

# FINDING OPTIMUM LOCATIONS FOR OPENING A RESTAURANT IN HONG KONG

Amanpreet Singh

# OUTLINE

- Introduction
- Data Acquisition
- General Overview Of Data
- Identify Focussing Neighbborthoods
- Distribution Pattern of Restaurants
- Determine Optimum Regions
- k-means Clustering
- Results
- Conclusion
- Future Work

# Hong Kong - Background

- One of the topmost alpha + world cities
- Seventh largest trading centers of the world
- Bridge between Asia and America
- Multicultural hub
- One of the prime tourist zones of Asia

# Objective

- Define the optimum locations for setting up a vegetarian restaurant in Hong Kong

# Conditions

The optimum location area should have:

- Less number of restaurants especially, vegetarian ones.
- Away from dense populated residential areas.
- Near some scenic spot.

# Challenges

- Hong Kong is already crowded with over 300 restaurants
- These restaurants can be categorised into over 40 different categories
- Dense population of Hong Kong



# Problem Statement

Locate the optimum areas for setting up a vegetarian restaurant in the stiff competitive world of Hong Kong



# Target Audience

Any individual or group who wants to set up a restaurant or more specifically, a vegetarian restaurant in Hong Kong



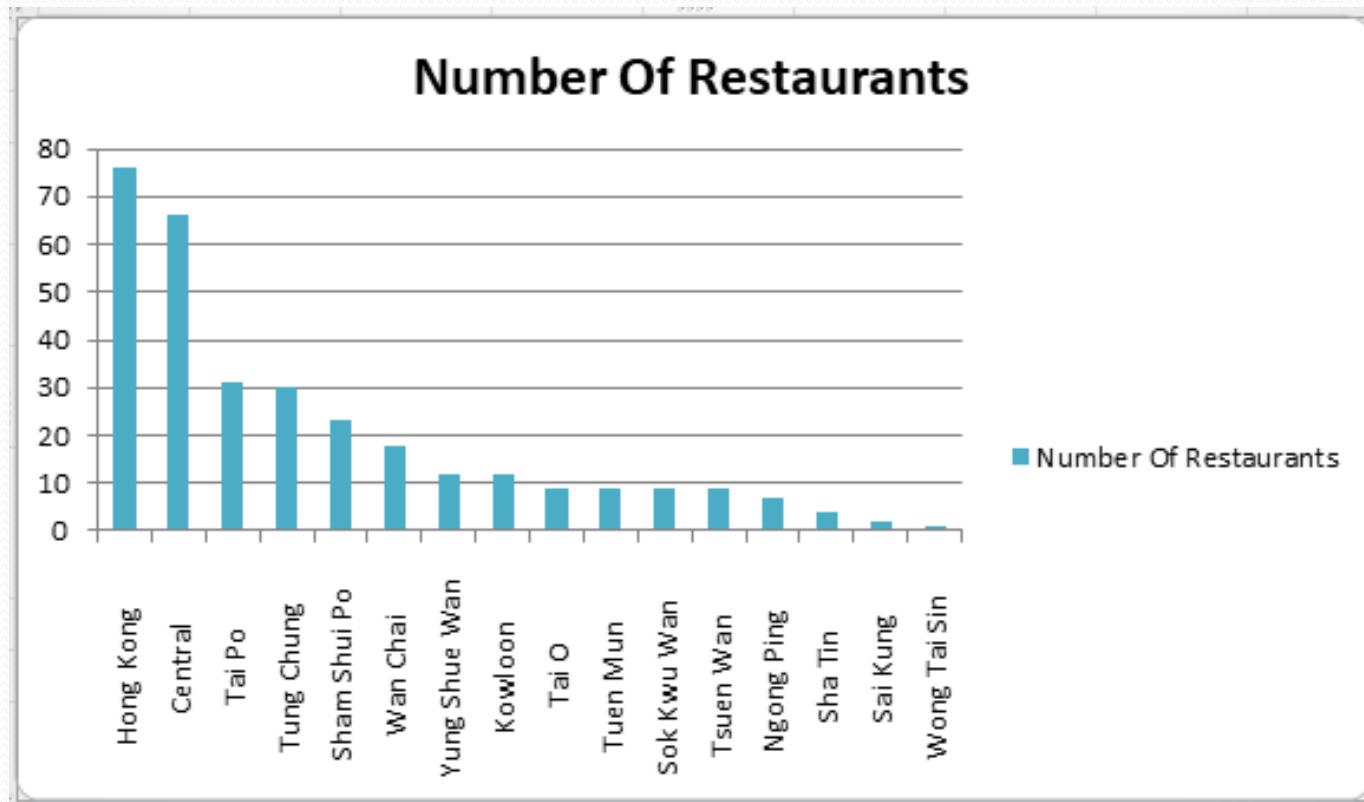
# Data Acquisition

- Geographical Coordinates of various neighborhoods of Hong Kong via <https://www.geodatos.net/en/coordinates/hong-kong>
- Venue Information regarding these neighborhoods via Foursquare location service

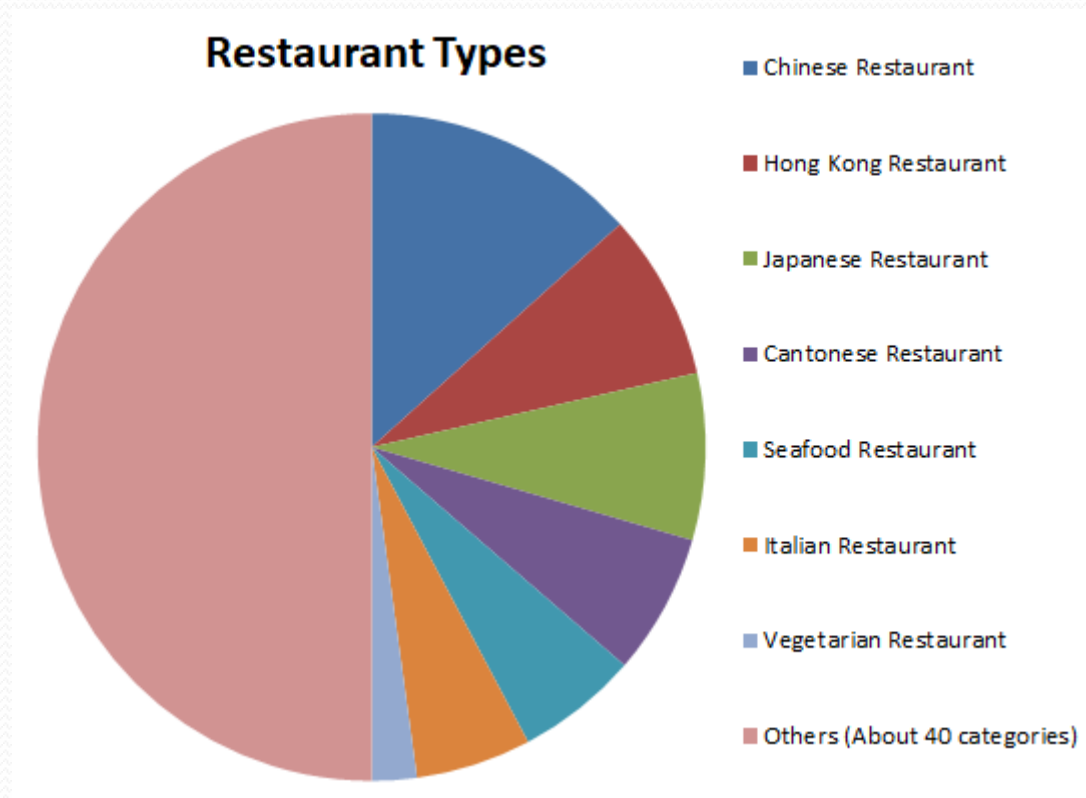
# General Overview Of Data

- 318 restaurants in 18 neighborhoods of Hong Kong
- Hong Kong neighborhood have largest number of restaurants i.e. 76, followed by Central i.e. 66
- 11 neighborhoods don't even have 20 restaurants
- Only 7 vegetarian restaurants in Hong Kong

# Distribution of Restaurants in Various Neighborhoods



# Different Types of Restaurants



# Identification of Focussing Neighborhoods

- Only those neighborhoods are analysed where number of restaurants is more than 20

Neighborhood	Number Of Restaurants
Hong Kong	76
Central	66
Tai Po	31
Tung Chung	30
Sham Shui Po	23

# Distribution Pattern of Restaurants

## Hong Kong Neighborhood

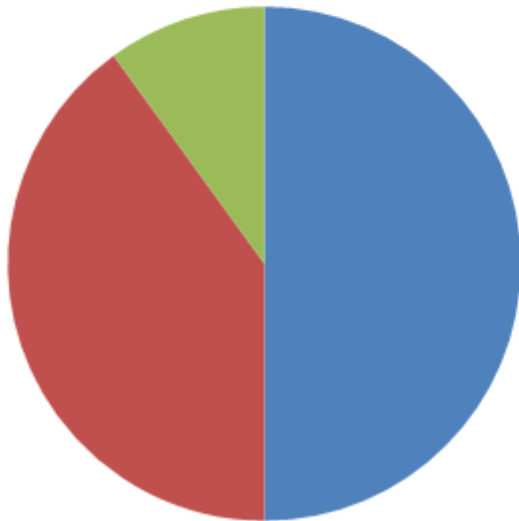
- South Western region alone have more than 40% of the total restaurants.
- Northern regions barely have 10% of the total restaurants.
- In this way, we can define low density regions in this neighborhood.
- We can do the same for other neighborhoods as well.

# Distribution Pattern Of Hong Kong Neighborhood

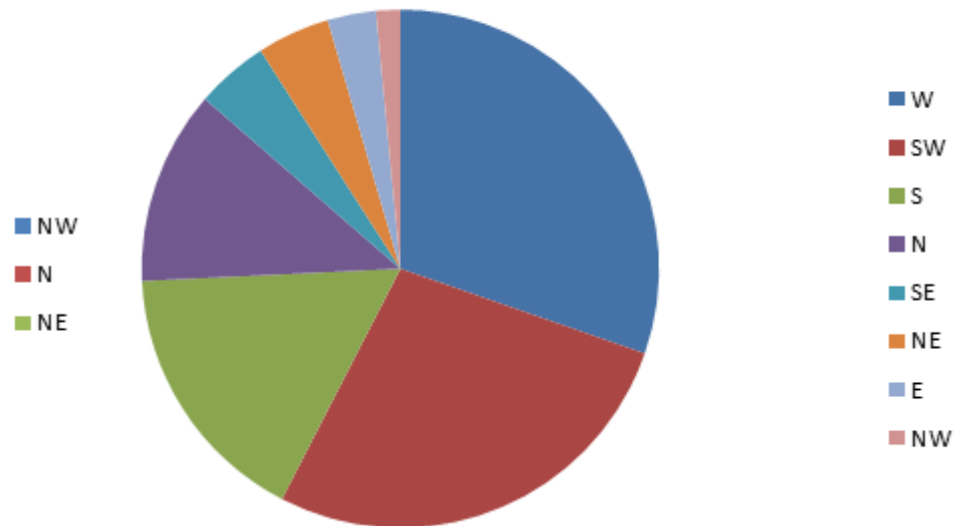
Direction With Respect To Central Point	Number Of Restaurants
SW	31
E	13
W	10
S	9
SE	6
NW	3
NE	2
N	2

# Distribution Pattern Of Central And Tung Chung

Distribution Pattern Of Tung Chung



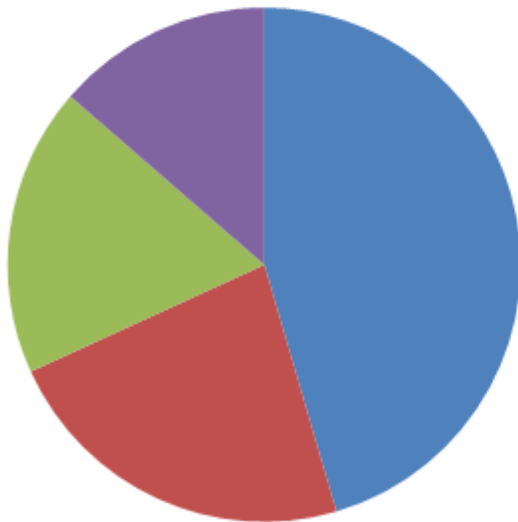
Distribution Pattern In Central





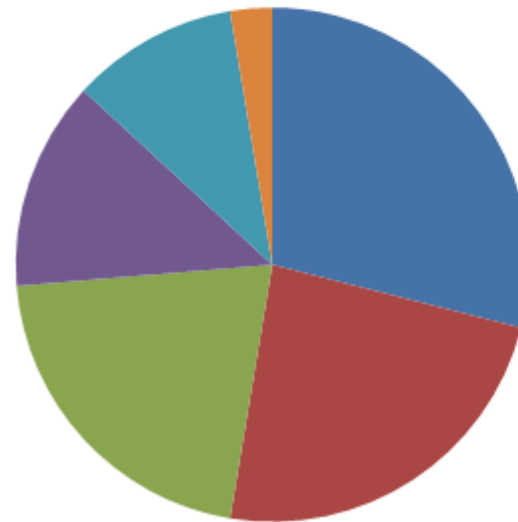
# Distribution Pattern Of Sham Shui Po And Tai Po

Distribution Pattern Of Sham Shui Po



■ NE  
■ E  
■ SE  
■ N

Distribution Pattern Of Tai Po



■ SW  
■ NE  
■ S  
■ NW  
■ N  
■ W

# Low Restaurant Density Areas

- The regions where number of restaurants was less than or equal to the average number of restaurants in that area were considered ‘low density areas’.

Neighborhood	Low Restaurant Density
Hong Kong	W, S, SE, NW, NE, N
Tung Chung	NE
Tai Po	NE, NW, N
Sham Shui Po	E, SE, N
Central	N, SE, NE, E, NW

# Low Residential Density Areas

- The regions where the number of residential units was less than or equal to the average number of residential units in that area were considered 'low density areas'.

Neighborhood	Low Residence Density
Hong Kong	NW, SE, E, NE, W, S
Tung Chung	NE, W, S, SE
Tai Po	NE, N, NW
Sham Shui Po	NW, W, NE, SE
Central	N, SW

# Scenes And Parks

- The best location for opening up a restaurant is usually near some scenic spot or park.
- The respective regions of such spots were also identified.

Neighborhood	Scenes or Parks
Hong Kong	NE, NW, SW, SE
Tung Chung	N
Tai Po	NW
Sham Shui Po	W, S, SE
Central	N, SE, NE, E

# Optimum Regions

The optimum location area should have:

- Less number of restaurants especially, vegetarian ones.
- Away from dense populated residential areas.
- Near some scenic spot.

The regions which were common in any two of the above three aspects are considered optimum regions.

# Optimum Regions

- Separate optimum regions have been defined for each neighborhood
- Each region meets at least two of the three essential requirements
- About 50 restaurants in optimum regions of all the neighborhoods combined
- Only one vegetarian restaurant in vicinity, in Hong Kong neighborhood

# Optimum Regions

Neighborhood	Low Restaurant Density	Low Residence	Scenes/Parks	Optimum Regions
Hong Kong	W, S, SE, NW, NE, N	NW, SE, E, NE, W, S	NE, NW, SW, SE	SE, NW, NE, W, S
Tung Chung	NE	NE, W, S, SE	N	NE
Tai Po	NE, NW, N	NE, N, NW	NW	NE, N, NW
Sham Shui Po	E, SE, N	NW, W, NE, SE	W, S, SE	W, SE
Central	N, SE, NE, E, NW	N, SW	N, SE, NE, E	N, E, NE, SE

# Optimum Regions

Neighborhood	Optimum Regions	Restaurants in Optimum Regions	Vegetarian Restaurants in Optimum Regions
Hong Kong	SE, NW, NE, W, S	25	1
Tung Chung	NE	3	0
Tai Po	NE, N, NW	7	0
Sham Shui Po	W, SE	4	0
Central	N, E, NE, SE	12	0



# k-means Clustering

- Unsupervised learning algorithm
- Groups out data based on similarity.
- Divides data into  $k$  non-overlapping subsets.
- Points within cluster are similar to each other.
- Points across different clusters are different.

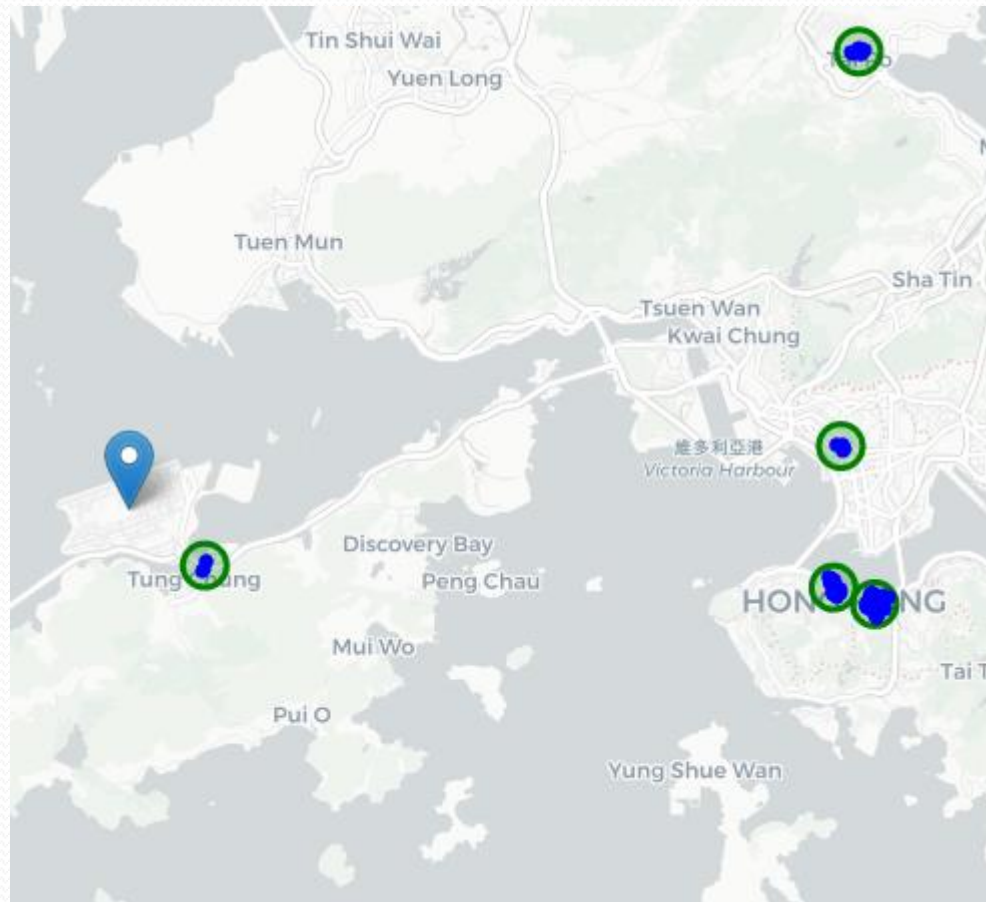
# k-means Clustering

- Venue locations from the optimum regions were clustered
- Over 100 venue locations
- Five clusters
- Each cluster represents each neighborhood
- Larger number of clusters could have caused overlapping

# Results

- Five clusters were created
- Each represents each neighborhood
- Geographical coordinates of cluster centroids were obtained
- Addresses of those centroids were obtained through reverse geocoding

# Map Showing Clusters Created



# Results

Neighborhood	Center Latitude	Center Longitude	Address
Tung Chung	22.28976767	113.94332793	North Lantau Highway, Hong Kong Island Tung Chung
Central	22.28332206	114.15918593	1 Connaught Place, Central & Western District, Hong Kong Island
Tai Po	22.45266454	114.16960888	On Po Road, Hong Kong Island Tai Po District
Hong Kong	22.27802033	114.1732967	Hong Kong Island Wan Chai District, Wan Chai District, Wan Chai, Hong Kong Island Hong Kong Island Hong Kong
Sham Shui Po	22.32812909	114.16167531	259 Tai Nan Street, Sham Shui Po District

# Conclusion

Initially, we defined low density restaurant regions, low density residential regions and scenic spots of top five competitive neighborhoods of Hong Kong. Then, we defined optimum regions where at least two of the above regions were in common. Finally, we created clusters from the venue locations of these regions and generated addresses of the centroid points from where exploration work for restaurant should begin.

# Future Possibilities

The results can further improved if:

- Data regarding price of land or rent prices can be collected
- If some area where vegetarian population or immigrants reside is known
- Cultural or historical landmarks and other important venues are analysed too



**THANK YOU**