CAPSTONE PROJECT: THE BATTLE OF NEIGHBORHOODS

Selecting the best location to open a Vegan SUSHI BAR in Manhattan, New York

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The Battle of the Neighborhoods – Final Report

1. Introduction:

The City of New York is the most populated city in the United States. It is diverse and is the financial capital of USA and is multicultural. It provides lot of business opportunities and business friendly environment as Ill as has attracted many different players into the market. It is also 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 among others in the United States. This also means that the market is severely 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 very carefully. The insights derived from this analysis will give a better understanding of the business environment which in return would help in strategically targeting the market. This will also aid in the reduction of risk and therefore, the Return on Investment will be reasonable.

Business Problem

The City of New York is famous for its excellent cuisines. It's food culture includes an variety of international cuisines influenced by the city's immigrant history. Recently, Vegan Sushi restaurants have become so popular in the United States now that veganism is highly popular in the young hip cultural. Thus, it appears that there is one on every corner and not only in major cities but also have started making appearances in smaller cities internationally. Starting a Vegan sushi restaurant can be a great business opportunity, but I need to distinguish ourselves from others to enjoy steady long-term successes.

If I plan a real restaurant that can demand higher prices for fresh fish and seafood replacement, delivered daily from Japan, I need to focus on neighborhoods and outlets that already attract a sophisticated Vegans as well as the original Japanese clientele. However, if I plan to have a cheaper buffet restaurant, it points to the masses looking for affordable high-traffic locations in large shopping centers and other local points of interest. Therefore, it is evident that in order to survive in such a fiercely competitive

market, it is very important to systematically and strategically plan. There are various factors need to be studied and considered in order to decide on the most effective location.

My Stakeholder wants to open her business in Manhattan area, therefore I have only focus on that borough during my analysis. The objective is to locate, analyze and recommend to the management which neighborhood of New York City will be best choice to start a vegan sushi restaurant. The Management also expects to understand the rationale of the recommendations made.

This would be a huge interest any stakeholder planning to start a new restaurant venture in New York City.

2. **Data**

Assumption for the project is that every regular sushi place in New York is a Vegan place.

Data 1: Neighborhood has a total of 5 boroughs and 306 neighborhoods. In order to segment the neighborhoods and explore them, I 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 website. Link to the dataset is: https://geo.nyu.edu/catalog/nyu_2451_34572

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. I used the Foursquare API to explore neighborhoods in New York City. The below is image of the Foursquare API data.

	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

In addition, Sushi category ID: 4bf58dd8d48988d1d2941735 was used for retrieving data from Foursquare API.

3. Methodology

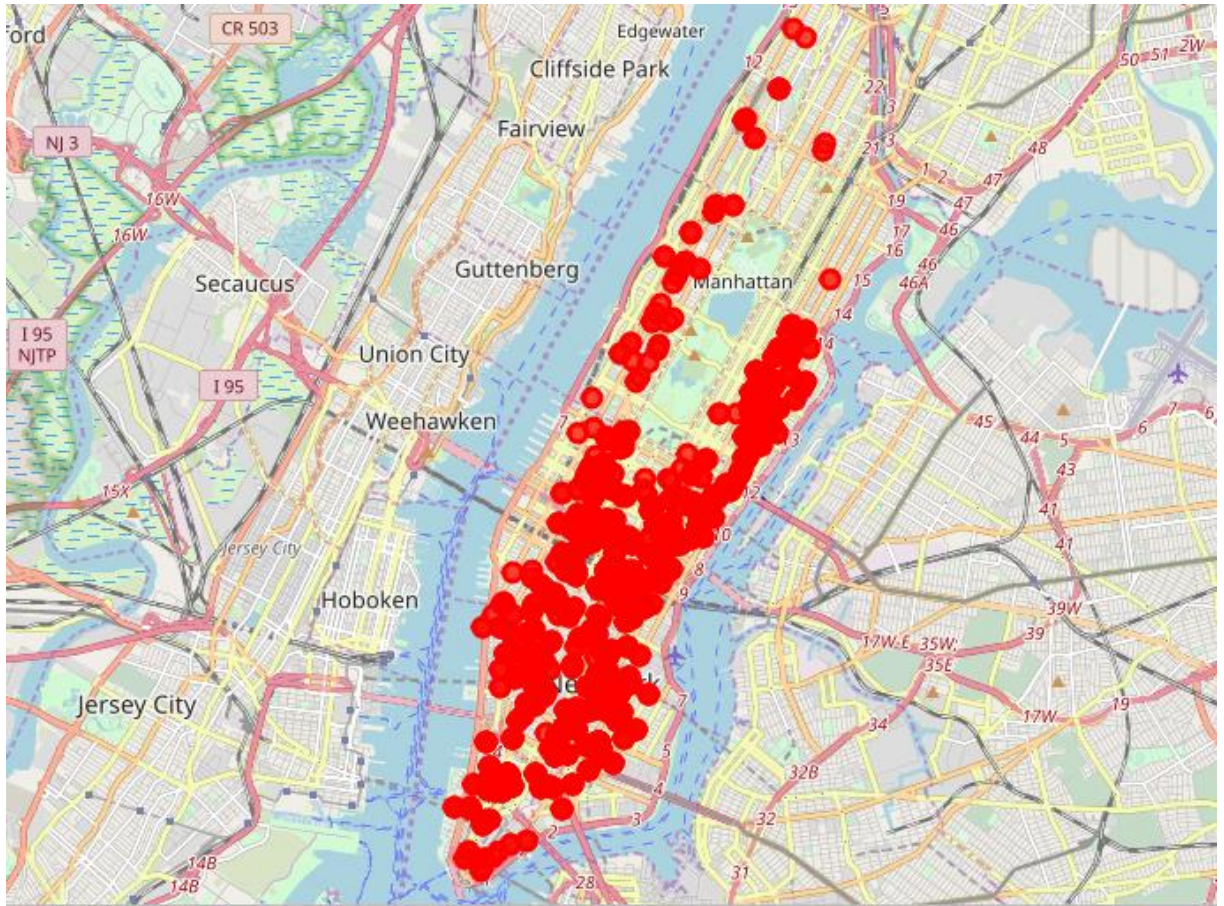In this project, I used the basic methodology as taught in the labs.

	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 addresses into their equivalent latitude and longitude values. Then I used the Foursquare API to then explore neighborhoods in Manhattan, New York. Once that is completed, explore function to get sushi restaurant categories in each neighborhood.

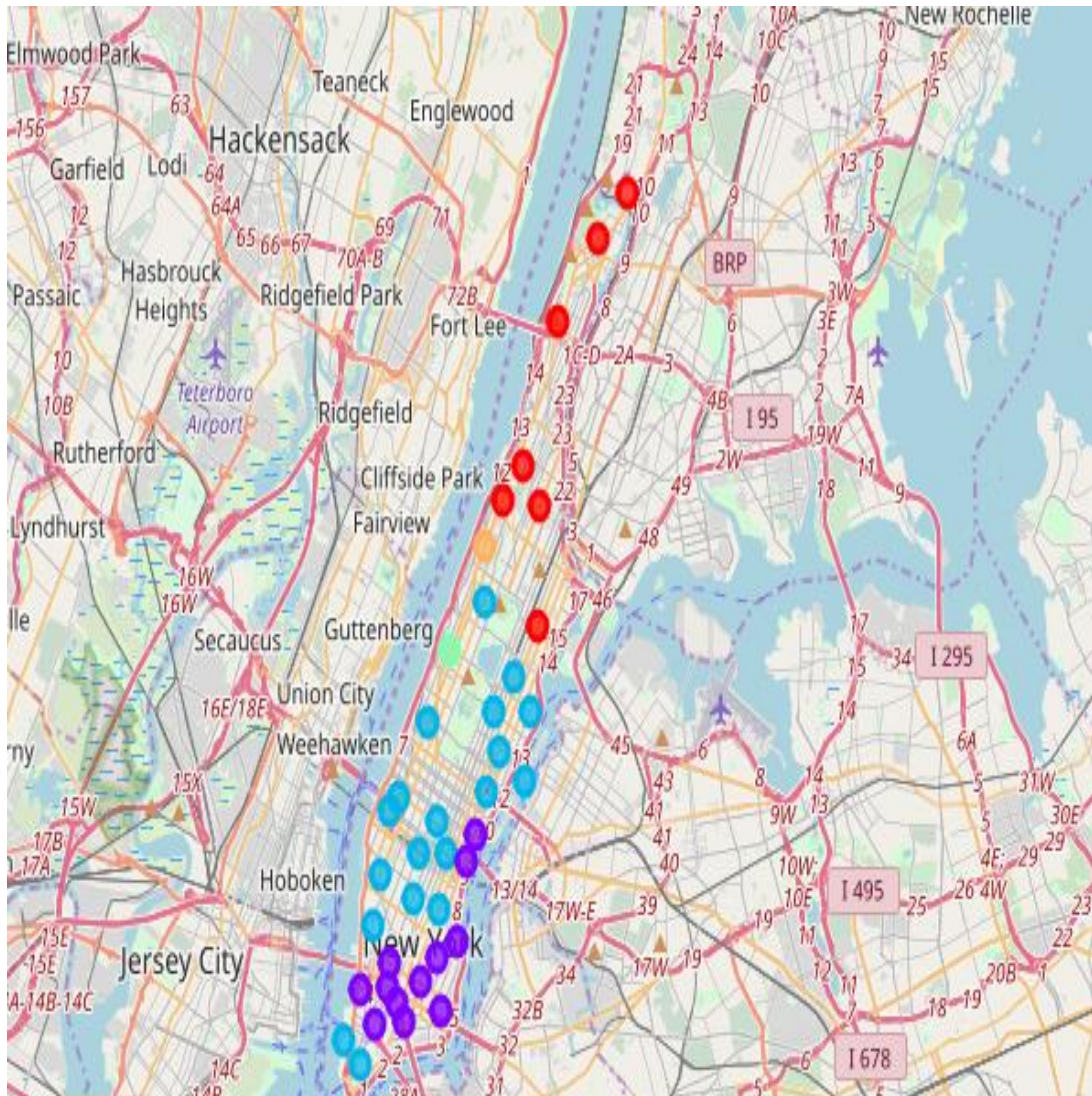|	Neighborhood	Neighborhood Latitude	Neighborhood Longitude	Venue	Venue Latitude	Venue Longitude	Venue Category
0	Fieldston	40.895437	-73.905643	Asian Tokyo	40.890839	-73.898335	Sushi Restaurant
1	Fieldston	40.895437	-73.905643	Yokohama	40.887214	-73.904708	Sushi Restaurant
2	Riverdale	40.890834	-73.912585	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	R
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	

Next, by using feature to group the neighborhoods into clusters, the K-means clustering algorithm was used to complete the task. Folium library is then 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-mean to clustering data area with least 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	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

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

```
manhattan_merged.loc[manhattan_merged['Cluster Labels'] == 2, manhattan_merged.columns[[1] + list(range(5, manhattan_merged.shape[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
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
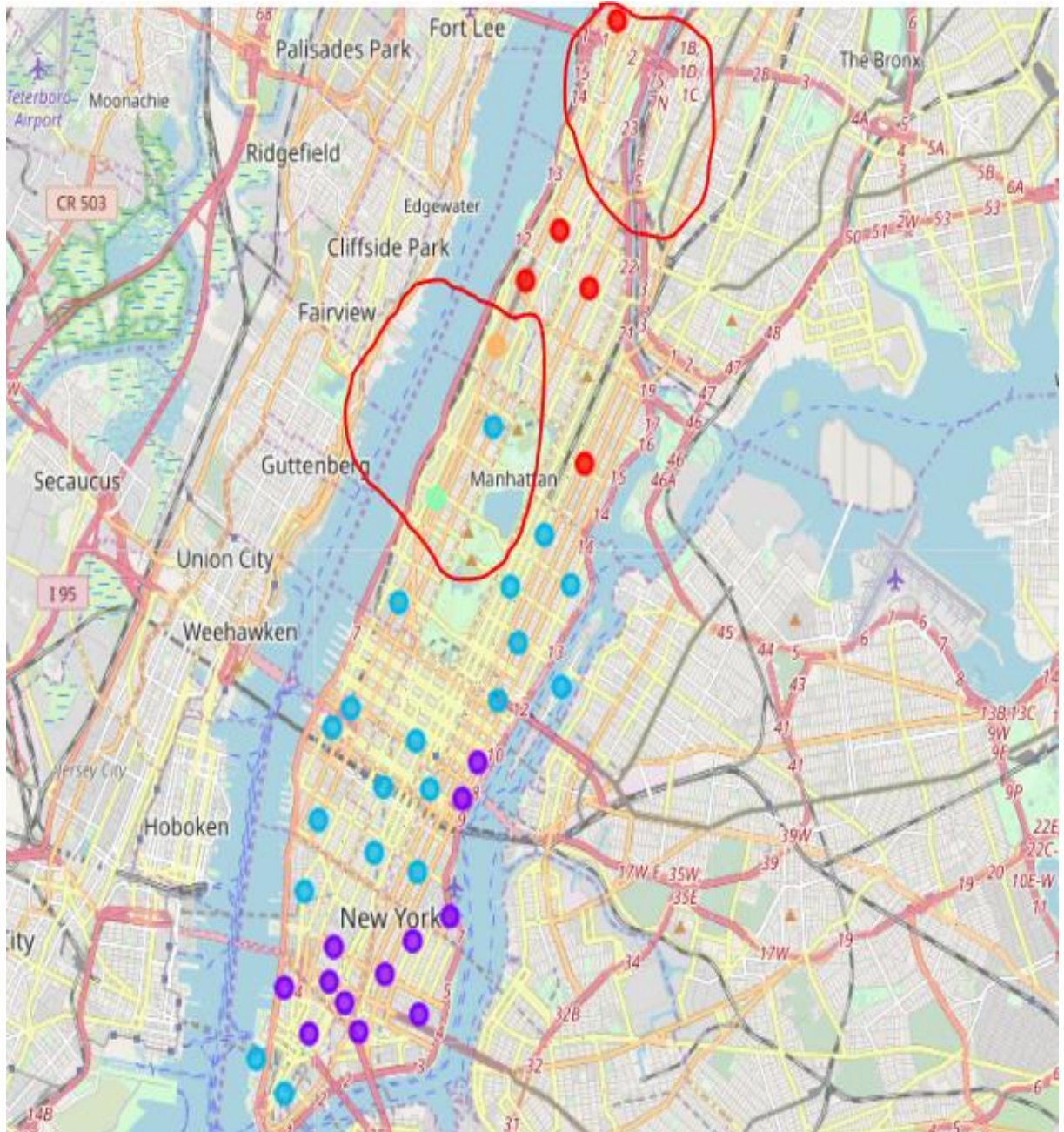
```
manhattan_merged.loc[manhattan_merged['Cluster Labels'] == 3, manhattan_merged.columns[[1] + list(range(5, manhattan_merged.shape[1]))]]
```

	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
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

```
manhattan_merged.loc[manhattan_merged['Cluster Labels'] == 4, manhattan_merged.columns[[1] + list(range(5, manhattan_merged.shape[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
26	Morningside Heights	Sushi Restaurant	Hawaiian Restaurant	Vegetarian / Vegan Restaurant	Noodle House	Bakery	Chinese Restaurant	Cocktail Bar	Deli / Bodega	Grocery Store	Japanese Restaurant

Based on dataframe analysis provided in the slides above, Cluster 3 (The Upper West Side) and Cluster 4 (The Morningside Heights) areas are the best places to open a new vegan sushi bar venture.

5. Discussion

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

The analysis was performed on limited data. This may sway either direction however, as there was a good amount of data is available, there was a scope to produce great results.

- There is a very severe competition in Midtown and Soho regions, therefore, I believe that it is very risky to open a new vegan venture in those areas.
- However, I would strongly recommend the Central Harlem region as it has great potentials as it is closer to the Morningside Heights area.
- These findings and recommendations can be further enhanced by adding a more detailed analysis on other factors such as transportation and demographics of inhabitants in the New York region.

Finally, FourSquare proved to be a good source for obtaining data but personally I found it extremely frustrating at times. This is solely because despite having a Developer account, I regularly exceeded my hourly limit locking me out for the day.

6. Conclusion

In conclusion, even though all aspects of the goals in this project were met, there is always room for further improvement and development. However, with the goals of the project being met and, of course with some more detailed work, it could easily be developed into a fully pledged application that could support the opening a business idea in an any unknown location (if not several).