Capstone Project - The Battle of Neighborhoods

Selecting the best location to open an SUSHI BAR IN Manhattan, New York

Introduction/Business Problem

- The City of New York is famous for its excelllent cuisine. It's food culture includes an array of international cuisines influenced by the city's immigrant history.

- Sushi 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 sushi restaurant can be a great business opportunity, but you need to distinguish yourself from others to enjoy long-term success.

- 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 sushi bars 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 sushi bar 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 sushi places.

- To identify the characteristics of our competitors' venues in Manhattan, we would first need to find out the number of sushi bars 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_sushi.shape
```

```
(1763, 7)
```

- Next, we also used Google Map API to find their geographic coordinates of the 5 locations shortlisted for our sushi bar and japanese restaurants :

	Neighborhood	Neighborhood Latitude	Neighborhood Longitude	Venue	Venue Latitude	Venue Longitude	Venue Category
0	Marble Hill	40.876551	-73.910660	Planet Tokyo	40.886233	-73.909479	Sushi Restaurant
1	Chinatown	40.715618	-73.994279	Shinsen	40.715608	-73.996611	Japanese Restaurant
2	Chinatown	40.715618	-73.994279	Amano Sushi	40.716017	-73.992818	Sushi Restaurant
3	Chinatown	40.715618	-73.994279	Whole Foods Sushi Bar	40.724000	-73.992277	Sushi Restaurant
4	Chinatown	40.715618	-73.994279	Douzo	40.719069	-73.990781	Japanese Restaurant

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

- 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 sushi restaurant categories in each neighborhood.
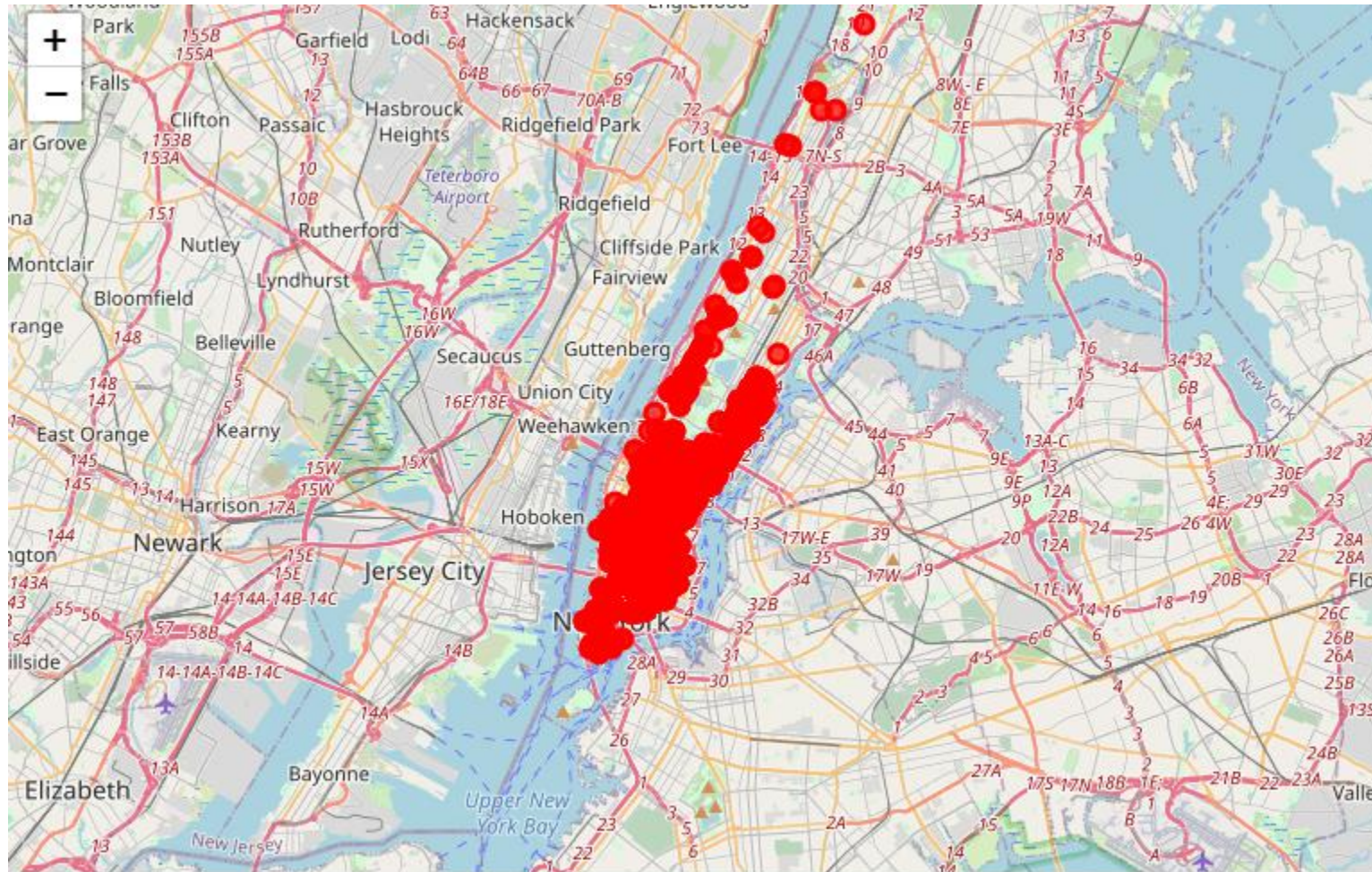
-

	Neighborhood	Asian Restaurant	Bakery	Chinese Restaurant	Cocktail Bar	Deli / Bodega	Grocery Store	Hawaiian Restaurant	Japanese Restaurant	Noodle House	...	Ramen Restaurant	Restaurant	Sake Bar	Sandwich Place	Seafood Restaurant	Smoothie Shop	Steakh
0	Marble Hill	0	0	0	0	0	0	0	0	0	...	0	0	0	0	0	0	0
1	Chinatown	0	0	0	0	0	0	0	1	0	...	0	0	0	0	0	0	0
2	Chinatown	0	0	0	0	0	0	0	0	0	...	0	0	0	0	0	0	0
3	Chinatown	0	0	0	0	0	0	0	0	0	...	0	0	0	0	0	0	0
4	Chinatown	0	0	0	0	0	0	0	1	0	...	0	0	0	0	0	0	0

5 rows × 21 columns

Sushi bars in Manhattan

- 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	Sushi Restaurant	Japanese Restaurant	Noodle House	Theme Restaurant	Vegetarian / Vegan Restaurant	Bakery	Chinese Restaurant	Cocktail Bar	Deli / Bodega	Grocery Store
1	Carnegie Hill	Sushi Restaurant	Japanese Restaurant	Asian Restaurant	Chinese Restaurant	Noodle House	Bakery	Cocktail Bar	Deli / Bodega	Grocery Store	Hawaiian Restaurant
2	Central Harlem	Sushi Restaurant	Vegetarian / Vegan Restaurant	Noodle House	Bakery	Chinese Restaurant	Cocktail Bar	Deli / Bodega	Grocery Store	Hawaiian Restaurant	Japanese Restaurant
3	Chelsea	Sushi Restaurant	Japanese Restaurant	Asian Restaurant	Vegetarian / Vegan Restaurant	Smoothie Shop	Seafood Restaurant	Sandwich Place	Sake Bar	Restaurant	Ramen Restaurant
4	Chinatown	Sushi Restaurant	Japanese Restaurant	Vegetarian / Vegan Restaurant	Noodle House	Bakery	Chinese Restaurant	Cocktail Bar	Deli / Bodega	Grocery Store	Hawaiian Restaurant

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

Cluster 0

	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	10th Most Common Venue
0	Manhattan	Marble Hill	40.876551	-73.910660	2	Sushi Restaurant	Vegetarian / Vegan Restaurant	Noodle House	Bakery	Chinese Restaurant	Cocktail Bar	Deli / Bodega	Grocery Store	Hawaiian Restaurant	Japanese Restaurant
1	Manhattan	Chinatown	40.715618	-73.994279	0	Sushi Restaurant	Japanese Restaurant	Vegetarian / Vegan Restaurant	Noodle House	Bakery	Chinese Restaurant	Cocktail Bar	Deli / Bodega	Grocery Store	Hawaiian Restaurant
2	Manhattan	Washington Heights	40.851903	-73.936900	2	Sushi Restaurant	Vegetarian / Vegan Restaurant	Noodle House	Bakery	Chinese Restaurant	Cocktail Bar	Deli / Bodega	Grocery Store	Hawaiian Restaurant	Japanese Restaurant
3	Manhattan	Inwood	40.867684	-73.921210	2	Sushi Restaurant	Vegetarian / Vegan Restaurant	Noodle House	Bakery	Chinese Restaurant	Cocktail Bar	Deli / Bodega	Grocery Store	Hawaiian Restaurant	Japanese Restaurant
4	Manhattan	Hamilton Heights	40.823604	-73.949688	2	Sushi Restaurant	Vegetarian / Vegan Restaurant	Noodle House	Bakery	Chinese Restaurant	Cocktail Bar	Deli / Bodega	Grocery Store	Hawaiian Restaurant	Japanese Restaurant

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	Sushi Restaurant	Vegetarian / Vegan Restaurant	Noodle House	Bakery	Chinese Restaurant	Cocktail Bar	Deli / Bodega	Grocery Store	Hawaiian Restaurant	Japanese Restaurant
2	Washington Heights	Sushi Restaurant	Vegetarian / Vegan Restaurant	Noodle House	Bakery	Chinese Restaurant	Cocktail Bar	Deli / Bodega	Grocery Store	Hawaiian Restaurant	Japanese Restaurant
3	Inwood	Sushi Restaurant	Vegetarian / Vegan Restaurant	Noodle House	Bakery	Chinese Restaurant	Cocktail Bar	Deli / Bodega	Grocery Store	Hawaiian Restaurant	Japanese Restaurant
4	Hamilton Heights	Sushi Restaurant	Vegetarian / Vegan Restaurant	Noodle House	Bakery	Chinese Restaurant	Cocktail Bar	Deli / Bodega	Grocery Store	Hawaiian Restaurant	Japanese Restaurant
5	Manhattanville	Sushi Restaurant	Vegetarian / Vegan Restaurant	Noodle House	Bakery	Chinese Restaurant	Cocktail Bar	Deli / Bodega	Grocery Store	Hawaiian Restaurant	Japanese Restaurant
6	Central Harlem	Sushi Restaurant	Vegetarian / Vegan Restaurant	Noodle House	Bakery	Chinese Restaurant	Cocktail Bar	Deli / Bodega	Grocery Store	Hawaiian Restaurant	Japanese Restaurant
7	East Harlem	Sushi Restaurant	Vegetarian / Vegan Restaurant	Noodle House	Bakery	Chinese Restaurant	Cocktail Bar	Deli / Bodega	Grocery Store	Hawaiian Restaurant	Japanese Restaurant

- **Cluster 2**

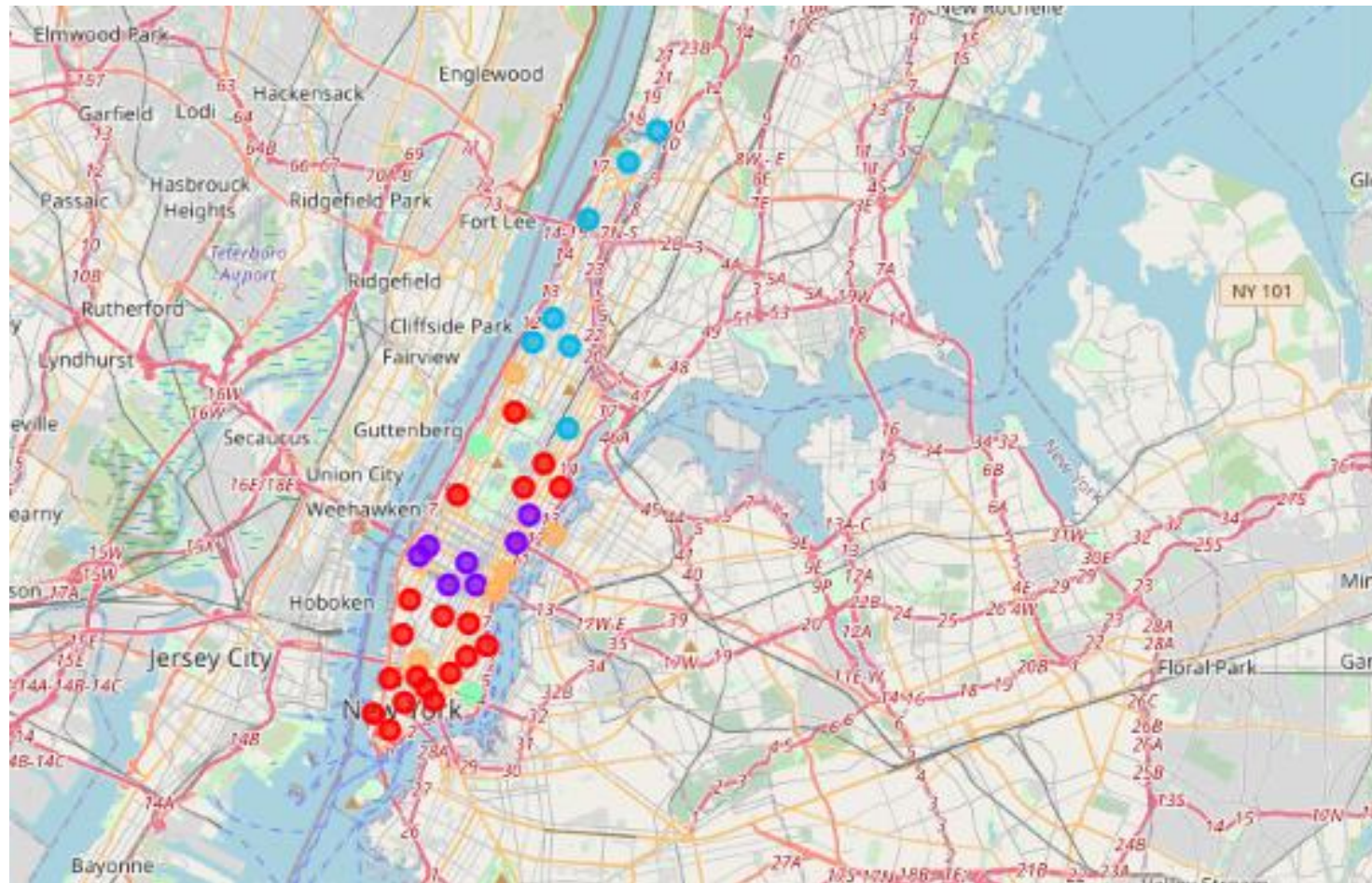|	Neighborhood	1st Most Common Venue	2nd Most Common Venue	3rd Most Common Venue	4th Most Common Venue	5th Most Common Venue	6th Most Common Venue	7th Most Common Venue	8th Most Common Venue	9th Most Common Venue	10th Most Common Venue
0	Marble Hill	Sushi Restaurant	Vegetarian / Vegan Restaurant	Noodle House	Bakery	Chinese Restaurant	Cocktail Bar	Deli / Bodega	Grocery Store	Hawaiian Restaurant	Japanese Restaurant
2	Washington Heights	Sushi Restaurant	Vegetarian / Vegan Restaurant	Noodle House	Bakery	Chinese Restaurant	Cocktail Bar	Deli / Bodega	Grocery Store	Hawaiian Restaurant	Japanese Restaurant
3	Inwood	Sushi Restaurant	Vegetarian / Vegan Restaurant	Noodle House	Bakery	Chinese Restaurant	Cocktail Bar	Deli / Bodega	Grocery Store	Hawaiian Restaurant	Japanese Restaurant
4	Hamilton Heights	Sushi Restaurant	Vegetarian / Vegan Restaurant	Noodle House	Bakery	Chinese Restaurant	Cocktail Bar	Deli / Bodega	Grocery Store	Hawaiian Restaurant	Japanese Restaurant
5	Manhattanville	Sushi Restaurant	Vegetarian / Vegan Restaurant	Noodle House	Bakery	Chinese Restaurant	Cocktail Bar	Deli / Bodega	Grocery Store	Hawaiian Restaurant	Japanese Restaurant
6	Central Harlem	Sushi Restaurant	Vegetarian / Vegan Restaurant	Noodle House	Bakery	Chinese Restaurant	Cocktail Bar	Deli / Bodega	Grocery Store	Hawaiian Restaurant	Japanese Restaurant
7	East Harlem	Sushi Restaurant	Vegetarian / Vegan Restaurant	Noodle House	Bakery	Chinese Restaurant	Cocktail Bar	Deli / Bodega	Grocery Store	Hawaiian Restaurant	Japanese Restaurant

Cluster 3

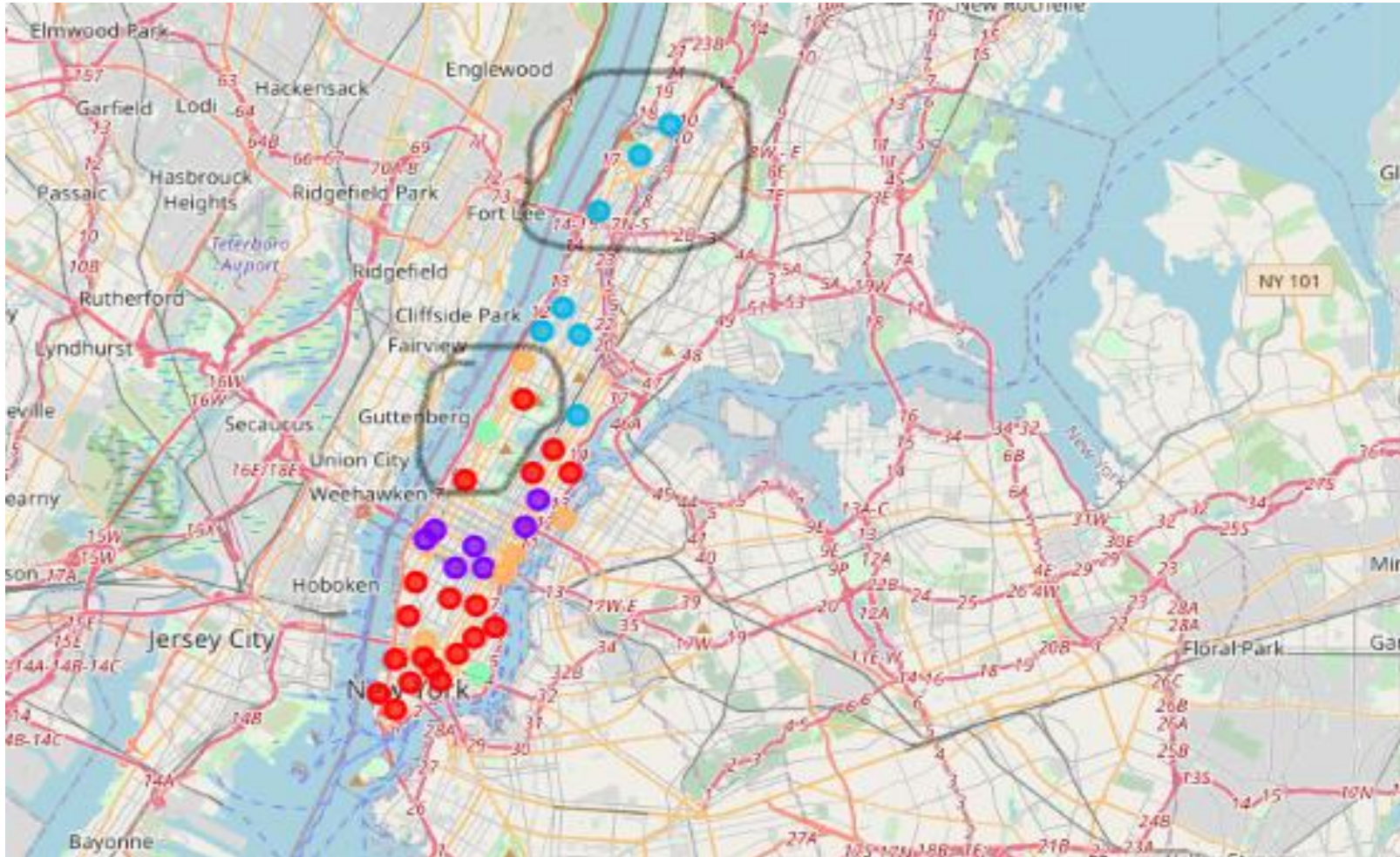|	Neighborhood	1st Most Common Venue	2nd Most Common Venue	3rd Most Common Venue	4th Most Common Venue	5th Most Common Venue	6th Most Common Venue	7th Most Common Venue	8th Most Common Venue	9th Most Common Venue	10th Most Common Venue
12	Upper West Side	Sushi Restaurant	Japanese Restaurant	Asian Restaurant	Grocery Store	Noodle House	Bakery	Chinese Restaurant	Cocktail Bar	Deli / Bodega	Hawaiian Restaurant
20	Lower East Side	Sushi Restaurant	Japanese Restaurant	Vegetarian / Vegan Restaurant	Noodle House	Bakery	Chinese Restaurant	Cocktail Bar	Deli / Bodega	Grocery Store	Hawaiian Restaurant

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
11	Roosevelt Island	Sushi Restaurant	Asian Restaurant	Noodle House	Bakery	Chinese Restaurant	Cocktail Bar	Deli / Bodega	Grocery Store	Hawaiian Restaurant	Japanese Restaurant
18	Greenwich Village	Sushi Restaurant	Japanese Restaurant	Sake Bar	Vegetarian / Vegan Restaurant	Noodle House	Bakery	Chinese Restaurant	Cocktail Bar	Deli / Bodega	Grocery Store
26	Morningside Heights	Sushi Restaurant	Hawaiian Restaurant	Vegetarian / Vegan Restaurant	Noodle House	Bakery	Chinese Restaurant	Cocktail Bar	Deli / Bodega	Grocery Store	Japanese Restaurant
35	Turtle Bay	Sushi Restaurant	Japanese Restaurant	Asian Restaurant	Steakhouse	Seafood Restaurant	Bakery	Chinese Restaurant	Cocktail Bar	Deli / Bodega	Grocery Store
36	Tudor City	Sushi Restaurant	Asian Restaurant	Japanese Restaurant	Vegetarian / Vegan Restaurant	Steakhouse	Smoothie Shop	Seafood Restaurant	Sandwich Place	Sake Bar	Restaurant

Based on dataframe analysis above Cluster 3 (Upper West Side) and Cluster 4 (Morningside Heights) areas are the best places to open a new sushi bar business.

- 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.

- 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 devleoped into a fully phledged application that could support the opening a business idea in an unknown location.