Capstone Project - The Battle of Neighborhoods

SELECTING THE BEST LOCATION TO OPEN AN FITNESS CENTER IN MANHATTAN, NEW YORK

Introduction/Business Problem

- The City of New York is famous for its health. It's fitness culture includes an array of international techniques influenced by the city's immigrant history.

- Fitness centers have become so popular in the United States now it seems that there is one on every corner, not only in major cities but also in smaller cities. Starting a fitness center can be a great business opportunity, but you need to distinguish yourself from others to enjoy long-term success.

Business Problem

- My client wants to open his business in Manhattan area, so I focus on that borough during my analysis. We define potential neighborhood based on the number of fitness centers which are operating right in each neighborhood. Manhattan has full potential but also is a very challenging district to open a business because of high competition. New fitness center should be open in an area that inadequate neighborhood in this way the center can attract more customers. Therefore, this analysis necessary to ensure that we have enough customers and that we are not so close to other fitness places.

Data Selection

▶ To identify the characteristics of our competitors' venues in Manhattan, we would first need to find out the number of fitness centers in Manhattan currently and their location.

▶ We then used Foursquare Map API to find their geographic coordinates based on their postal code addresses.

▶ In Manhattan, there is 1885 fitness centers are currently operating.

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1  newyork_venues_fitness_centers.shape
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(1885, 7)

Data Selection

▶ Next, we also used Foursquare Map API to find their geographic coordinates of the 5 locations shortlisted for our fitness center:

	Neighborhood	Neighborhood Latitude	Neighborhood Longitude	Venue	Venue Latitude	Venue Longitude	Venue Category
0	Marble Hill	40.876551	-73.91066	Bronx Boxing	40.875671	-73.908355	Boxing Gym
1	Marble Hill	40.876551	-73.91066	24 Hour Fitness	40.880592	-73.908255	Gym / Fitness Center
2	Marble Hill	40.876551	-73.91066	Astral Fitness & Wellness Center	40.876705	-73.906372	Gym
3	Marble Hill	40.876551	-73.91066	Planet Fitness	40.874088	-73.909137	Gym / Fitness Center
4	Marble Hill	40.876551	-73.91066	La Palestra 99	40.873919	-73.917065	Gym

Table 2: Data frame containing geographic coordinates of our 5 shortlisted locations

Methodology

- Addresses are converted into their equivalent latitude and longitude values.

- Foursquare API is used to explore neighborhoods in Manhattan, New York.

- After that, explore function to get fitness center categories in each neighborhood.

Methodology

	Neighborhood	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
0	Battery Park City	Gym	Gym / Fitness Center	Yoga Studio	Boxing Gym	Gym Pool	Cycle Studio	Massage Studio	Corporate Amenity	Doctor's Office	Athletics & Sports
1	Carnegie Hill	Gym / Fitness Center	Gym	Yoga Studio	Boxing Gym	Community Center	Physical Therapist	Pool	Martial Arts Dojo	Cycle Studio	Climbing Gym
2	Central Harlem	Gym	Gym / Fitness Center	Yoga Studio	Climbing Gym	Cycle Studio	Martial Arts Dojo	Pilates Studio	General College & University	Athletics & Sports	Tennis Court
3	Chelsea	Gym / Fitness Center	Cycle Studio	Gym	Yoga Studio	Boxing Gym	Martial Arts Dojo	Recreation Center	Physical Therapist	Building	Dog Run
4	Chinatown	Gym / Fitness Center	Gym	Yoga Studio	Boxing Gym	Pilates Studio	Cycle Studio	Athletics & Sports	Martial Arts Dojo	Office	Spiritual Center

Methodology
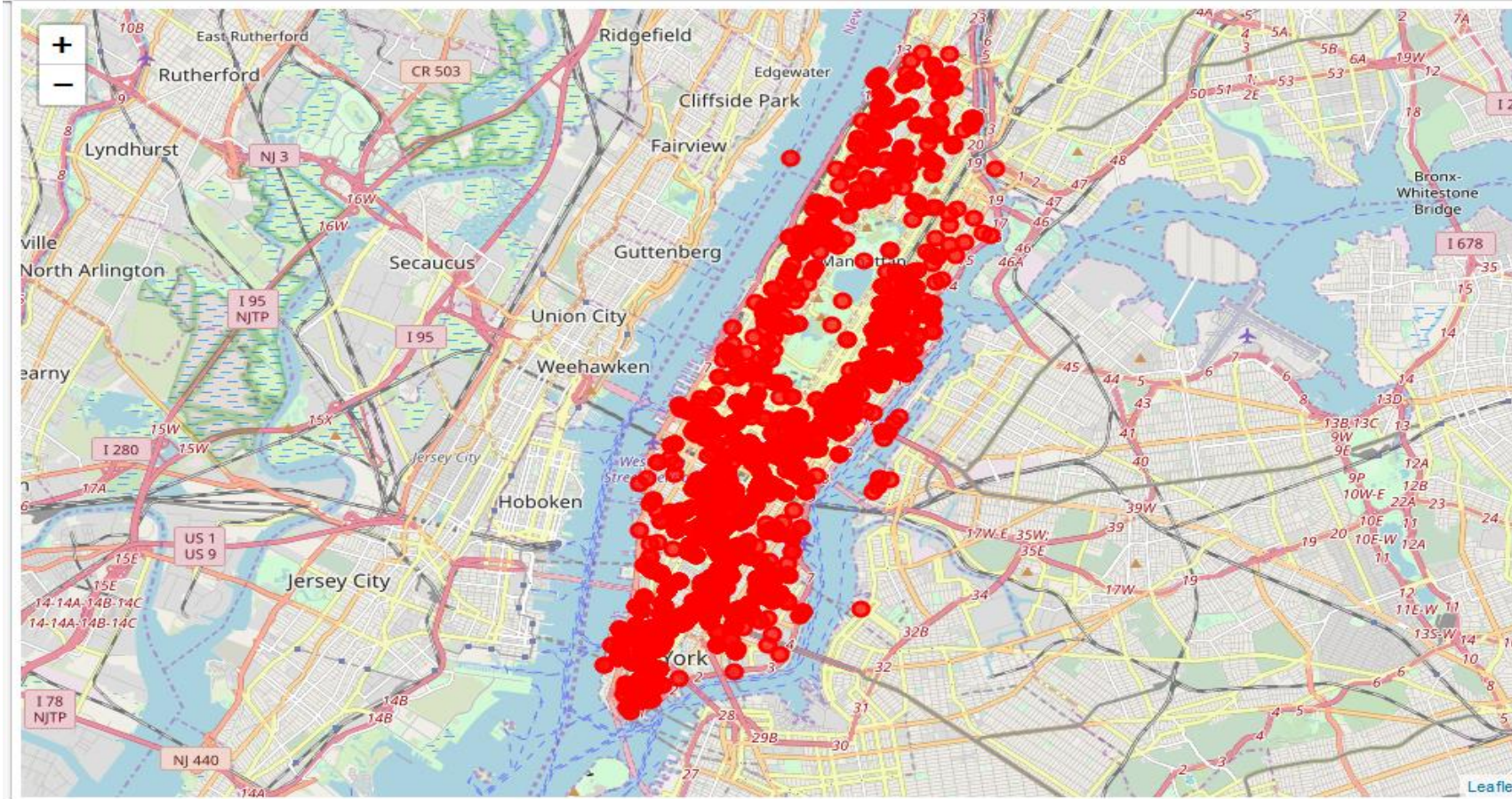
fitness centers in Manhattan

Methodology

▶ Then using this feature to group the neighborhoods into clusters K-means clustering algorithm will be use to complete this task. And also, the Folium library to visualize the neighborhoods in Manhattan and its emerging clusters.

	Borough	Neighborhood	Latitude	Longitude	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	Cor
0	Manhattan	Marble Hill	40.876551	-73.910660	1	Gym	Gym / Fitness Center	Yoga Studio	Pilates Studio	Martial Arts Dojo	Weight Loss Center	Tennis Stadium	Boxing Gym	Doctor's Office	
1	Manhattan	Chinatown	40.715618	-73.994279	4	Gym / Fitness Center	Gym	Yoga Studio	Boxing Gym	Pilates Studio	Cycle Studio	Athletics & Sports	Martial Arts Dojo	Office	S
2	Manhattan	Washington Heights	40.851903	-73.936900	3	Gym	Gym / Fitness Center	Yoga Studio	Pilates Studio	Dance Studio	Gymnastics Gym	Gym Pool	General College & University	Dog Run	D
3	Manhattan	Inwood	40.867684	-73.921210	1	Gym	Gym / Fitness Center	Yoga Studio	Pilates Studio	Dance Studio	Gymnastics Gym	Gym Pool	General College & University	Dog Run	D
4	Manhattan	Hamilton Heights	40.823604	-73.949688	2	Gym / Fitness Center	Gym	Yoga Studio	Martial Arts Dojo	Cycle Studio	Track	Basketball Court	State / Provincial Park	Climbing Gym	D

Results

- Using K-mean to clustering data area with less number of fitness centers
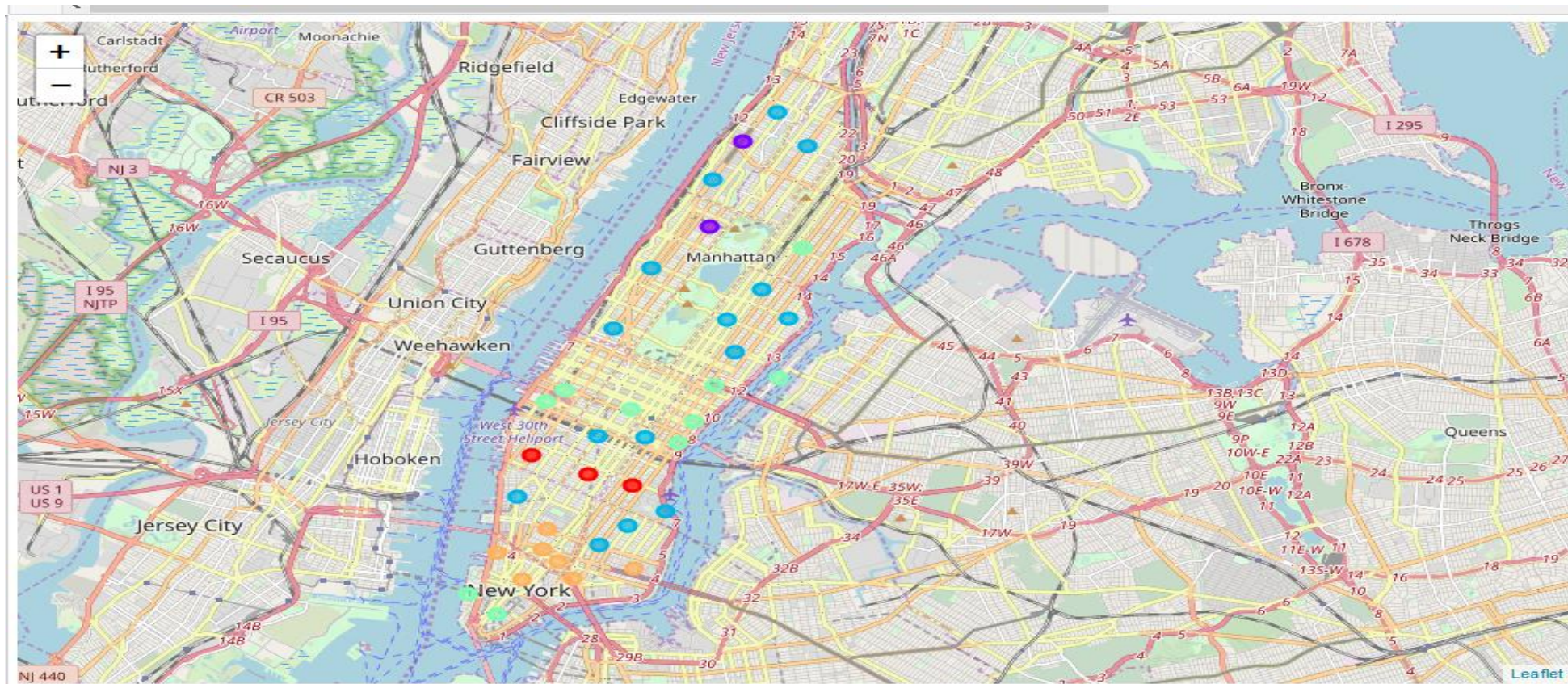
Cluster 0

	Neighborhood	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
17	Chelsea	Gym / Fitness Center	Cycle Studio	Gym	Yoga Studio	Boxing Gym	Martial Arts Dojo	Recreation Center	Physical Therapist	Building	Dog Run
27	Gramercy	Gym / Fitness Center	Gym	Cycle Studio	Yoga Studio	Martial Arts Dojo	Boxing Gym	Pilates Studio	Dog Run	Gymnastics Gym	Gym Pool
38	Flatiron	Gym / Fitness Center	Gym	Cycle Studio	Yoga Studio	Martial Arts Dojo	Boxing Gym	Pilates Studio	Dog Run	Gymnastics Gym	Gym Pool

Result

Cluster 1

	Neighborhood	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
0	Marble Hill	Gym	Gym / Fitness Center	Yoga Studio	Pilates Studio	Martial Arts Dojo	Weight Loss Center	Tennis Stadium	Boxing Gym	Doctor's Office	Gym Pool
3	Inwood	Gym	Gym / Fitness Center	Yoga Studio	Pilates Studio	Dance Studio	Gymnastics Gym	Gym Pool	General College & University	Dog Run	Doctor's Office
5	Manhattanville	Gym	Gym / Fitness Center	Yoga Studio	Pilates Studio	Basketball Court	Climbing Gym	Cycle Studio	Gym Pool	Martial Arts Dojo	Park
25	Manhattan Valley	Gym	Gym / Fitness Center	Yoga Studio	Martial Arts Dojo	Track	Gym Pool	Playground	Cycle Studio	Dance Studio	General College & University

Result

- ## Cluster 2

	Neighborhood	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
4	Hamilton Heights	Gym / Fitness Center	Gym	Yoga Studio	Martial Arts Dojo	Cycle Studio	Track	Basketball Court	State / Provincial Park	Climbing Gym	Doctor's Office
6	Central Harlem	Gym	Gym / Fitness Center	Yoga Studio	Climbing Gym	Cycle Studio	Martial Arts Dojo	Pilates Studio	General College & University	Athletics & Sports	Tennis Court
8	Upper East Side	Gym / Fitness Center	Gym	Yoga Studio	Cycle Studio	Building	Martial Arts Dojo	Club House	Spa	School	Track
9	Yorkville	Gym / Fitness Center	Gym	Yoga Studio	School	Physical Therapist	Pilates Studio	Cycle Studio	Pool	Martial Arts Dojo	Community Center
10	Lenox Hill	Gym / Fitness Center	Gym	Cycle Studio	Yoga Studio	Tennis Court	School	Non-Profit	Physical Therapist	Pilates Studio	Boxing Gym
12	Upper West Side	Gym / Fitness Center	Gym	Yoga Studio	Pilates Studio	Cycle Studio	Martial Arts Dojo	Track	Playground	Massage Studio	Weight Loss Center
13	Lincoln Square	Gym / Fitness Center	Gym	Yoga Studio	Cycle Studio	Pilates Studio	Climbing Gym	Cultural Center	Dog Run	Gym Pool	Massage Studio
16	Murray Hill	Gym / Fitness Center	Gym	Cycle Studio	Yoga Studio	Boxing Gym	Building	Climbing Gym	Club House	Community Center	Corporate Amenity
19	East Village	Gym / Fitness Center	Gym	Yoga Studio	Pilates Studio	Cycle Studio	Boxing Gym	Track	Pool	Building	Gym Pool
24	West Village	Gym / Fitness Center	Gym	Yoga Studio	Cycle Studio	Pilates Studio	Track	Physical Therapist	Pool	Boxing Gym	Basketball Court

Result

Cluster 3

	Neighborhood	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
2	Washington Heights	Gym	Gym / Fitness Center	Yoga Studio	Pilates Studio	Dance Studio	Gymnastics Gym	Gym Pool	General College & University	Dog Run	Doctor's Office
7	East Harlem	Gym	Gym / Fitness Center	Yoga Studio	Martial Arts Dojo	Weight Loss Center	Boxing Gym	Building	Climbing Gym	Track	Club House
11	Roosevelt Island	Gym	Gym / Fitness Center	Yoga Studio	Pilates Studio	School	Non-Profit	Dance Studio	Gym Pool	Martial Arts Dojo	Club House
14	Clinton	Gym	Gym / Fitness Center	Yoga Studio	Cycle Studio	Residential Building (Apartment / Condo)	Boxing Gym	Building	Medical Center	Track	Tennis Court
15	Midtown	Gym / Fitness Center	Gym	Cycle Studio	Yoga Studio	Boxing Gym	Building	Climbing Gym	Club House	Community Center	Corporate Amenity
28	Battery Park City	Gym	Gym / Fitness Center	Yoga Studio	Boxing Gym	Gym Pool	Cycle Studio	Massage Studio	Corporate Amenity	Doctor's Office	Athletics & Sports
29	Financial District	Gym	Gym / Fitness Center	Boxing Gym	Yoga Studio	Cycle Studio	Gym Pool	Massage Studio	Corporate Amenity	Doctor's Office	Martial Arts Dojo

Result

Cluster 4

	Neighborhood	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
1	Chinatown	Gym / Fitness Center	Gym	Yoga Studio	Boxing Gym	Pilates Studio	Cycle Studio	Athletics & Sports	Martial Arts Dojo	Office	Spiritual Center
18	Greenwich Village	Gym / Fitness Center	Gym	Yoga Studio	Cycle Studio	Pilates Studio	Boxing Gym	Pool	Office	Gym Pool	General College & University
20	Lower East Side	Gym / Fitness Center	Gym	Yoga Studio	Pilates Studio	Boxing Gym	Outdoor Gym	Pool	Community Center	Athletics & Sports	Track
21	Tribeca	Gym	Gym / Fitness Center	Yoga Studio	Cycle Studio	Boxing Gym	Pilates Studio	Gym Pool	Athletics & Sports	Pool	Office
22	Little Italy	Gym / Fitness Center	Gym	Yoga Studio	Cycle Studio	Pilates Studio	Boxing Gym	Athletics & Sports	Office	Spiritual Center	Cultural Center
23	Soho	Gym	Gym / Fitness Center	Yoga Studio	Pilates Studio	Boxing Gym	Cycle Studio	Athletics & Sports	Gym Pool	Pool	Office
32	Civic Center	Gym	Gym / Fitness Center	Yoga Studio	Cycle Studio	Boxing Gym	Gym Pool	Athletics & Sports	Pilates Studio	Office	Spiritual Center

Result

Result

Based on dataframe analysis above Cluster 0 (Chelsea) and Cluster 1 (Marble Hill) areas are the best places to open a new fitness center business.

Discussion

▶ This analysis is performed on limited data. This may be right or may be wrong. But if good amount of data is available there is scope to come up with better results.

▶ There is high competition in Hamilton Heights and Washington Heights so it is very risky to open business in these areas.

▶ East Harlem has also potential where closes to Washington Heights area.

▶ It can be done more detailed analysis by adding other factors such as transportation, demographics of inhabitants.

Conclusion

▶ Although all of the goals of this project were met there is definitely room for further improvement and development as noted below. However, the goals of the project were met and, with some more work, could easily be developed into a fully pledged application that could support the opening a business idea in an unknown location.