Capstone final project

Opening a Thai restaurant in Manhattan, New York

Context and business problem

- The City of New York, usually called either New York City (NYC) or simply New York (NY), is the most populous city in the United States. With an estimated 2018 population of 8,398,748 distributed over a land area of about 302.6 square miles (784 km2), New York is also the most densely populated major city in the United States.

- My client wants to open a new Thai restaurant chain in Manhattan area, so I only focus on that borough during my analysis. The objective is to locate and recommend to the management which neighborhood of New york city will be best choice to start a restaurant. The Management also expects to understand the rationale of the recommendations made.

Data Selection

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

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

- In Manhattan, there is 1763 sushi bars are currently operating.

```
newyork_venues_thai.shape

(1000, 7)
```
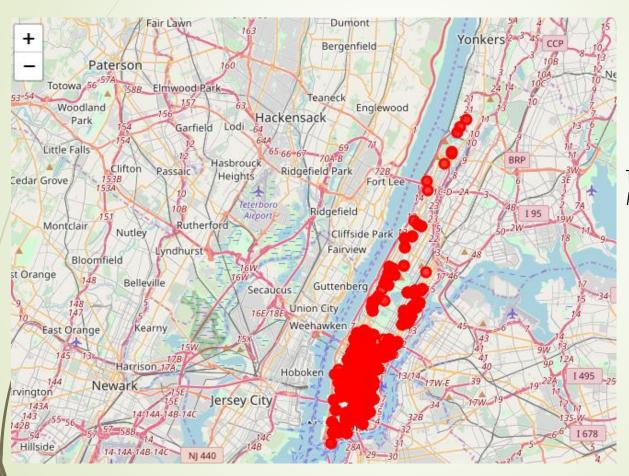
Data Selection

- Next, we also used Google Map API to find their geographic coordinates of the 5 locations shortlisted for the Thai restaurants:

	Neighborhood	Neighborhood Latitude	Neighborhood Longitude	Venue	Venue Latitude	Venue Longitude	Venue Category
0	Marble Hill	40.876551	-73.910660	Siam Square	40.878796	-73.916701	Thai Restaurant
1	Marble Hill	40.876551	-73.910660	Holy Basil	40.881678	-73.914376	Thai Restaurant
2	Marble Hill	40.876551	-73.910660	Nam Thai	40.886211	-73.909991	Thai Restaurant
3	Chinatown	40.715618	-73.994279	Noree Thai Bazaar	40.717900	-73.992966	Thai Restaurant
4	Chinatown	40.715618	-73.994279	Khao Man Gai NY	40.715514	-73.989680	Thai Restaurant

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 Thai restaurants categories in each neighborhood.

Methodology

	Neighborhood	Asian Restaurant	Chinese Restaurant	Food Truck	Indian Restaurant	Japanese Restaurant	Malay Restaurant	Ramen Restaurant	Sushi Restaurant	Thai Restaurant	Vietnamese Restaurant	Wine Bar
0	Marble Hill	0	0	0	0	0	0	0	0	1	0	0
1	Marble Hill	0	0	0	0	0	0	0	0	1	0	0
2	Marble Hill	0	0	0	0	0	0	0	0	1	0	0
3	Chinatown	0	0	0	0	0	0	0	0	1	0	0
4	Chinatown	0	0	0	0	0	0	0	0	1	0	0

Methodology

Thai restaurants 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.

	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	Thai Restaurant	Japanese Restaurant	Wine Bar	Vietnamese Restaurant	Sushi Restaurant	Ramen Restaurant	Malay Restaurant	Indian Restaurant	Food Truck	Chinese Restaurant
1	Carnegie Hill	Thai Restaurant	Asian Restaurant	Wine Bar	Vietnamese Restaurant	Sushi Restaurant	Ramen Restaurant	Malay Restaurant	Japanese Restaurant	Indian Restaurant	Food Truck
2	Central Harlem	Thai Restaurant	Wine Bar	Vietnamese Restaurant	Sushi Restaurant	Ramen Restaurant	Malay Restaurant	Japanese Restaurant	Indian Restaurant	Food Truck	Chinese Restaurant
3	Chelsea	Thai Restaurant	Malay Restaurant	Japanese Restaurant	Food Truck	Chinese Restaurant	Wine Bar	Vietnamese Restaurant	Sushi Restaurant	Ramen Restaurant	Indian Restaurant
4	Chinatown	Thai Restaurant	Asian Restaurant	Vietnamese Restaurant	Sushi Restaurant	Malay Restaurant	Wine Bar	Ramen Restaurant	Japanese Restaurant	Indian Restaurant	Food Truck

Results

- Using K-mean to clustering data area with less number of sushi bars

Cluster 0

```
manhattan_merged.loc[manhattan_merged['Cluster Labels'] == 0, manhattan_merged.columns[[1] + list(range(5, manhattan_merged
```

	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
13	Lincoln Square	Thai Restaurant	Ramen Restaurant	Food Truck	Asian Restaurant	Wine Bar	Vietnamese Restaurant	Sushi Restaurant	Malay Restaurant	Japanese Restaurant	Indian Restaurant
14	Clinton	Thai Restaurant	Ramen Restaurant	Food Truck	Asian Restaurant	Chinese Restaurant	Wine Bar	Vietnamese Restaurant	Sushi Restaurant	Malay Restaurant	Japanese Restaurant
15	Midtown	Thai Restaurant	Food Truck	Asian Restaurant	Wine Bar	Vietnamese Restaurant	Sushi Restaurant	Ramen Restaurant	Malay Restaurant	Japanese Restaurant	Indian Restaurant
16	Murray Hill	Thai Restaurant	Food Truck	Asian Restaurant	Wine Bar	Vietnamese Restaurant	Sushi Restaurant	Ramen Restaurant	Malay Restaurant	Japanese Restaurant	Indian Restaurant
17	Chelsea	Thai Restaurant	Malay Restaurant	Japanese Restaurant	Food Truck	Chinese Restaurant	Wine Bar	Vietnamese Restaurant	Sushi Restaurant	Ramen Restaurant	Indian Restaurant
27	Gramercy	Thai Restaurant	Food Truck	Chinese Restaurant	Malay Restaurant	Japanese Restaurant	Asian Restaurant	Wine Bar	Vietnamese Restaurant	Sushi Restaurant	Ramen Restaurant
33	Midtown South	Thai Restaurant	Food Truck	Japanese Restaurant	Chinese Restaurant	Asian Restaurant	Wine Bar	Vietnamese Restaurant	Sushi Restaurant	Ramen Restaurant	Malay Restaurant
34	Sutton Place	Thai Restaurant	Food Truck	Chinese Restaurant	Wine Bar	Vietnamese Restaurant	Sushi Restaurant	Ramen Restaurant	Malay Restaurant	Japanese Restaurant	Indian Restaurant

Result

Cluster 1

```
manhattan_merged.loc[manhattan_merged['Cluster Labels'] == 1, manhattan_merged.columns[[1] + list(range(5, manhattan_merged
```

	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
8	Upper East Side	Thai Restaurant	Asian Restaurant	Wine Bar	Vietnamese Restaurant	Sushi Restaurant	Ramen Restaurant	Malay Restaurant	Japanese Restaurant	Indian Restaurant	Food Truck
9	Yorkville	Thai Restaurant	Asian Restaurant	Wine Bar	Vietnamese Restaurant	Sushi Restaurant	Ramen Restaurant	Malay Restaurant	Japanese Restaurant	Indian Restaurant	Food Truck
10	Lenox Hill	Thai Restaurant	Food Truck	Wine Bar	Vietnamese Restaurant	Sushi Restaurant	Ramen Restaurant	Malay Restaurant	Japanese Restaurant	Indian Restaurant	Chinese Restaurant
12	Upper West Side	Thai Restaurant	Asian Restaurant	Wine Bar	Vietnamese Restaurant	Sushi Restaurant	Ramen Restaurant	Malay Restaurant	Japanese Restaurant	Indian Restaurant	Food Truck
18	Greenwich Village	Thai Restaurant	Asian Restaurant	Sushi Restaurant	Chinese Restaurant	Wine Bar	Vietnamese Restaurant	Ramen Restaurant	Malay Restaurant	Japanese Restaurant	Indian Restaurant
21	Tribeca	Thai Restaurant	Asian Restaurant	Wine Bar	Vietnamese Restaurant	Sushi Restaurant	Ramen Restaurant	Malay Restaurant	Japanese Restaurant	Indian Restaurant	Food Truck
24	West Village	Thai Restaurant	Chinese Restaurant	Wine Bar	Vietnamese Restaurant	Sushi Restaurant	Ramen Restaurant	Malay Restaurant	Japanese Restaurant	Indian Restaurant	Food Truck
26	Morningside Heights	Thai Restaurant	Indian Restaurant	Wine Bar	Vietnamese Restaurant	Sushi Restaurant	Ramen Restaurant	Malay Restaurant	Japanese Restaurant	Food Truck	Chinese Restaurant

Result

- **Cluster 2**

```
manhattan_merged.loc[manhattan_merged['Cluster Labels'] == 2, manhattan_merged.columns[[1] + list(range(5, manhattan_merged
```

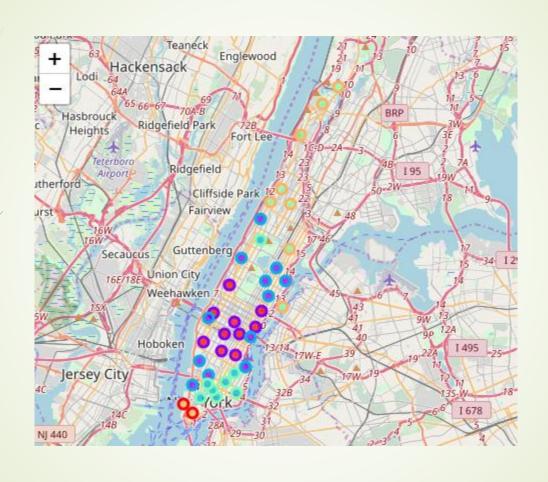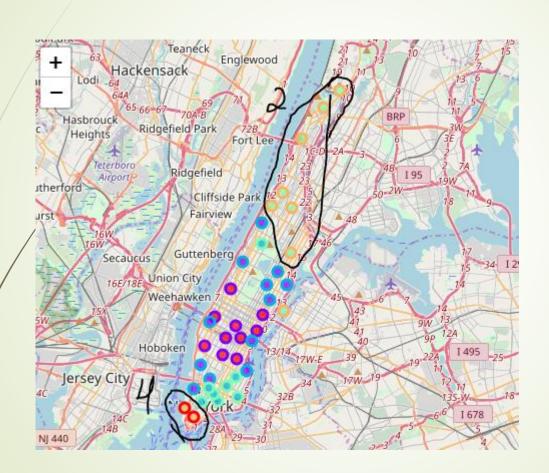|	Neighborhood	1st Most Common Venue	2nd Most Common Venue	3rd Most Common Venue	4th Most Common Venue	5th Most Common Venue	6th Most Common Venue	7th Most Common Venue	8th Most Common Venue	9th Most Common Venue	10th Most Common Venue
1	Chinatown	Thai Restaurant	Asian Restaurant	Vietnamese Restaurant	Sushi Restaurant	Malay Restaurant	Wine Bar	Ramen Restaurant	Japanese Restaurant	Indian Restaurant	Food Truck
19	East Village	Thai Restaurant	Sushi Restaurant	Chinese Restaurant	Asian Restaurant	Wine Bar	Vietnamese Restaurant	Food Truck	Ramen Restaurant	Malay Restaurant	Japanese Restaurant
20	Lower East Side	Thai Restaurant	Asian Restaurant	Wine Bar	Vietnamese Restaurant	Sushi Restaurant	Ramen Restaurant	Malay Restaurant	Japanese Restaurant	Indian Restaurant	Food Truck
22	Little Italy	Thai Restaurant	Asian Restaurant	Vietnamese Restaurant	Sushi Restaurant	Malay Restaurant	Wine Bar	Ramen Restaurant	Japanese Restaurant	Indian Restaurant	Food Truck
23	Soho	Thai Restaurant	Asian Restaurant	Sushi Restaurant	Malay Restaurant	Wine Bar	Vietnamese Restaurant	Ramen Restaurant	Japanese Restaurant	Indian Restaurant	Food Truck
25	Manhattan Valley	Thai Restaurant	Indian Restaurant	Asian Restaurant	Wine Bar	Vietnamese Restaurant	Sushi Restaurant	Ramen Restaurant	Malay Restaurant	Japanese Restaurant	Food Truck
31	Noho	Thai Restaurant	Asian Restaurant	Wine Bar	Vietnamese Restaurant	Sushi Restaurant	Chinese Restaurant	Ramen Restaurant	Malay Restaurant	Japanese Restaurant	Indian Restaurant
32	Civic Center	Thai Restaurant	Malay Restaurant	Japanese Restaurant	Asian Restaurant	Wine Bar	Vietnamese Restaurant	Sushi Restaurant	Ramen Restaurant	Indian Restaurant	Food Truck

Result

Cluster 3

```
manhattan_merged.loc[manhattan_merged['Cluster Labels'] == 3, manhattan_merged.columns[[1] + list(range(5, manhattan_merged
```

	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	Thai Restaurant	Wine Bar	Vietnamese Restaurant	Sushi Restaurant	Ramen Restaurant	Malay Restaurant	Japanese Restaurant	Indian Restaurant	Food Truck	Chinese Restaurant
2	Washington Heights	Thai Restaurant	Wine Bar	Vietnamese Restaurant	Sushi Restaurant	Ramen Restaurant	Malay Restaurant	Japanese Restaurant	Indian Restaurant	Food Truck	Chinese Restaurant
3	Inwood	Thai Restaurant	Wine Bar	Vietnamese Restaurant	Sushi Restaurant	Ramen Restaurant	Malay Restaurant	Japanese Restaurant	Indian Restaurant	Food Truck	Chinese Restaurant
4	Hamilton Heights	Thai Restaurant	Wine Bar	Vietnamese Restaurant	Sushi Restaurant	Ramen Restaurant	Malay Restaurant	Japanese Restaurant	Indian Restaurant	Food Truck	Chinese Restaurant
5	Manhattanville	Thai Restaurant	Wine Bar	Vietnamese Restaurant	Sushi Restaurant	Ramen Restaurant	Malay Restaurant	Japanese Restaurant	Indian Restaurant	Food Truck	Chinese Restaurant
6	Central Harlem	Thai Restaurant	Wine Bar	Vietnamese Restaurant	Sushi Restaurant	Ramen Restaurant	Malay Restaurant	Japanese Restaurant	Indian Restaurant	Food Truck	Chinese Restaurant
7	East Harlem	Thai Restaurant	Wine Bar	Vietnamese Restaurant	Sushi Restaurant	Ramen Restaurant	Malay Restaurant	Japanese Restaurant	Indian Restaurant	Food Truck	Chinese Restaurant
11	Roosevelt Island	Thai Restaurant	Wine Bar	Vietnamese Restaurant	Sushi Restaurant	Ramen Restaurant	Malay Restaurant	Japanese Restaurant	Indian Restaurant	Food Truck	Chinese Restaurant

Result

Cluster 4

```
manhattan_merged.loc[manhattan_merged['Cluster Labels'] == 4, manhattan_merged.columns[[1] + list(range(5, manhattan_merge
```

	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
28	Battery Park City	Thai Restaurant	Japanese Restaurant	Wine Bar	Vietnamese Restaurant	Sushi Restaurant	Ramen Restaurant	Malay Restaurant	Indian Restaurant	Food Truck	Chinese Restaurant
29	Financial District	Thai Restaurant	Japanese Restaurant	Wine Bar	Vietnamese Restaurant	Sushi Restaurant	Ramen Restaurant	Malay Restaurant	Indian Restaurant	Food Truck	Chinese Restaurant

Result

Result

Based on dataframe analysis above Cluster 2 and Cluster 4 areas are the best places to open a new sushi bar 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 Midtown and Soho so it is very risky to open business in these areas.

- Central Harlem has also potential where closes to Morningside 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.