376	22.3381
6	荃灣	荔枝角站	Lai Chi Kok	Tsuen Wan Line	114.1482	22.3373
7	荃灣	长沙灣站	Cheung Sha Wan	Tsuen Wan Line	114.1563	22.3354
8	荃灣	深水埗站	Sham Shui Po	Tsuen Wan Line	114.1623	22.3307
9	荃灣	太子站	Prince Edward	Tsuen Wan Line	114.1683	22.3245

The below are the geographic location for each MTR station.



To explore the best District, we will include the districts if it has more than 55 venues.

The below are the list of Districts.

District	Number of Venues
Central	200
Sheung Wan	200
Mong Kok	184
Prince Edward	150
Admiralty	126
Tsim Sha Tsui	100
Tin Hau	100
Causeway Bay	100
Wan Chai	100
Tai Koo	98
Kennedy Town	75
Quarry Bay	68
North Point	64
Kwun Tong	60
Kowloon Bay	56

We will use the most common venue appear in each district as an estimated scale to determine the best location to set up a hotel

District	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
Admiralty	Café	Hotel	Cantonese Restaurant	Hotel Bar	Park	Steakhouse	Italian Restaurant	Yoga Studio	Seafood Restaurant	Burger Joint
Causeway Bay	Japanese Restaurant	Chinese Restaurant	Coffee Shop	Sushi Restaurant	Cantonese Restaurant	Dessert Shop	Hotel	Bakery	Noodle House	Sporting Goods Shop
Central	Italian Restaurant	Japanese Restaurant	French Restaurant	Lounge	Hotel	Bar	Sushi Restaurant	Yoga Studio	Cocktail Bar	Clothing Store
Kennedy Town	Coffee Shop	Japanese Restaurant	Café	French Restaurant	Mexican Restaurant	Vietnamese Restaurant	Cha Chaan Teng	Chinese Restaurant	Hong Kong Restaurant	Park
Kowloon Bay	Chinese Restaurant	Fast Food Restaurant	Café	Noodle House	Sushi Restaurant	Coffee Shop	Japanese Restaurant	Shopping Mall	Supermarket	Cha Chaan Teng
Kwun Tong	Chinese Restaurant	Café	Coffee Shop	Fast Food Restaurant	Cha Chaan Teng	Sushi Restaurant	Japanese Restaurant	Restaurant	Hong Kong Restaurant	Paper / Office Supplies Store
Mong Kok	Dessert Shop	Cha Chaan Teng	Noodle House	Coffee Shop	Toy / Game Store	Hotel	Bakery	Chinese Restaurant	Vegetarian / Vegan Restaurant	Sporting Goods Shop
North Point	Hotpot Restaurant	Hong Kong Restaurant	Noodle House	Cha Chaan Teng	Burger Joint	Thai Restaurant	Chinese Restaurant	Bus Stop	Snack Place	Café
Prince Edward	Chinese Restaurant	Café	Bakery	Noodle House	Cantonese Restaurant	Cha Chaan Teng	Steakhouse	Dessert Shop	Market	Fast Food Restaurant
Quarry Bay	Coffee Shop	Chinese Restaurant	Japanese Restaurant	French Restaurant	Café	Sandwich Place	Farmers Market	New American Restaurant	Cha Chaan Teng	Burger Joint
Sheung Wan	Japanese Restaurant	Café	Coffee Shop	Cocktail Bar	Chinese Restaurant	French Restaurant	Middle Eastern Restaurant	Massage Studio	Beer Store	Dim Sum Restaurant
Tai Koo	Café	Japanese Restaurant	Coffee Shop	Noodle House	Department Store	Cantonese Restaurant	Thai Restaurant	Clothing Store	Food Court	Korean Restaurant
Tin Hau	Chinese Restaurant	Coffee Shop	Noodle House	Café	Japanese Restaurant	Sushi Restaurant	Vietnamese Restaurant	Hotel	Cha Chaan Teng	Korean Restaurant
Tsim Sha Tsui	Hotel	Japanese Restaurant	Chinese Restaurant	Cha Chaan Teng	Shopping Mall	Coffee Shop	Dumpling Restaurant	Cosmetics Shop	Cocktail Bar	Café
Wan Chai	Coffee Shop	Café	Italian Restaurant	Hotel	Thai Restaurant	Vegetarian / Vegan Restaurant	Hong Kong Restaurant	Cantonese Restaurant	Chinese Restaurant	Lounge

After using K-Mean to cluster, it separates into 5 cluster.

#### Red – Cluster 0

District	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
Causeway Bay	Japanese Restaurant	Chinese Restaurant	Coffee Shop	Sushi Restaurant	Cantonese Restaurant	Dessert Shop	Hotel	Bakery	Noodle House	Sporting Goods Shop
Central	Italian Restaurant	Japanese Restaurant	French Restaurant	Lounge	Hotel	Bar	Sushi Restaurant	Yoga Studio	Cocktail Bar	Clothing Store
Kennedy Town	Coffee Shop	Japanese Restaurant	Café	French Restaurant	Mexican Restaurant	Vietnamese Restaurant	Cha Chaan Teng	Chinese Restaurant	Hong Kong Restaurant	Park
Quarry Bay	Coffee Shop	Chinese Restaurant	Japanese Restaurant	French Restaurant	Café	Sandwich Place	Farmers Market	New American Restaurant	Cha Chaan Teng	Burger Joint
Sheung Wan	Japanese Restaurant	Café	Coffee Shop	Cocktail Bar	Chinese Restaurant	French Restaurant	Middle Eastern Restaurant	Massage Studio	Beer Store	Dim Sum Restaurant
Tai Koo	Café	Japanese Restaurant	Coffee Shop	Noodle House	Department Store	Cantonese Restaurant	Thai Restaurant	Clothing Store	Food Court	Korean Restaurant
Tsim Sha Tsui	Hotel	Japanese Restaurant	Chinese Restaurant	Cha Chaan Teng	Shopping Mall	Coffee Shop	Dumpling Restaurant	Cosmetics Shop	Cocktail Bar	Café
Wan Chai	Coffee Shop	Café	Italian Restaurant	Hotel	Thai Restaurant	Vegetarian / Vegan Restaurant	Hong Kong Restaurant	Cantonese Restaurant	Chinese Restaurant	Lounge

#### Purple – Cluster 1

District	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
Kowloon Bay	Chinese Restaurant	Fast Food Restaurant	Café	Noodle House	Sushi Restaurant	Coffee Shop	Japanese Restaurant	Shopping Mall	Supermarket	Cha Chaan Teng

#### Blue – Cluster 2

District	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
Kwun Tong	Chinese Restaurant	Café	Coffee Shop	Fast Food Restaurant	Cha Chaan Teng	Sushi Restaurant	Japanese Restaurant	Restaurant	Hong Kong Restaurant	Paper / Office Supplies Store
Mong Kok	Dessert Shop	Cha Chaan Teng	Noodle House	Coffee Shop	Toy / Game Store	Hotel	Bakery	Chinese Restaurant	Vegetarian / Vegan Restaurant	Sporting Goods Shop
Prince Edward	Chinese Restaurant	Café	Bakery	Noodle House	Cantonese Restaurant	Cha Chaan Teng	Steakhouse	Dessert Shop	Market	Fast Food Restaurant
Tin Hau	Chinese Restaurant	Coffee Shop	Noodle House	Café	Japanese Restaurant	Sushi Restaurant	Vietnamese Restaurant	Hotel	Cha Chaan Teng	Korean Restaurant

#### Green – Cluster 3

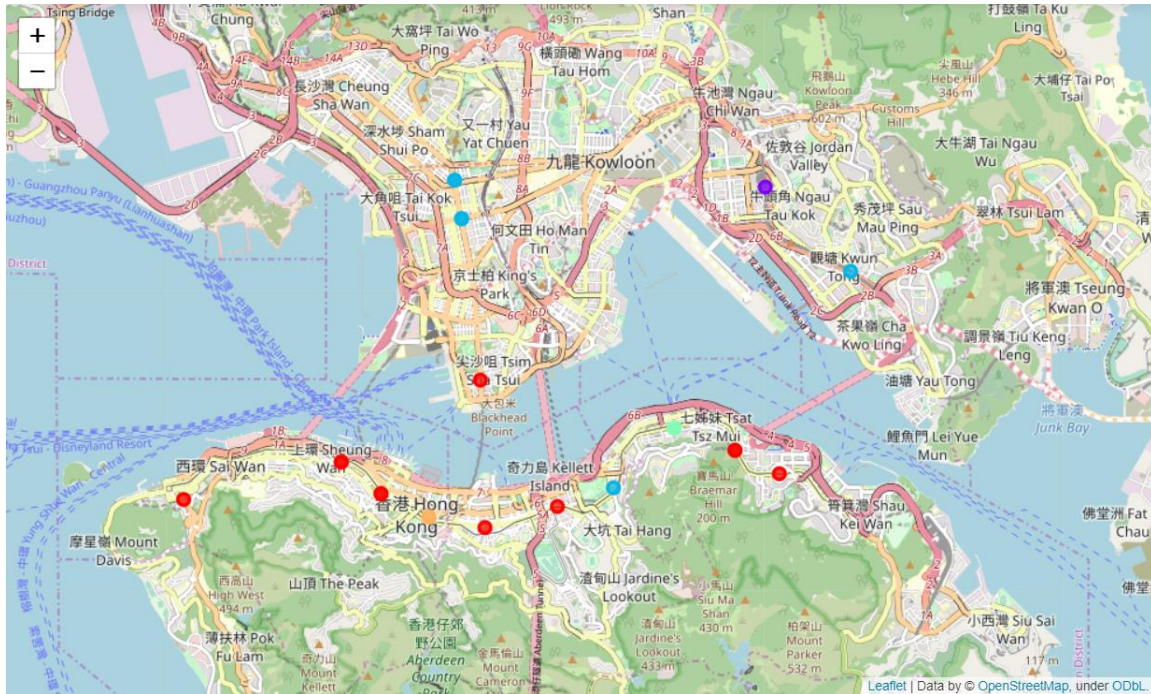
District	1st Most Common Venue	2nd Most Common Venue	3rd Most Common Venue	4th Most Common Venue	5th Most Common Venue	6th Most Common Venue	7th Most Common Venue	8th Most Common Venue	9th Most Common Venue	10th Most Common Venue
North Point	Hotpot Restaurant	Hong Kong Restaurant	Noodle House	Cha Chaan Teng	Burger Joint	Thai Restaurant	Chinese Restaurant	Bus Stop	Snack Place	Café

#### Orange – Cluster 4

District	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
Admiralty	Café	Hotel	Cantonese Restaurant	Hotel Bar	Park	Steakhouse	Italian Restaurant	Yoga Studio	Seafood Restaurant	Burger Joint



The below are each cluster in the map.



## Result

The result after clustering shows that Cluster 0 are the best districts to choose if a hotel group would like to set up a hotel in Hong Kong.

There are 6 districts in Cluster 0, which is Causeway Bay, Central, Kennedy Town, Quarry Bay, Sheung Wan and Tai Koo. All those districts provide a wide variety of restaurants and shops, it also provides more than 100 venues for those districts.

## Discussion and Conclusion

Among all those 6 districts listed in Cluster 0. The districts I recommend setting up a hotel are Sheung Wa and Central. The below are the reasons:

- It suits the need for foodies to explore different kind of restaurants (especially for Central, it provides more varieties on different kind of cuisines such as Japanese, Chinese and French, etc).
- Both districts have over 200 venues including restaurants and shops.
- Lastly, when you look at the geographic location of Central and Sheung Wan, they are very close to each other. And both venues within those districts are accessible by walking distance. Therefore, setting up hotel between them can get benefit from it.

In conclusion, this project did not include the rental cost of land, which make up to 50% of the total cost for operation in Hong Kong. And to reflect the actual situation, we need to include the rental cost.

Furthermore, to improve the accuracy of Machine Learning such as K-Mean Cluster, more data are required. But Foursquare only provided limited venues for free calls, which may affect the result of K-Mean Cluster.