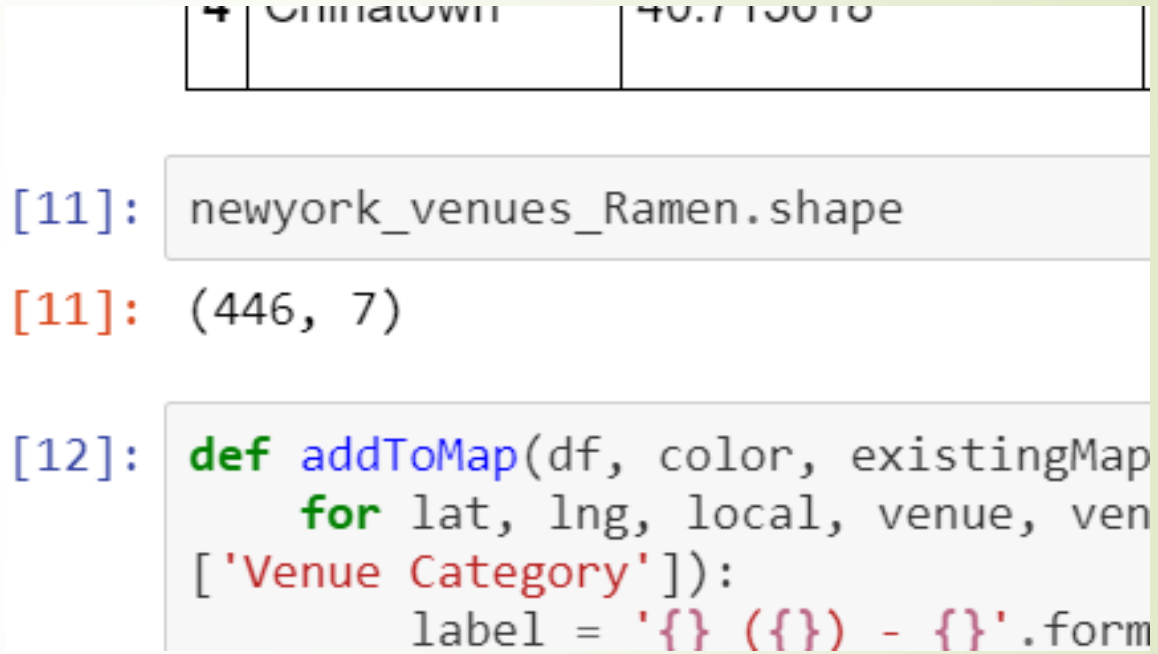
Recommend a location in Manhattan,New York to open a new Ramen Restaurant

Business Problem

- My client wants to open his business in Manhattan area, so I focus on that borough during my analysis. this analysis necessary to ensure that we have enough customers and that we are not so close to other ramen restaurants.

Data selection

- To identify the characteristics of our competitors' venues in Manhattan, we would first need to find out the number of ramen 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 446 ramen restaurants are currently operating.



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 ramen restaurant categories in each neighborhood.

3. Analyze Each Neighborhood

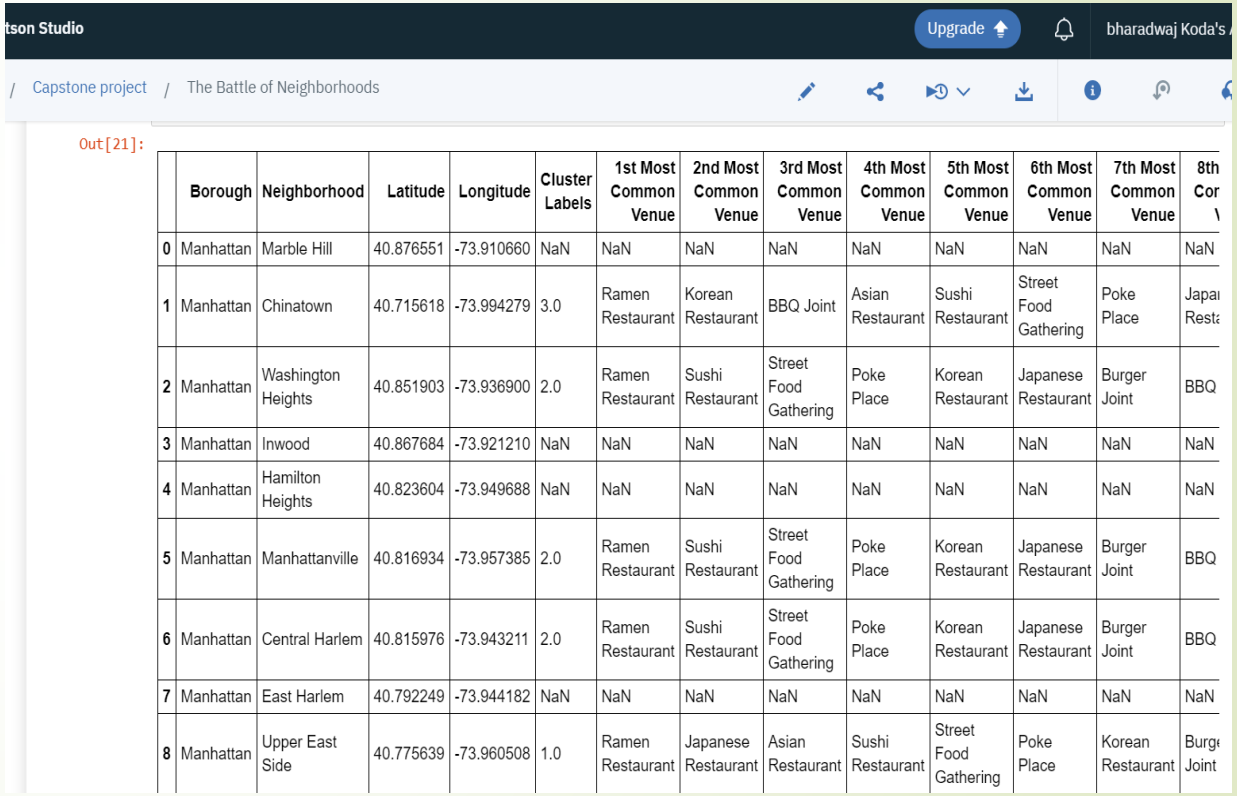
```
 #one hot encoding
manhattan_onehot = pd.get_dummies(newyork_venues_Ramen[['Venue Category']], prefix="", prefix_sep="")

# 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
```

Methodology

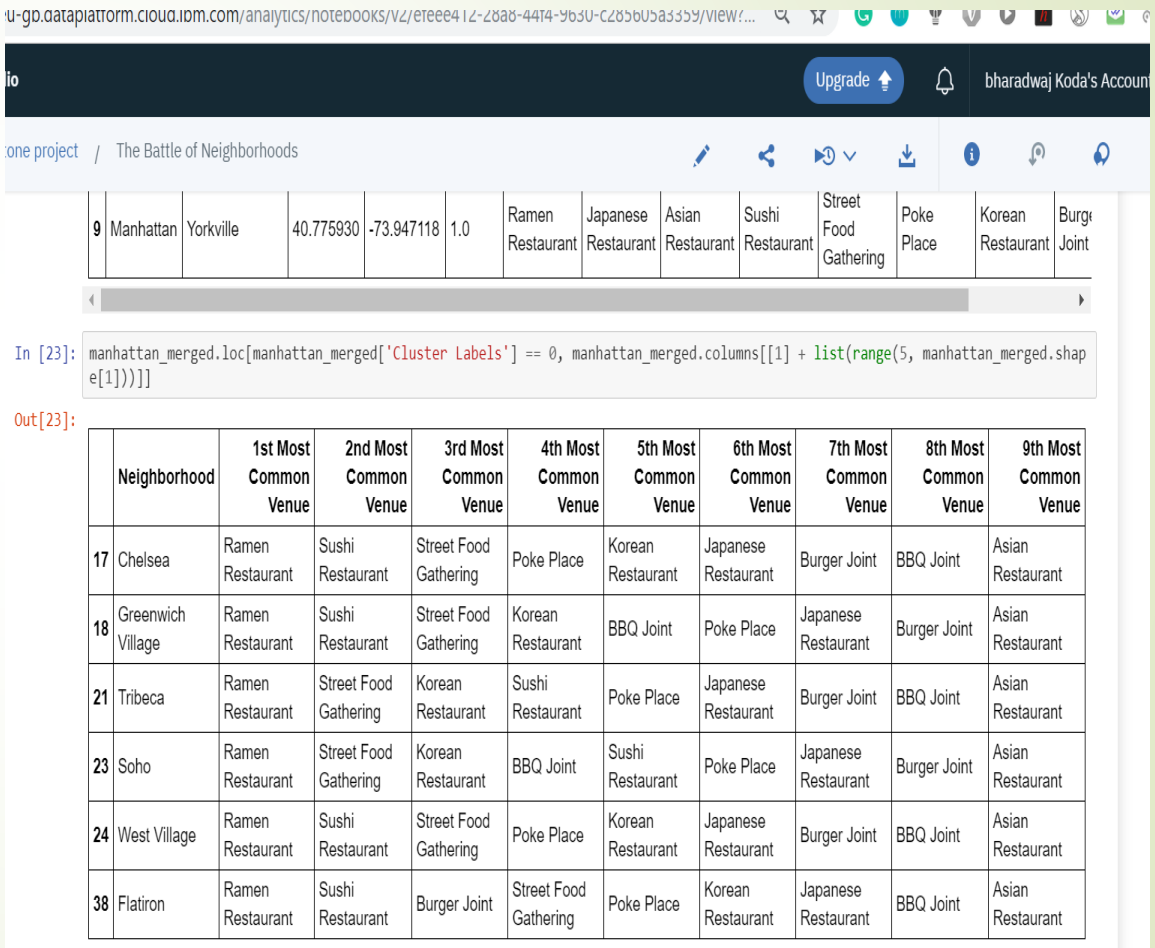
- Then using this feature to group the neighborhoods into clusters K-means clustering algorithm will be use to complete this task. And also, the Folium library to visualize the neighborhoods in Manhattan and its emerging clusters.



	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 Cor
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	Japa Resta
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	Burg Joint

Results

- Using K-mean to clustering data area with less number of ramen restaurants
- For Cluster 0



9	Manhattan	Yorkville	40.775930	-73.947118	1.0	Ramen Restaurant	Japanese Restaurant	Asian Restaurant	Sushi Restaurant	Street Food Gathering	Poke Place	Korean Restaurant	Burg Joint

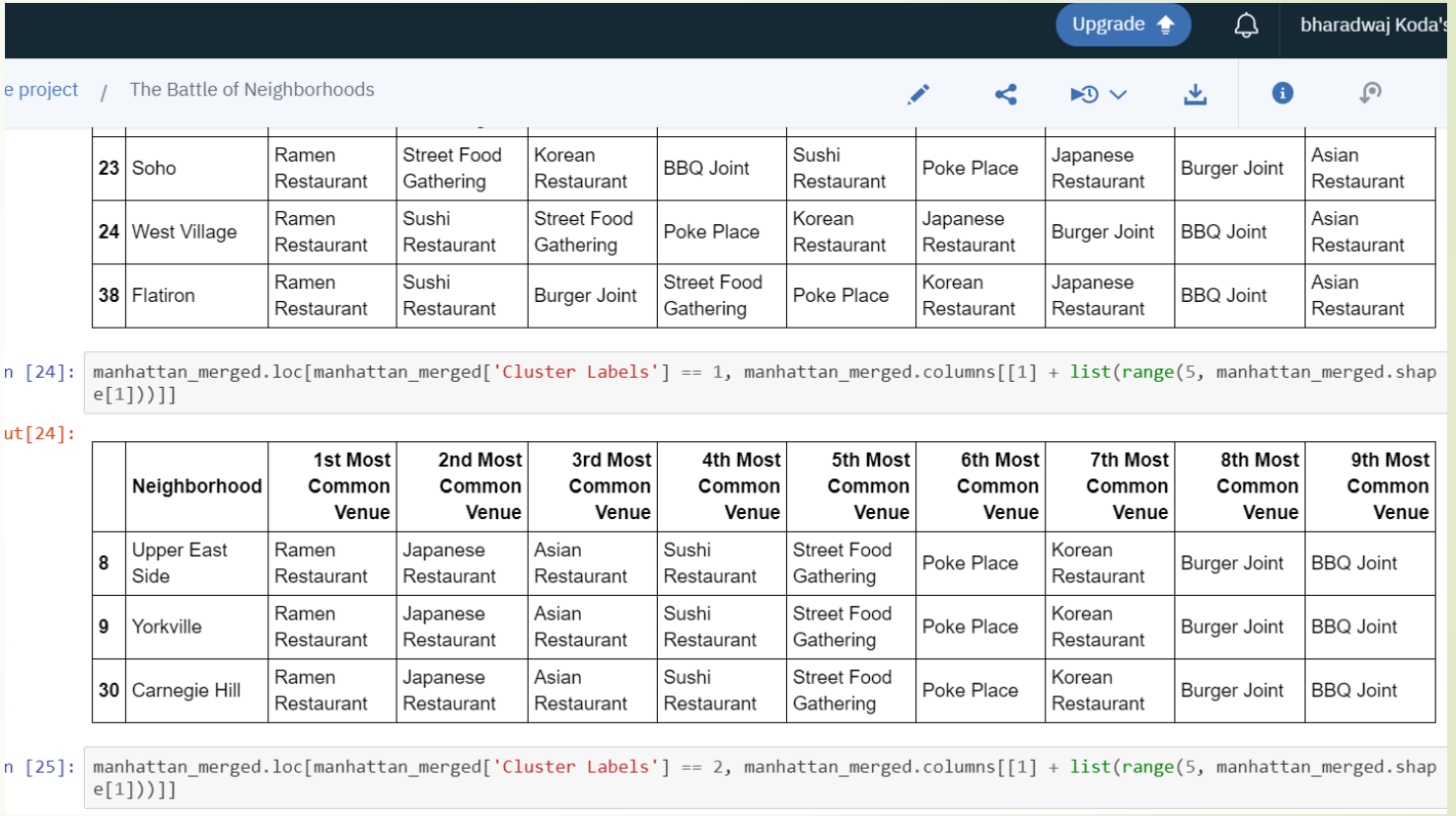
In [23]:
```
manhattan_merged.loc[manhattan_merged['Cluster Labels'] == 0, manhattan_merged.columns[[1] + list(range(5, manhattan_merged.shape[1]))]]
```

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

Results

- Cluster 1



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

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

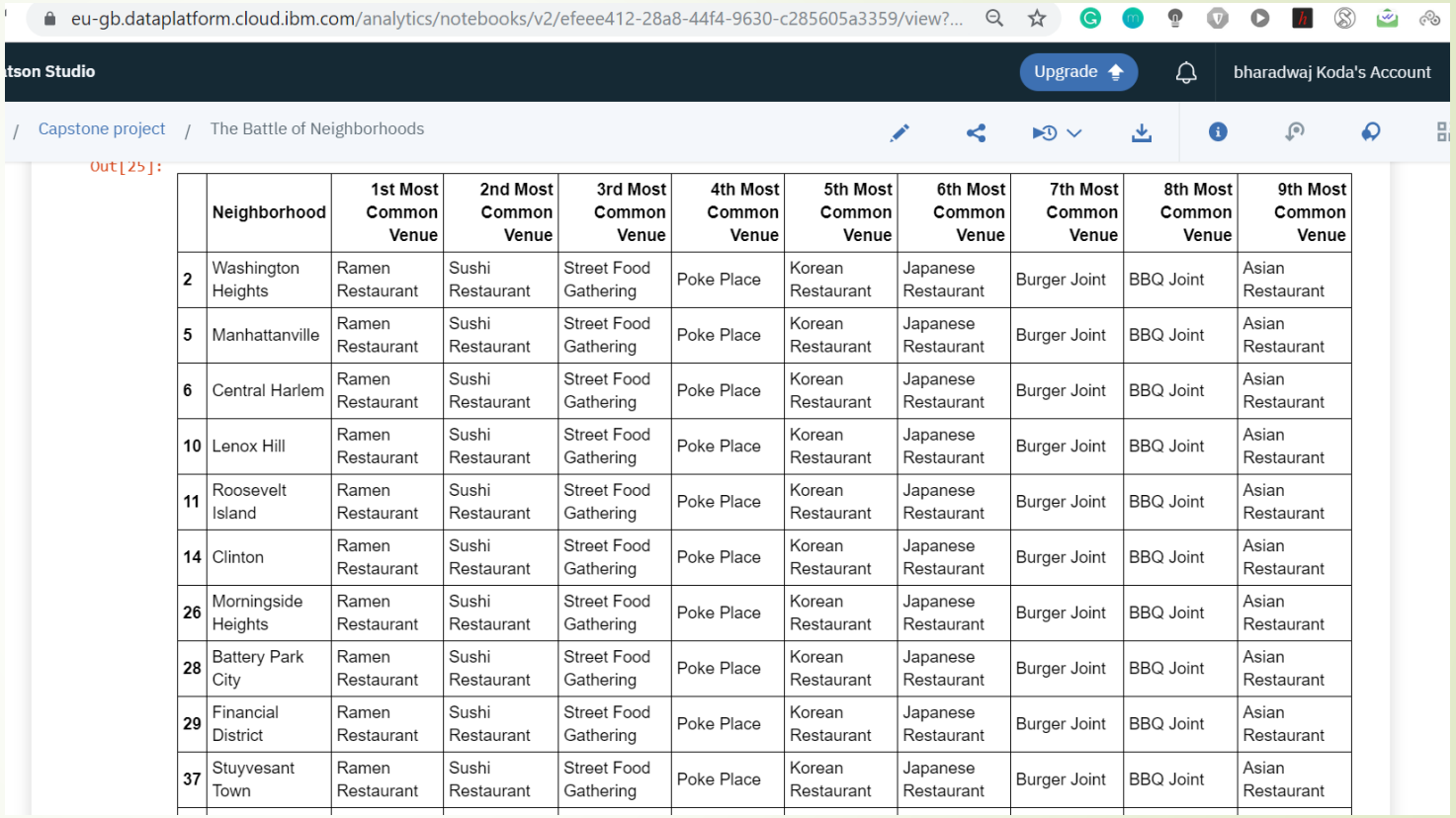
ut[24]:

	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

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

Results

- 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
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

Results

- Cluster 3

Studio

Upgrade

bharadwaj Koda's Ac

Capstone project / The Battle of Neighborhoods

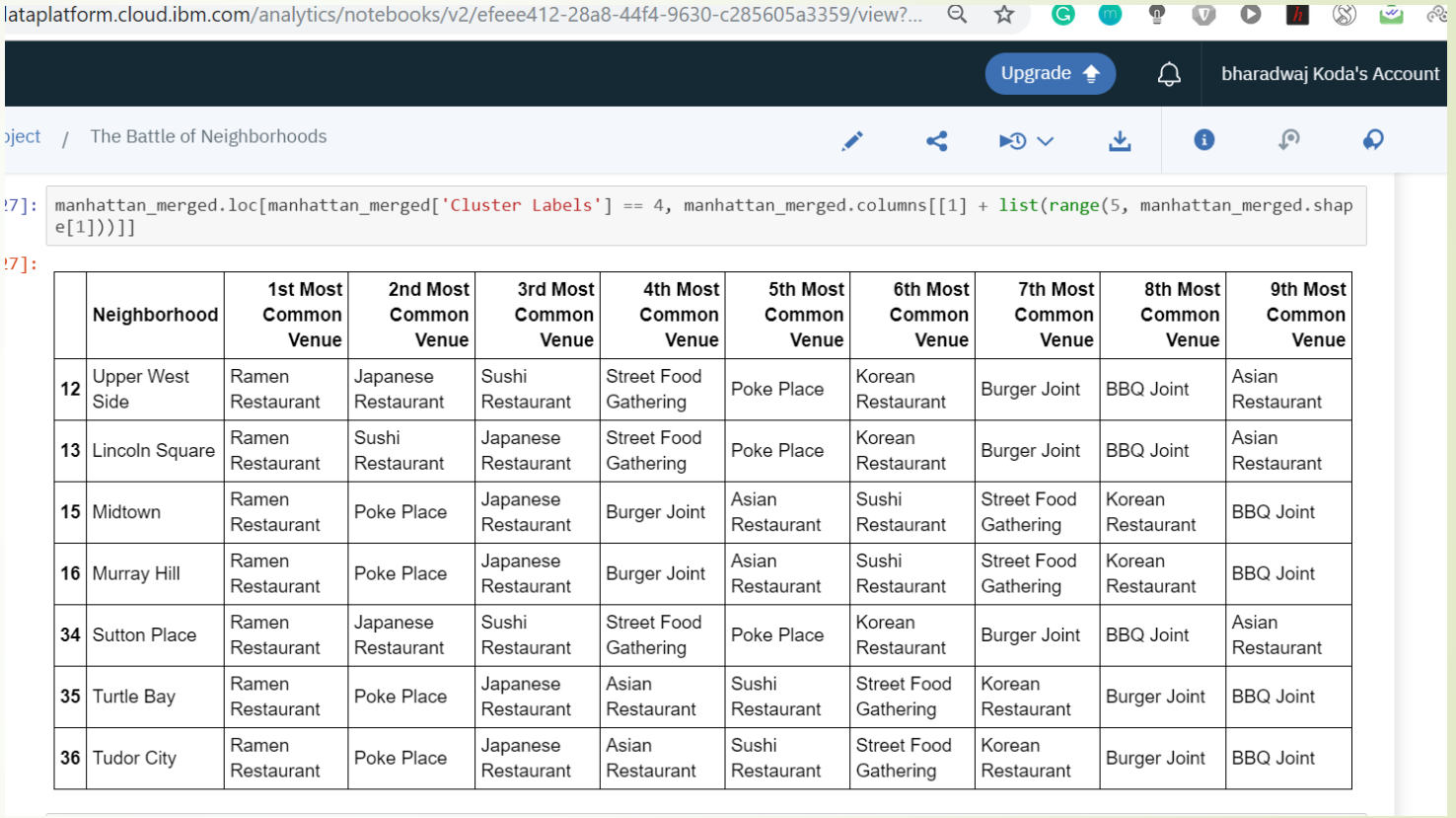
In [26]:
```
manhattan_merged.loc[manhattan_merged['Cluster Labels'] == 3, manhattan_merged.columns[[1] + list(range(5, manhattan_merged.shape[1]))]]
```

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

Results

- Cluster 4



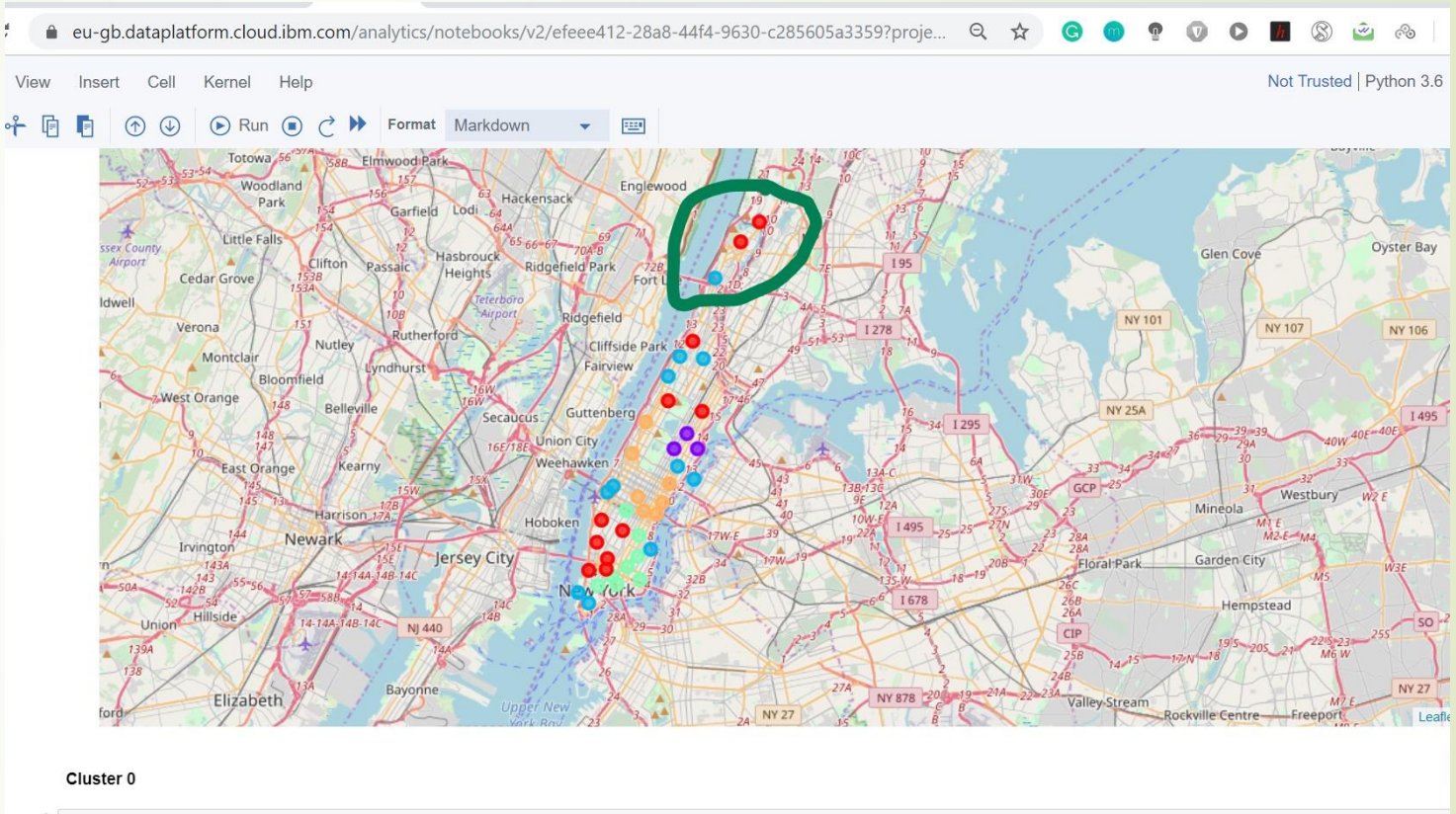
	Neighborhood	1st Most Common Venue	2nd Most Common Venue	3rd Most Common Venue	4th Most Common Venue	5th Most Common Venue	6th Most Common Venue	7th Most Common Venue	8th Most Common Venue	9th Most Common Venue
12	Upper West Side	Ramen Restaurant	Japanese Restaurant	Sushi Restaurant	Street Food Gathering	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

Result

- Based on dataframe analysis above Cluster 1 (Upper East Side,Yorkville,cargie hill) areas are the best places to open a ramen restaurant.

Discussion

- Based on analysis above Cluster 1 (Upper East Side ,Yorkville,carnigie hill) areas are the best places to open a new ramen restaurant business.



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 New York city
- Final decision on optimal restaurant location will be made by owners based on specific characteristics of