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, multicultural and is the financial capital of the USA. It provides a lot of business opportunities and a 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 a highly developed city, the 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 the analysis will give a good understanding of the business environment which help in strategically targeting the market. This will help in the 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. Sushi restaurants have become so popular in the United States now that it seems 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.

If you plan a real restaurant that can demand higher prices for fresh fish, delivered daily from Japan, focus on neighborhoods and outlets that already attract a sophisticated Japanese client. If you plan a cheap buffet restaurant, focus on the masses looking for affordable food in high-traffic locations with large shopping centers and other local points of interest.

My client wants to open his business in the Manhattan area, so I will 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 is also a very challenging district to open a business because of the high competition. New sushi bar should be opened in an area with the limited competition with adequate customer pool. In this way, the bar can attract more customers. Therefore, this analysis is necessary to ensure that we have enough customers and that we are not so close to other sushi places.

2. Data requirements

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.

In addition, Sushi category Id 4bf58dd8d48988d1d2941735 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 converted the addresses into their equivalent latitude and longitude values. Then we will use the Foursquare API to explore neighborhoods in Manhattan, New York. After that, we will use explore function to get sushi restaurant categories in each neighborhood.

	Neighborhood	Neighborhood Latitude	Neighborhood Longitude	Venue	Venue Latitude	Venue Longitude	Venue Category
0	Fieldston	40.895437	-73.905643	Asian Tokyo	40.890839	-73.898335	Sushi Restaurant
1	Fieldston	40.895437	-73.905643	Yokohama	40.887214	-73.904708	Sushi Restaurant
2	Riverdale	40.890834	-73.912585	Planet Tokyo	40.886158	-73.909615	Sushi Restaurant
3	Riverdale	40.890834	-73.912585	Yokohama	40.887214	-73.904708	Sushi Restaurant
4	Kingsbridge	40.881687	-73.902818	Yokohama	40.887214	-73.904708	Sushi Restaurant

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newyork_venues_sushi.shape
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(1763, 7)
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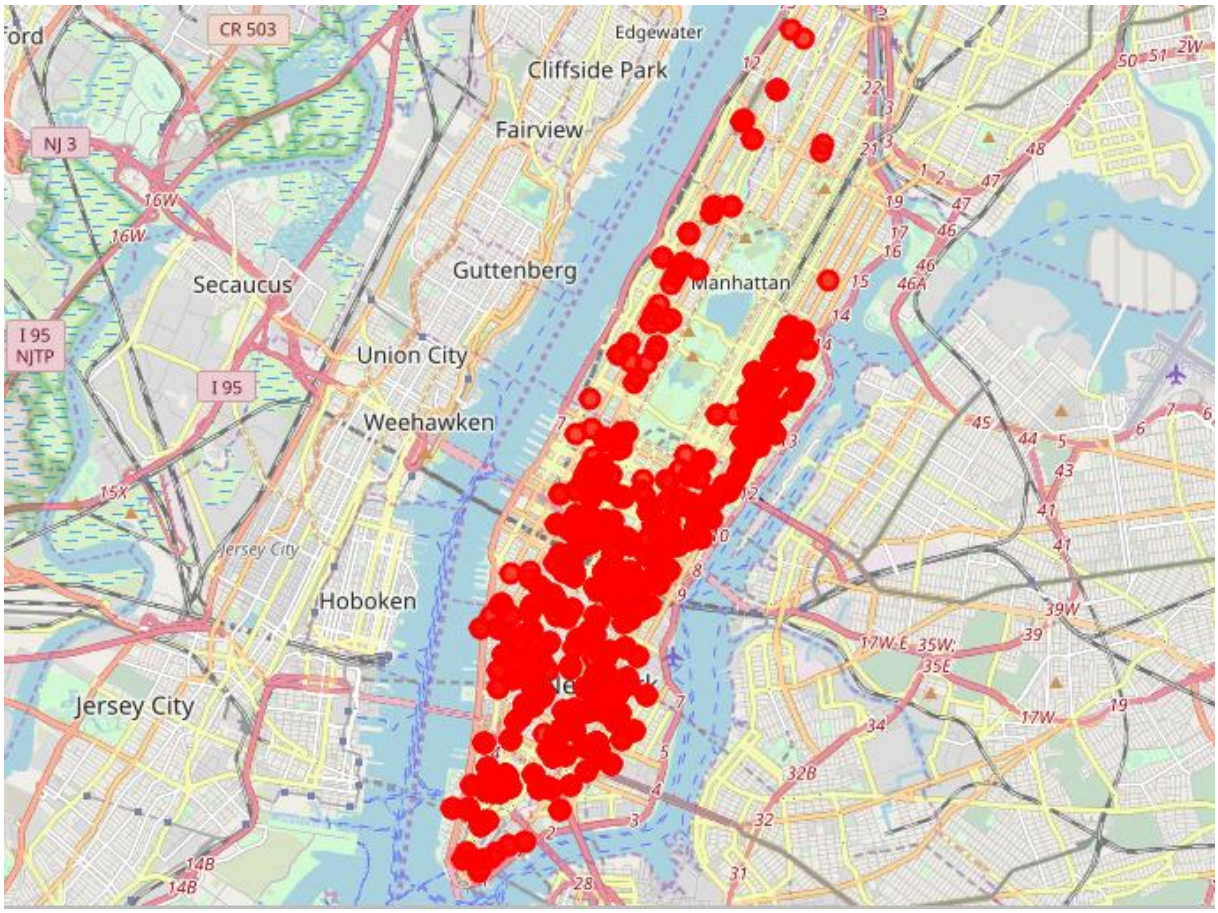
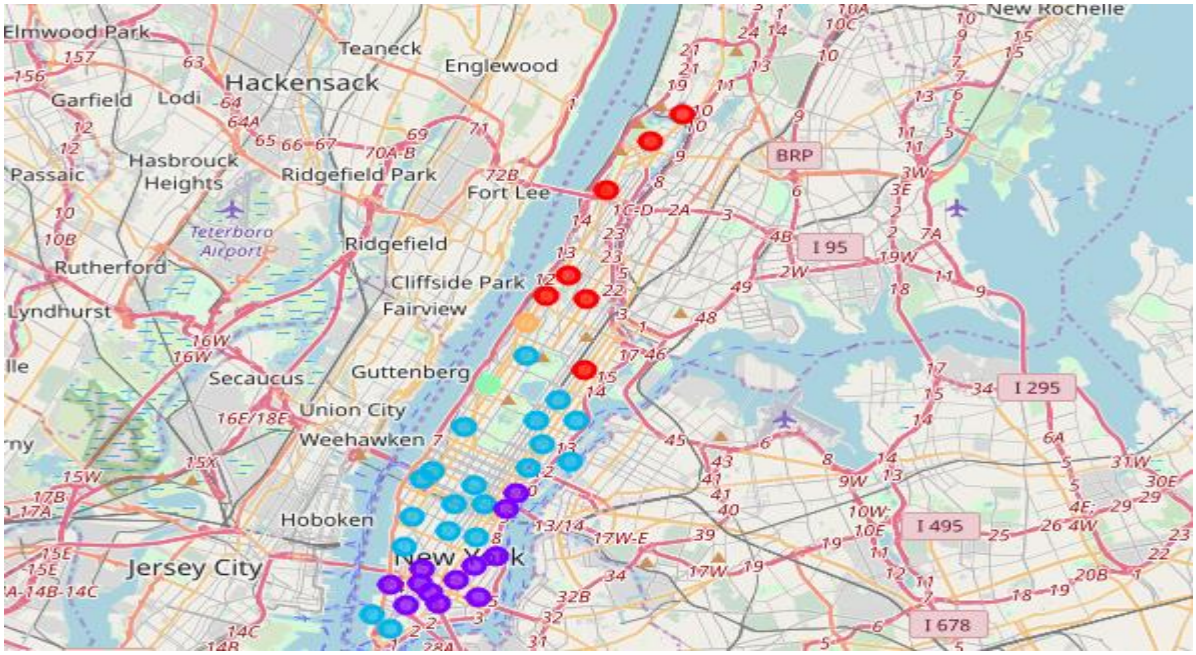


Sushi bars in Manhattan

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

Then I have used these features to group the neighborhoods into clusters using a K-means clustering algorithm. And, the Folium library was used 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
0	Annadale	Sushi Restaurant	Vegetarian / Vegan Restaurant	Korean Restaurant	Bakery	Bubble Tea Shop	Burger Joint	Café	Chinese Restaurant	Cocktail Bar
1	Arden Heights	Sushi Restaurant	Vegetarian / Vegan Restaurant	Korean Restaurant	Bakery	Bubble Tea Shop	Burger Joint	Café	Chinese Restaurant	Cocktail Bar
2	Astoria	Sushi Restaurant	Asian Restaurant	Japanese Restaurant	Korean Restaurant	Bakery	Bubble Tea Shop	Burger Joint	Café	Chinese Restaurant
3	Astoria Heights	Sushi Restaurant	Vegetarian / Vegan Restaurant	Korean Restaurant	Bakery	Bubble Tea Shop	Burger Joint	Café	Chinese Restaurant	Cocktail Bar
4	Auburndale	Sushi Restaurant	Vegetarian / Vegan Restaurant	Korean Restaurant	Bakery	Bubble Tea Shop	Burger Joint	Café	Chinese Restaurant	Cocktail Bar



4. Results

K-mean Cluster Using K-means to cluster the data area with less number of sushi bars, we get 5 clusters.

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	C
0	Manhattan	Marble Hill	40.876551	-73.910660	0	Sushi Restaurant	Vegetarian / Vegan Restaurant	Korean Restaurant	Bakery	Bubble Tea Shop	Burger Joint	Café	Chinese Restaurant	Cocktail Bar	
1	Manhattan	Chinatown	40.715618	-73.994279	0	Sushi Restaurant	Japanese Restaurant	Vegetarian / Vegan Restaurant	Korean Restaurant	Bakery	Bubble Tea Shop	Burger Joint	Café	Chinese Restaurant	
2	Manhattan	Washington Heights	40.851903	-73.936900	0	Sushi Restaurant	Vegetarian / Vegan Restaurant	Korean Restaurant	Bakery	Bubble Tea Shop	Burger Joint	Café	Chinese Restaurant	Cocktail Bar	
3	Manhattan	Inwood	40.867684	-73.921210	0	Sushi Restaurant	Vegetarian / Vegan Restaurant	Korean Restaurant	Bakery	Bubble Tea Shop	Burger Joint	Café	Chinese Restaurant	Cocktail Bar	
4	Manhattan	Hamilton Heights	40.823604	-73.949688	0	Sushi Restaurant	Vegetarian / Vegan Restaurant	Korean Restaurant	Bakery	Bubble Tea Shop	Burger Joint	Café	Chinese Restaurant	Cocktail Bar	

Cluster 1

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manhattan_merged.loc[manhattan_merged['Cluster Labels'] == 1, manhattan_merged.columns[[1] + list(range(5, manhattan_merged.shape[1]))]]
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	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	Sushi Restaurant	Japanese Restaurant	Vegetarian / Vegan Restaurant	Noodle House	Bakery	Chinese Restaurant	Cocktail Bar	Deli / Bodega	Grocery Store	Hawaiian Restaurant
18	Greenwich Village	Sushi Restaurant	Japanese Restaurant	Sake Bar	Grocery Store	Vegetarian / Vegan Restaurant	Noodle House	Bakery	Chinese Restaurant	Cocktail Bar	Deli / Bodega
19	East Village	Sushi Restaurant	Japanese Restaurant	Vegetarian / Vegan Restaurant	Noodle House	Bakery	Chinese Restaurant	Cocktail Bar	Deli / Bodega	Grocery Store	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
21	Tribeca	Sushi Restaurant	Noodle House	Japanese Restaurant	Theme Restaurant	Vegetarian / Vegan Restaurant	Bakery	Chinese Restaurant	Cocktail Bar	Deli / Bodega	Grocery Store
22	Little Italy	Sushi Restaurant	Japanese Restaurant	Noodle House	Vegetarian / Vegan Restaurant	Bakery	Chinese Restaurant	Cocktail Bar	Deli / Bodega	Grocery Store	Hawaiian Restaurant
23	Soho	Sushi Restaurant	Japanese Restaurant	Noodle House	Theme Restaurant	Vegetarian / Vegan Restaurant	Bakery	Chinese Restaurant	Cocktail Bar	Deli / Bodega	Grocery Store
31	Noho	Sushi Restaurant	Japanese Restaurant	Vegetarian / Vegan Restaurant	Noodle House	Bakery	Chinese Restaurant	Cocktail Bar	Deli / Bodega	Grocery Store	Hawaiian Restaurant
32	Civic Center	Sushi Restaurant	Japanese Restaurant	Noodle House	Theme Restaurant	Vegetarian / Vegan Restaurant	Bakery	Chinese Restaurant	Cocktail Bar	Deli / Bodega	Grocery Store
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
37	Stuyvesant Town	Sushi Restaurant	Japanese Restaurant	Vegetarian / Vegan Restaurant	Noodle House	Bakery	Chinese Restaurant	Cocktail Bar	Deli / Bodega	Grocery Store	Hawaiian Restaurant

Cluster 2

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manhattan_merged.loc[manhattan_merged['Cluster Labels'] == 2, manhattan_merged.columns[[1] + list(range(5, manhattan_merged.shape[1]))]]
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	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	Sushi Restaurant	Japanese Restaurant	Asian Restaurant	Grocery Store	Noodle House	Bakery	Chinese Restaurant	Cocktail Bar	Deli / Bodega	Hawaiian Restaurant
9	Yorkville	Sushi Restaurant	Japanese Restaurant	Asian Restaurant	Chinese Restaurant	Noodle House	Bakery	Cocktail Bar	Deli / Bodega	Grocery Store	Hawaiian Restaurant
10	Lenox Hill	Sushi Restaurant	Asian Restaurant	Japanese Restaurant	Grocery Store	Noodle House	Bakery	Chinese Restaurant	Cocktail Bar	Deli / Bodega	Hawaiian Restaurant
11	Roosevelt Island	Sushi Restaurant	Asian Restaurant	Japanese Restaurant	Noodle House	Bakery	Chinese Restaurant	Cocktail Bar	Deli / Bodega	Grocery Store	Hawaiian Restaurant
13	Lincoln Square	Sushi Restaurant	Japanese Restaurant	Smoothie Shop	Chinese Restaurant	Grocery Store	Vegetarian / Vegan Restaurant	Noodle House	Bakery	Cocktail Bar	Deli / Bodega
14	Clinton	Sushi Restaurant	Japanese Restaurant	Poke Place	Chinese Restaurant	Cocktail Bar	Asian Restaurant	Seafood Restaurant	Sandwich Place	Sake Bar	Restaurant
15	Midtown	Sushi Restaurant	Asian Restaurant	Japanese Restaurant	Seafood Restaurant	Ramen Restaurant	Bakery	Vegetarian / Vegan Restaurant	Sandwich Place	Sake Bar	Restaurant
16	Murray Hill	Sushi Restaurant	Japanese Restaurant	Asian Restaurant	Restaurant	Bakery	Chinese Restaurant	Ramen Restaurant	Vegetarian / Vegan Restaurant	Sake Bar	Sandwich Place
17	Chelsea	Sushi Restaurant	Japanese Restaurant	Asian Restaurant	Vegetarian / Vegan Restaurant	Smoothie Shop	Seafood Restaurant	Sandwich Place	Sake Bar	Restaurant	Ramen Restaurant
24	West Village	Sushi Restaurant	Japanese Restaurant	Vegetarian / Vegan Restaurant	Sake Bar	Grocery Store	Asian Restaurant	Sandwich Place	Seafood Restaurant	Restaurant	Ramen Restaurant
25	Manhattan Valley	Sushi Restaurant	Hawaiian Restaurant	Japanese Restaurant	Vegetarian / Vegan Restaurant	Noodle House	Bakery	Chinese Restaurant	Cocktail Bar	Deli / Bodega	Grocery Store
27	Gramercy	Sushi Restaurant	Japanese Restaurant	Vegetarian / Vegan Restaurant	Chinese Restaurant	Noodle House	Bakery	Cocktail Bar	Deli / Bodega	Grocery Store	Hawaiian Restaurant
28	Battery Park City	Sushi Restaurant	Japanese Restaurant	Noodle House	Theme Restaurant	Vegetarian / Vegan Restaurant	Bakery	Chinese Restaurant	Cocktail Bar	Deli / Bodega	Grocery Store
29	Financial District	Sushi Restaurant	Japanese Restaurant	Vegetarian / Vegan Restaurant	Noodle House	Bakery	Chinese Restaurant	Cocktail Bar	Deli / Bodega	Grocery Store	Hawaiian Restaurant
30	Carnegie Hill	Sushi Restaurant	Japanese Restaurant	Asian Restaurant	Chinese Restaurant	Noodle House	Bakery	Cocktail Bar	Deli / Bodega	Grocery Store	Hawaiian Restaurant
33	Midtown South	Sushi Restaurant	Asian Restaurant	Japanese Restaurant	Restaurant	Bakery	Chinese Restaurant	Ramen Restaurant	Vegetarian / Vegan Restaurant	Sake Bar	Sandwich Place
34	Sutton Place	Sushi Restaurant	Asian Restaurant	Japanese Restaurant	Steakhouse	Seafood Restaurant	Deli / Bodega	Bakery	Chinese Restaurant	Cocktail Bar	Grocery Store

Cluster 3

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

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]))]]
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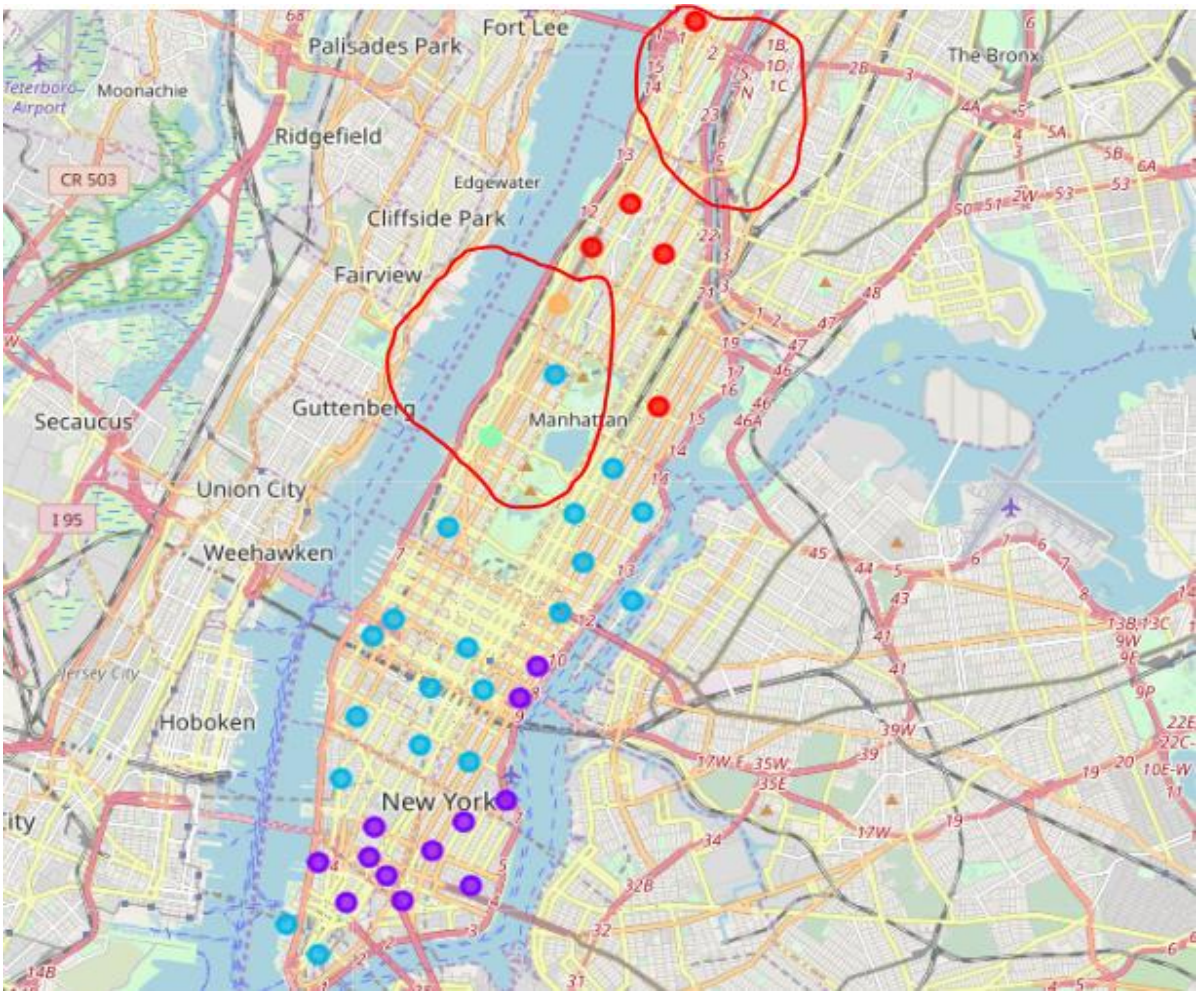
	Neighborhood	1st Most Common Venue	2nd Most Common Venue	3rd Most Common Venue	4th Most Common Venue	5th Most Common Venue	6th Most Common Venue	7th Most Common Venue	8th Most Common Venue	9th Most Common Venue	10th Most Common Venue
26	Morningside Heights	Sushi Restaurant	Hawaiian Restaurant	Vegetarian / Vegan Restaurant	Noodle House	Bakery	Chinese Restaurant	Cocktail Bar	Deli / Bodega	Grocery Store	Japanese Restaurant



<u>Based on the data frame analysis above, Cluster 3 (Upper West Side) and Cluster 4 (Morningside Heights) areas are the best places to open a new sushi bar business</u>.

5. Discussion

In this section, I would be discussing the observations I have noted and the recommendations that I can make based on the results.

This analysis is performed on limited data. But if a 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 a business in these areas.
- Central Harlem also has a potential close to the Morningside Heights area.
- A more detailed analysis can be done by adding other factors such as transportation, demographics of inhabitants.

Finally, FourSquare proved to be a good source of data but frustrating at times.
Despite having a Developer account, I regularly exceeded my hourly limit locking me out for the day.

6. Conclusion

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

As per the neighborhood or restaurant type (like Sushi), restaurants analysis can be done and a venue with the lowest risk and competition can be identified.