

The Battle of the Neighborhoods – Report

1. Introduction & Business Problem:

The City of New York is the most populous city in the United States. It is diverse and is the financial capital of USA. It is multicultural. It provides lot of business opportunities and business friendly environment. It has attracted many different players into the market. It is a global hub of business and commerce. The city is a major center for banking and finance, retailing, world trade, transportation, tourism, real estate, new media, traditional media, advertising, legal services, accountancy, insurance, theater, fashion, and the arts in the United States. This also means that the market is highly competitive. As it is highly developed city so cost of doing business is also one of the highest. Thus, any new business venture or expansion needs to be analyzed carefully. The insights derived from analysis will give good understanding of the business environment which help in strategically targeting the market. This will help in reduction of risk. And the Return on Investment will be reasonable.

Business Problem

The City of New York is famous for its excellent cuisine. Its food culture includes an array of international cuisines influenced by the city's immigrant history. Ramen restaurants 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 Ramen restaurant can be a great business opportunity, but you need to distinguish yourself from others to enjoy long-term success.

If you plan a real restaurant focus on neighborhoods and outlets that already attract a sophisticated Japanese client. If you plan a cheap buffet restaurant, points to the masses looking for affordable high-traffic locations with large shopping centers and other local points of interest.

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 Ramen restaurants 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 ramen restaurant should be open in an area that inadequate neighborhood in this way the bar can attract more customers. Therefore, this analysis necessary to ensure that we have enough customers and that we are not so close to other ramen places.

2. Data

Data 1: Neighborhood has a total of 5 boroughs and 306 neighborhoods. In order to segment the neighborhoods and explore them, we will essentially need a dataset that contains the 5 boroughs and the neighborhoods that exist in each borough as well as the latitude and longitude coordinates of each neighborhood. This dataset exists for free on the web. Link to the dataset is: https://geo.nyu.edu/catalog/nyu_2451_34572

	Borough	Neighborhood	Latitude	Longitude
0	Bronx	Wakefield	40.894705	-73.847201
1	Bronx	Co-op City	40.874294	-73.829939
2	Bronx	Eastchester	40.887556	-73.827806
3	Bronx	Fieldston	40.895437	-73.905643
4	Bronx	Riverdale	40.890834	-73.912585

Data2: New York city geographical coordinates data will be utilized as input for the Foursquare API, that will be leveraged to provision venues information for each neighborhood. We will use the Foursquare API to explore neighborhoods in New York City. The below is image of the Foursquare API data.

In addition, ramen restaurant category Id - 55a59bace4b013909087cb24 is used for retrieving data from Foursquare API.

3. Methodology

In this project, I will use the basic methodology as taught in Week 3 lab.

	Borough	Neighborhood	Latitude	Longitude
0	Bronx	Wakefield	40.894705	-73.847201
1	Bronx	Co-op City	40.874294	-73.829939
2	Bronx	Eastchester	40.887556	-73.827806
3	Bronx	Fieldston	40.895437	-73.905643
4	Bronx	Riverdale	40.890834	-73.912585

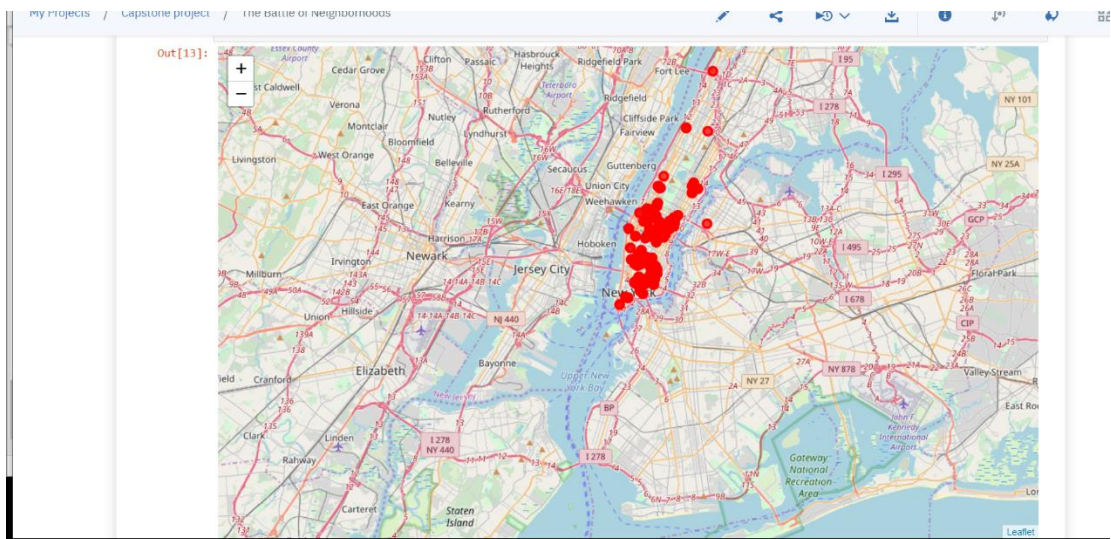
Above, I have done convert addresses into their equivalent latitude and longitude values. Then we will use the Foursquare API to explore neighborhoods in Manhattan, New York. After that, explore function to get ramen restaurant categories in each neighborhood.

+	CHINATOWN	40.713018
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```
[11]: newyork_venues_Ramen.shape
```

```
[11]: (446, 7)
```

```
[12]: def addToMap(df, color, existingMap):
      for lat, lng, local, venue, ven
      ['Venue Category']):
          label = '{} ({{}} - {{}}'.form
```



Ramen restaurants in Manhattan

3. Analyze Each Neighborhood

```
#one hot encoding
manhattan_onehot = pd.get_dummies(newyork_venues_Ramen[['Venue Category']], prefix="", prefix_sep="")

# add neighborhood column back to dataframe
manhattan_onehot['Neighborhood'] = newyork_venues_Ramen['Neighborhood']

# move neighborhood column to the first column
fixed_columns = [manhattan_onehot.columns[-1]] + list(manhattan_onehot.columns[:-1])
manhattan_onehot = manhattan_onehot[fixed_columns]

manhattan_onehot.head()
```

	Neighborhood	Asian Restaurant	BBQ Joint	Burger Joint	Japanese Restaurant	Korean Restaurant	Poke Place	Ramen Restaurant	Street Food Gathering	Sushi Restaurant
0	Chinatown	0	0	0	0	1	0	0	0	0
1	Chinatown	0	0	0	0	0	0	1	0	0
2	Chinatown	0	0	0	0	0	0	1	0	0
3	Chinatown	0	0	0	0	0	0	1	0	0
4	Chinatown	0	0	0	0	0	0	1	0	0

```
manhattan_grouped = manhattan_onehot.groupby('Neighborhood').mean().reset_index()
manhattan_grouped
```

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

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Out[21]:													
	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
0	Manhattan	Marble Hill	40.876551	-73.910660	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN
1	Manhattan	Chinatown	40.715618	-73.994279	3.0	Ramen Restaurant	Korean Restaurant	BBQ Joint	Asian Restaurant	Sushi Restaurant	Street Food Gathering	Poke Place	Japanese Restaurant
2	Manhattan	Washington Heights	40.851903	-73.936900	2.0	Ramen Restaurant	Sushi Restaurant	Street Food Gathering	Poke Place	Korean Restaurant	Japanese Restaurant	Burger Joint	BBQ
3	Manhattan	Inwood	40.867684	-73.921210	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN
4	Manhattan	Hamilton Heights	40.823604	-73.949688	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN
5	Manhattan	Manhattanville	40.816934	-73.957385	2.0	Ramen Restaurant	Sushi Restaurant	Street Food Gathering	Poke Place	Korean Restaurant	Japanese Restaurant	Burger Joint	BBQ
6	Manhattan	Central Harlem	40.815976	-73.943211	2.0	Ramen Restaurant	Sushi Restaurant	Street Food Gathering	Poke Place	Korean Restaurant	Japanese Restaurant	Burger Joint	BBQ
7	Manhattan	East Harlem	40.792249	-73.944182	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN
8	Manhattan	Upper East Side	40.775639	-73.960508	1.0	Ramen Restaurant	Japanese Restaurant	Asian Restaurant	Sushi Restaurant	Street Food Gathering	Poke Place	Korean Restaurant	Burger Joint

4. Results

K-mean Cluster Using K-mean to clustering data area with less number of ramen restaurants.

Cluster 0

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9	Manhattan	Yorkville	40.775930	-73.947118	1.0	Ramen Restaurant	Japanese Restaurant	Asian Restaurant	Sushi Restaurant	Street Food Gathering	Poke Place	Korean Restaurant	Burger Joint
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```
In [23]: manhattan_merged.loc[manhattan_merged['Cluster Labels'] == 0, manhattan_merged.columns[[1] + list(range(5, manhattan_merged.shape[1]))]]
```

Out[23]:

	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
17	Chelsea	Ramen Restaurant	Sushi Restaurant	Street Food Gathering	Poke Place	Korean Restaurant	Japanese Restaurant	Burger Joint	BBQ Joint	Asian Restaurant
18	Greenwich Village	Ramen Restaurant	Sushi Restaurant	Street Food Gathering	Korean Restaurant	BBQ Joint	Poke Place	Japanese Restaurant	Burger Joint	Asian Restaurant
21	Tribeca	Ramen Restaurant	Street Food Gathering	Korean Restaurant	Sushi Restaurant	Poke Place	Japanese Restaurant	Burger Joint	BBQ Joint	Asian Restaurant
23	Soho	Ramen Restaurant	Street Food Gathering	Korean Restaurant	BBQ Joint	Sushi Restaurant	Poke Place	Japanese Restaurant	Burger Joint	Asian Restaurant
24	West Village	Ramen Restaurant	Sushi Restaurant	Street Food Gathering	Poke Place	Korean Restaurant	Japanese Restaurant	Burger Joint	BBQ Joint	Asian Restaurant
38	Flatiron	Ramen Restaurant	Sushi Restaurant	Burger Joint	Street Food Gathering	Poke Place	Korean Restaurant	Japanese Restaurant	BBQ Joint	Asian Restaurant

Cluster 1

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23	Soho	Ramen Restaurant	Street Food Gathering	Korean Restaurant	BBQ Joint	Sushi Restaurant	Poke Place	Japanese Restaurant	Burger Joint	Asian Restaurant
24	West Village	Ramen Restaurant	Sushi Restaurant	Street Food Gathering	Poke Place	Korean Restaurant	Japanese Restaurant	Burger Joint	BBQ Joint	Asian Restaurant
38	Flatiron	Ramen Restaurant	Sushi Restaurant	Burger Joint	Street Food Gathering	Poke Place	Korean Restaurant	Japanese Restaurant	BBQ Joint	Asian Restaurant

```
In [24]: manhattan_merged.loc[manhattan_merged['Cluster Labels'] == 1, manhattan_merged.columns[[1] + list(range(5, manhattan_merged.shape[1]))]]
```

Out[24]:

	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
8	Upper East Side	Ramen Restaurant	Japanese Restaurant	Asian Restaurant	Sushi Restaurant	Street Food Gathering	Poke Place	Korean Restaurant	Burger Joint	BBQ Joint
9	Yorkville	Ramen Restaurant	Japanese Restaurant	Asian Restaurant	Sushi Restaurant	Street Food Gathering	Poke Place	Korean Restaurant	Burger Joint	BBQ Joint
30	Carnegie Hill	Ramen Restaurant	Japanese Restaurant	Asian Restaurant	Sushi Restaurant	Street Food Gathering	Poke Place	Korean Restaurant	Burger Joint	BBQ Joint

```
In [25]: manhattan_merged.loc[manhattan_merged['Cluster Labels'] == 2, manhattan_merged.columns[[1] + list(range(5, manhattan_merged.shape[1]))]]
```

Cluster 2

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Out[25]:

	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
2	Washington Heights	Ramen Restaurant	Sushi Restaurant	Street Food Gathering	Poke Place	Korean Restaurant	Japanese Restaurant	Burger Joint	BBQ Joint	Asian Restaurant
5	Manhattanville	Ramen Restaurant	Sushi Restaurant	Street Food Gathering	Poke Place	Korean Restaurant	Japanese Restaurant	Burger Joint	BBQ Joint	Asian Restaurant
6	Central Harlem	Ramen Restaurant	Sushi Restaurant	Street Food Gathering	Poke Place	Korean Restaurant	Japanese Restaurant	Burger Joint	BBQ Joint	Asian Restaurant
10	Lenox Hill	Ramen Restaurant	Sushi Restaurant	Street Food Gathering	Poke Place	Korean Restaurant	Japanese Restaurant	Burger Joint	BBQ Joint	Asian Restaurant
11	Roosevelt Island	Ramen Restaurant	Sushi Restaurant	Street Food Gathering	Poke Place	Korean Restaurant	Japanese Restaurant	Burger Joint	BBQ Joint	Asian Restaurant
14	Clinton	Ramen Restaurant	Sushi Restaurant	Street Food Gathering	Poke Place	Korean Restaurant	Japanese Restaurant	Burger Joint	BBQ Joint	Asian Restaurant
26	Morningside Heights	Ramen Restaurant	Sushi Restaurant	Street Food Gathering	Poke Place	Korean Restaurant	Japanese Restaurant	Burger Joint	BBQ Joint	Asian Restaurant
28	Battery Park City	Ramen Restaurant	Sushi Restaurant	Street Food Gathering	Poke Place	Korean Restaurant	Japanese Restaurant	Burger Joint	BBQ Joint	Asian Restaurant
29	Financial District	Ramen Restaurant	Sushi Restaurant	Street Food Gathering	Poke Place	Korean Restaurant	Japanese Restaurant	Burger Joint	BBQ Joint	Asian Restaurant
37	Stuyvesant Town	Ramen Restaurant	Sushi Restaurant	Street Food Gathering	Poke Place	Korean Restaurant	Japanese Restaurant	Burger Joint	BBQ Joint	Asian Restaurant

Cluster 3

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```
In [26]: manhattan_merged.loc[manhattan_merged['Cluster Labels'] == 3, manhattan_merged.columns[[1] + list(range(5, manhattan_merged.shape[1]))]]
```

Out[26]:

	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
1	Chinatown	Ramen Restaurant	Korean Restaurant	BBQ Joint	Asian Restaurant	Sushi Restaurant	Street Food Gathering	Poke Place	Japanese Restaurant	Burger Joint
19	East Village	Ramen Restaurant	Asian Restaurant	Sushi Restaurant	Street Food Gathering	Poke Place	Korean Restaurant	Japanese Restaurant	Burger Joint	BBQ Joint
20	Lower East Side	Ramen Restaurant	BBQ Joint	Asian Restaurant	Sushi Restaurant	Street Food Gathering	Poke Place	Korean Restaurant	Japanese Restaurant	Burger Joint
22	Little Italy	Ramen Restaurant	Korean Restaurant	BBQ Joint	Asian Restaurant	Sushi Restaurant	Street Food Gathering	Poke Place	Japanese Restaurant	Burger Joint
27	Gramercy	Ramen Restaurant	Asian Restaurant	Sushi Restaurant	Street Food Gathering	Poke Place	Korean Restaurant	Japanese Restaurant	Burger Joint	BBQ Joint
31	Noho	Ramen Restaurant	Korean Restaurant	BBQ Joint	Asian Restaurant	Sushi Restaurant	Street Food Gathering	Poke Place	Japanese Restaurant	Burger Joint
32	Civic Center	Ramen Restaurant	Korean Restaurant	Sushi Restaurant	Street Food Gathering	Poke Place	Japanese Restaurant	Burger Joint	BBQ Joint	Asian Restaurant
33	Midtown South	Ramen Restaurant	Burger Joint	Asian Restaurant	Sushi Restaurant	Street Food Gathering	Poke Place	Korean Restaurant	Japanese Restaurant	BBQ Joint

Cluster 4

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

7]:

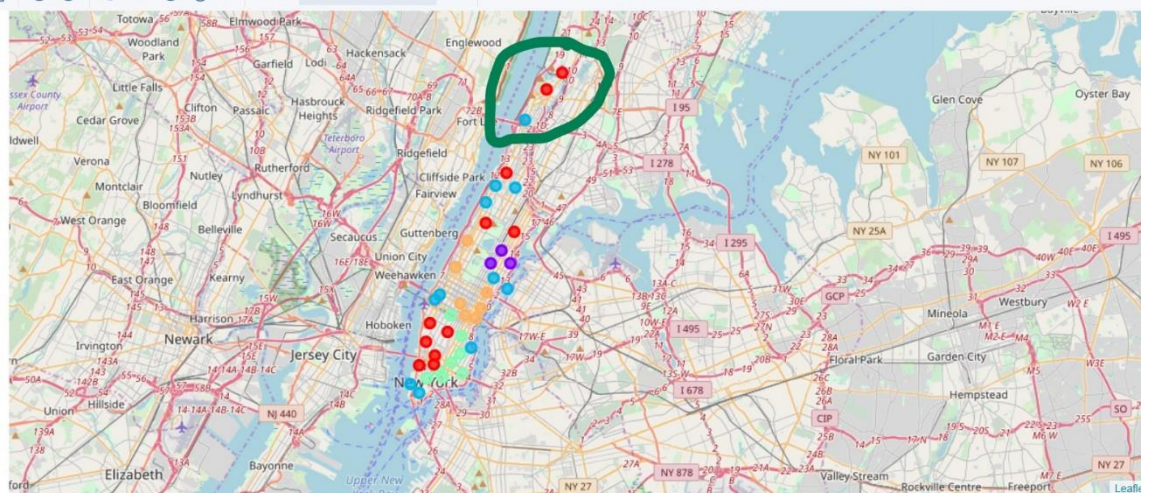
	Neighborhood	1st Most Common Venue	2nd Most Common Venue	3rd Most Common Venue	4th Most Common Venue	5th Most Common Venue	6th Most Common Venue	7th Most Common Venue	8th Most Common Venue	9th Most Common Venue
12	Upper West Side	Ramen Restaurant	Japanese Restaurant	Sushi Restaurant	Street Food Gathering	Poke Place	Korean Restaurant	Burger Joint	BBQ Joint	Asian Restaurant
13	Lincoln Square	Ramen Restaurant	Sushi Restaurant	Japanese Restaurant	Street Food Gathering	Poke Place	Korean Restaurant	Burger Joint	BBQ Joint	Asian Restaurant
15	Midtown	Ramen Restaurant	Poke Place	Japanese Restaurant	Burger Joint	Asian Restaurant	Sushi Restaurant	Street Food Gathering	Korean Restaurant	BBQ Joint
16	Murray Hill	Ramen Restaurant	Poke Place	Japanese Restaurant	Burger Joint	Asian Restaurant	Sushi Restaurant	Street Food Gathering	Korean Restaurant	BBQ Joint
34	Sutton Place	Ramen Restaurant	Japanese Restaurant	Sushi Restaurant	Street Food Gathering	Poke Place	Korean Restaurant	Burger Joint	BBQ Joint	Asian Restaurant
35	Turtle Bay	Ramen Restaurant	Poke Place	Japanese Restaurant	Asian Restaurant	Sushi Restaurant	Street Food Gathering	Korean Restaurant	Burger Joint	BBQ Joint
36	Tudor City	Ramen Restaurant	Poke Place	Japanese Restaurant	Asian Restaurant	Sushi Restaurant	Street Food Gathering	Korean Restaurant	Burger Joint	BBQ Joint

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Cluster 0

Highlighted area is the best possible location for the opening of new ramen restaurant

5. Result and Discussion

Here we use K-means to clustering data area with less number of ramen restaurants

Based on dataframe analysis above Cluster 1 (Upper East Side, Yorkville, cargenie hill)

areas are the best places to open a ramen restaurant.

6. Conclusion

Purpose of this project was to identify Manhattan area in New York City in order to aid Owner in narrowing down the search for optimal location for a new Ramen restaurant. Here K-means clustering is used on the data to narrow the best possible locations to open the restaurants in Manhattan area of Newyork city

Final decission on optimal restaurant location will be made by owners based on specific characteristics of neighborhoods and locations in every recommended zone, taking into consideration additional factors like attractiveness of each location (proximity to park or water), levels of noise / proximity to major roads, real estate availability, prices, social and economic dynamics of every neighborhood etc.