Capstone Project

Choosing new studio locations for AT20

Introduction

Background:

AT20 is a fitness studio group in mainland China specialized in Electrical Muscle Stimulation (EMS) training. AT20 claims that the new training method leads to seriously impressive results in short periods of time. People could reap the benefits of a comparable hour-long workout in less than 20 minutes or less. Focused customers of AT20 are busy office workers who work long hours and don't have the luxury for long hour physical exercise. According to experience, AT20 studio is ideally located **near subway station**.

Introduction

Requirements:

Management of AT20 plans to set up shops in Hong Kong that could meet the following criteria:

1. within 1.5km from major MTR stations (subway of Hong Kong)

2. Locate in neighborhood that the number of fitness centers are not saturated (less competition)

Target audience:

- Management of AT20 who have to decide the locations of their new studios in Hong Kong

- People who are interested in setting up fitness centers/Gym business in Hong Kong.

Data

- List of MTR stations in Hong Kong - this could be obtained from wikipedia (https://en.wikipedia.org/wiki/List_of_MTR_stations)
- Numbers of fitness centers/Gym within 1.5km radius in each MTR stations - via API query of foursquare.com
- Population density of districts where each MTR stations are located - obtain from wikipedia (https://en.wikipedia.org/wiki/Districts_of_Hong_Kong)

Methodology

A. Grouping of MTR stations:

step 1:
Find out different type of venues in the vicinity of each MTR stations via foursquare API queries

step 2:
using the finding in step 1 to categories (using "k-means clustering") all the MTR stations into 5 groups.

step 3:
examine each of the 5 MTR station groups from step 2 and assign to each of them a meaning label

Methodology

B. Determine how "crowded" is the gym/fitness center market in the neighbor of all the MTR stations:

- the area of a circle of 1.5 Km radius = 3.1415 (pi) x 1.5 x 1.5 = 7.068 sq, Km.
- The number of populations in a 7.068 sq. Km circle with MTR station as its center is estimated by 7.068 x population density (number of people/sq. Km)

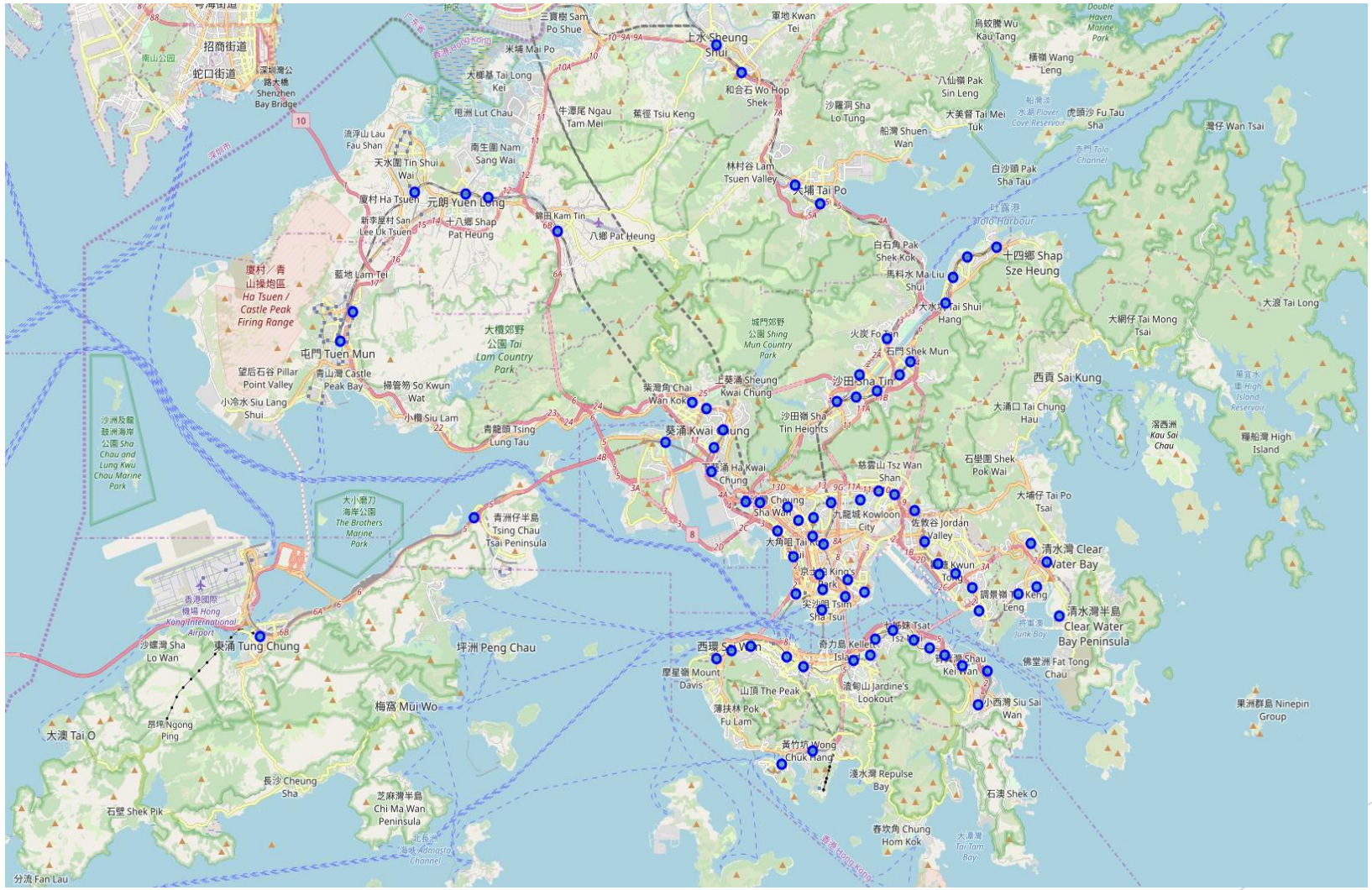
number of people per gym/fitness center is calculated by (7.068 x population density)/ number of gym/fitness centers:

step 1: calculate number of people per gym/fitness center by using above formula.

step 2: list the top 3 MTR station with the highest number of people per gym/fitness center in each group, and this would be our recommendation of new AT20 studio.

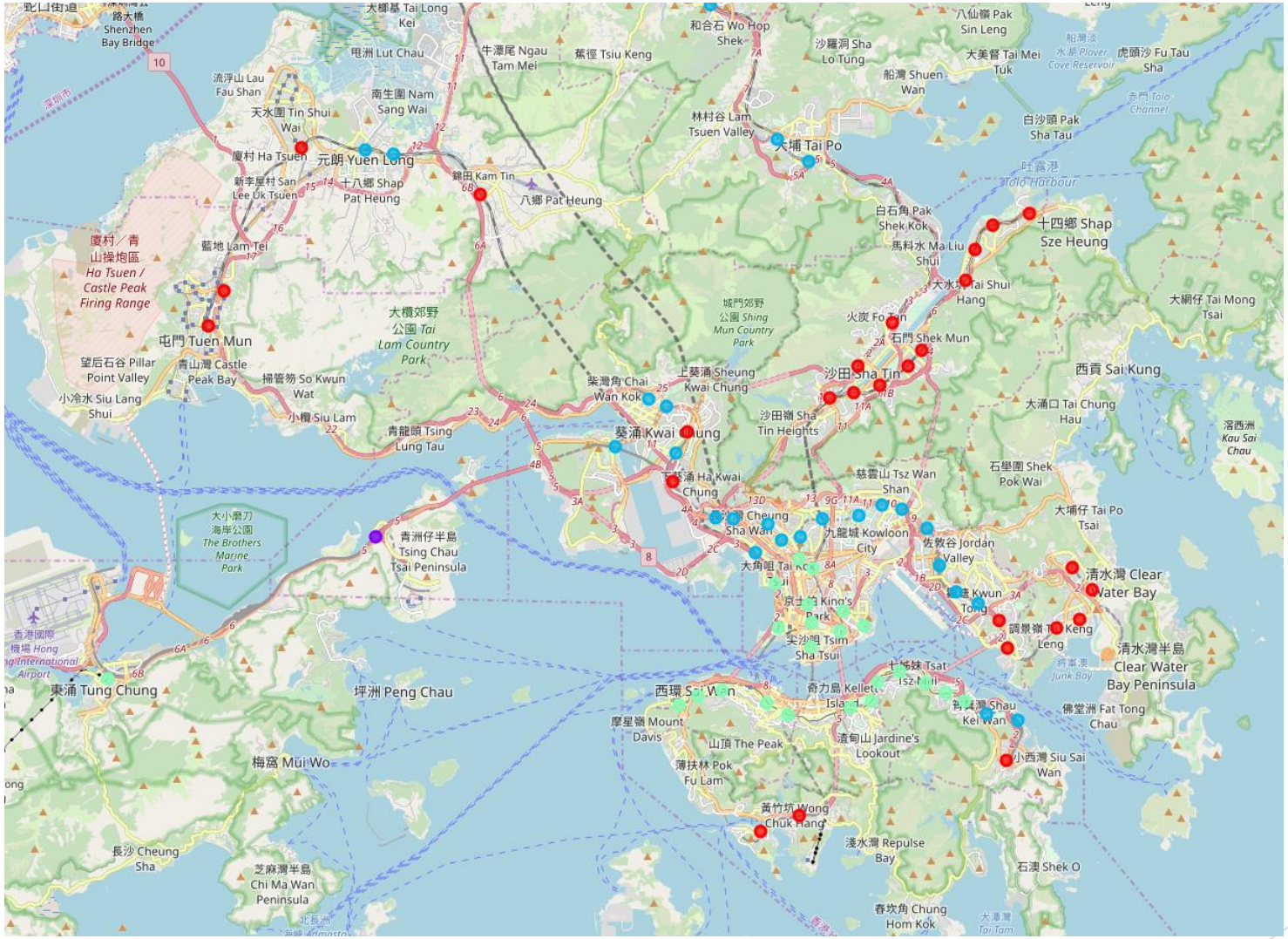
Findings

Locations of all MTR Stations:



Findings

API queries to the explore endpoint of foursquare.com were conducted to obtain common venues with 1.5Km radius of each of the MTR station. This information was then used to cluster the MTR stations via k-mean clustering method.



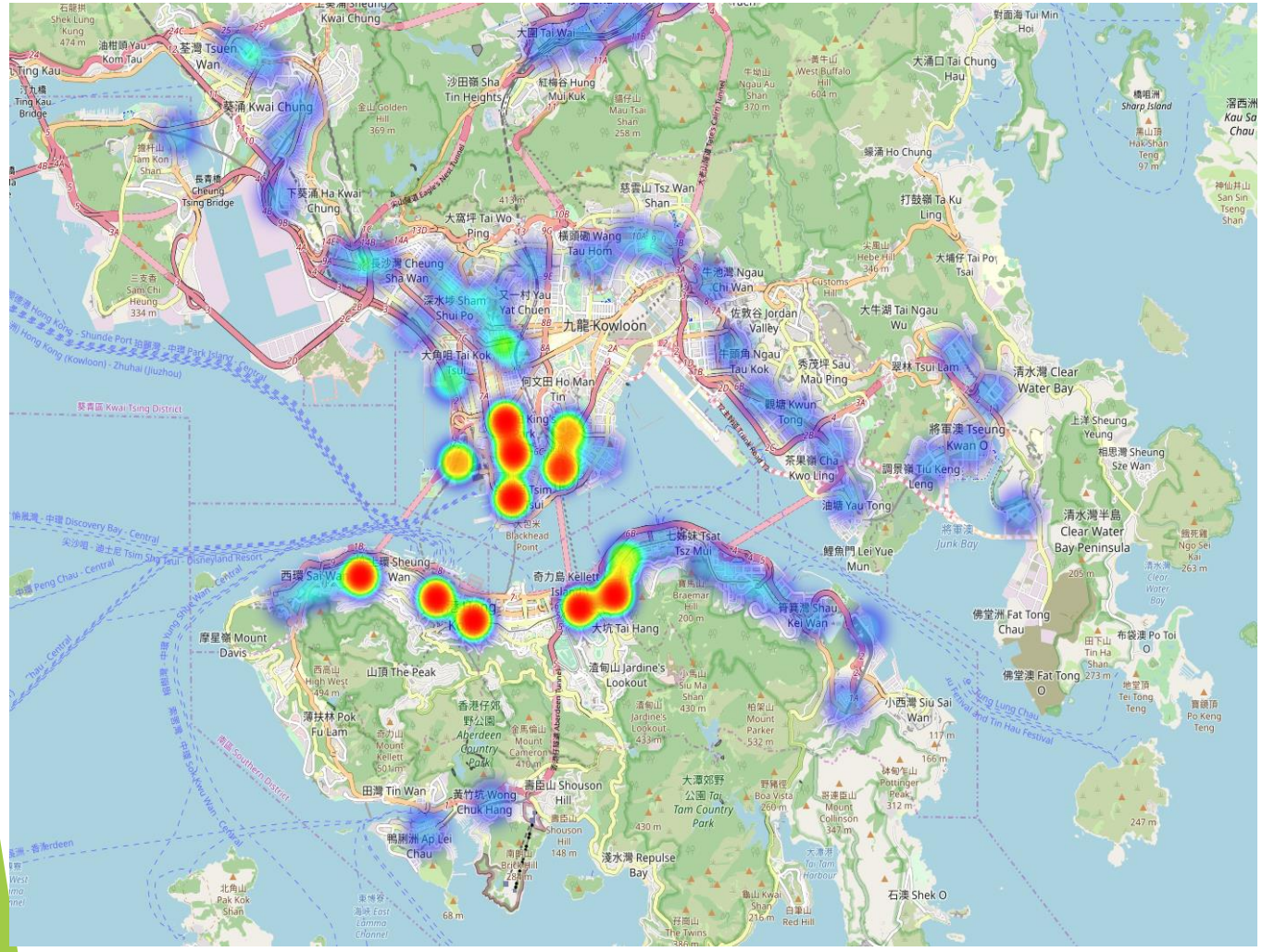
Findings

MTR Stations were categorized into 3 groups using k-mean clustering based on venues categories from foursquare API queries

Group: New Development Area	Group: Traditional Residential Area	Group: High Value Central Area
MTR Chai Wan station	MTR Cheung Sha Wan station	MTR Admiralty station
MTR Che Kung Temple station	MTR Choi Hung station	MTR Causeway Bay station
MTR City One station	MTR Diamond Hill station	MTR Central station
MTR Fo Tan station	MTR Fanling station	MTR Fortress Hill station
MTR Hang Hau station	MTR Heng Fa Chuen station	MTR HKU station
MTR Heng On station	MTR Kowloon Bay station	MTR Ho Man Tin station
MTR Kam Sheung Road station	MTR Kowloon Tong station	MTR Hung Hom station
MTR Kwai Hing station	MTR Kwai Fong station	MTR Jordan station
MTR Lai King station	MTR Kwun Tong station	MTR Kennedy Town station
MTR Lam Tin station	MTR Lai Chi Kok station	MTR Kowloon station
MTR Lei Tung station	MTR Lok Fu station	MTR Mong Kok station
MTR Ma On Shan station	MTR Long Ping station	MTR North Point station
MTR Po Lam station	MTR Mei Foo station	MTR Olympic station
MTR Sha Tin station	MTR Nam Cheong station	MTR Prince Edward station
MTR Sha Tin Wai station	MTR Ngau Tau Kok station	MTR Quarry Bay station
MTR Shek Mun station	MTR Sham Shui Po station	MTR Sai Wan Ho station
MTR Sheung Shui station	MTR Shau Kei Wan station	MTR Sai Ying Pun station
MTR Siu Hong station	MTR Shek Kip Mei station	MTR Tai Koo station
MTR Tai Shui Hang station	MTR Tai Po Market station	MTR Tin Hau station
MTR Tai Wai station	MTR Tai Wo Hau station	MTR Tsim Sha Tsui station
MTR Tin Shui Wai station	MTR Tai Wo station	MTR Tung Chung station
MTR Tiu Keng Leng station	MTR Tsing Yi station	MTR Whampoa station
MTR Tseung Kwan O station	MTR Tsuen Wan station	MTR Yau Ma Tei station
MTR Tuen Mun station	MTR Wong Tai Sin station	
MTR Wong Chuk Hang station	MTR Yuen Long station	
MTR Wu Kai Sha station		
MTR Yau Tong station		

Findings

Next, we obtained the numbers of gym/fitness center within 1.5 Km radius in each MTR station.



	MTR Station	count
0	MTR Admiralty station	84
1	MTR Central station	82
2	MTR Sai Ying Pun station	77
3	MTR Causeway Bay station	58
4	MTR Jordan station	46
5	MTR Tin Hau station	44
6	MTR Yau Ma Tei station	37
7	MTR Tsim Sha Tsui station	36
8	MTR Hung Hom station	31
9	MTR Kowloon station	28

Findings

For each of the stations in these 3 groups we have to determine how "crowded" is the gym/fitness center market in the neighbor of all the MTR stations:

- We define the term "PeoplePerGym" as the number of people serves by 1 gym in a particular MTR station. It is calculated by:
  "Pop_density" (population density) x (1.5km x 1.5km xpi) / "count" (number of gym/fitness center)

- Top 3 MTR stations with the highest 'PeoplePerGym' value in each group is recommended.

Findings

The top 3 MTR stations in group ‘'New Development Area'

	MTRStation	count	District	Pop_density	PeoplePerGym
0	MTR Yau Tong station	1	Kwun Tong	56779.05	401347.454305
1	MTR Chai Wan station	3	Eastern	31217.67	73554.902051
2	MTR Lam Tin station	6	Kwun Tong	56779.05	66891.242384

The top 3 MTR stations in group ‘Traditional Residential Area'

	MTRStation	count	District	Pop_density	PeoplePerGym
0	MTR Cheung Sha Wan station	1	Sham Shui Po	41529.41	293554.101069
1	MTR Shau Kei Wan station	1	Eastern	31217.67	220664.706152
2	MTR Diamond Hill station	3	Wong Tai Sin	45645.16	107548.874496

The top 3 MTR stations in group ‘High Value Central Area’

	MTRStation	count	District	Pop_density	PeoplePerGym
0	MTR Whampoa station	11	Kowloon City	40194.70	25829.053820
1	MTR Mong Kok station	18	Yau Tsim Mong	44864.09	17618.086944
2	MTR Prince Edward station	18	Yau Tsim Mong	44864.09	17618.086944

Conclusion

Our recommendation for the new AT20 studio in ‘New Development Area’ group is:
MTR Yau Tong station, MTR Chai Wan station, MTR Lam Tin station

Our recommendation for the new AT20 studio in ‘Traditional Residential Area’ group is:
MTR Cheung Sha Wan Station, MTR Shau Kei Wan Station, MTR Diamond Hill Station

Our recommendation for the new AT20 studio in ‘High Value Central Area’group is:
MTR Whampoa Station, MTR Mong Kok Station, MTR Prince Edward Station