Capstone Project - The Battle of Neighbourhoods (Week 4 and 5)

Selecting the best location to open an SUSHI bar in Manhattan, New York

1. Introduction and 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 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 neighbourhood based on the number of sushi bars which are operating right in each neighbourhood. 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 neighbourhood 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.

2. Introduction and business problem

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 are 1763 sushi bars that are currently operating.

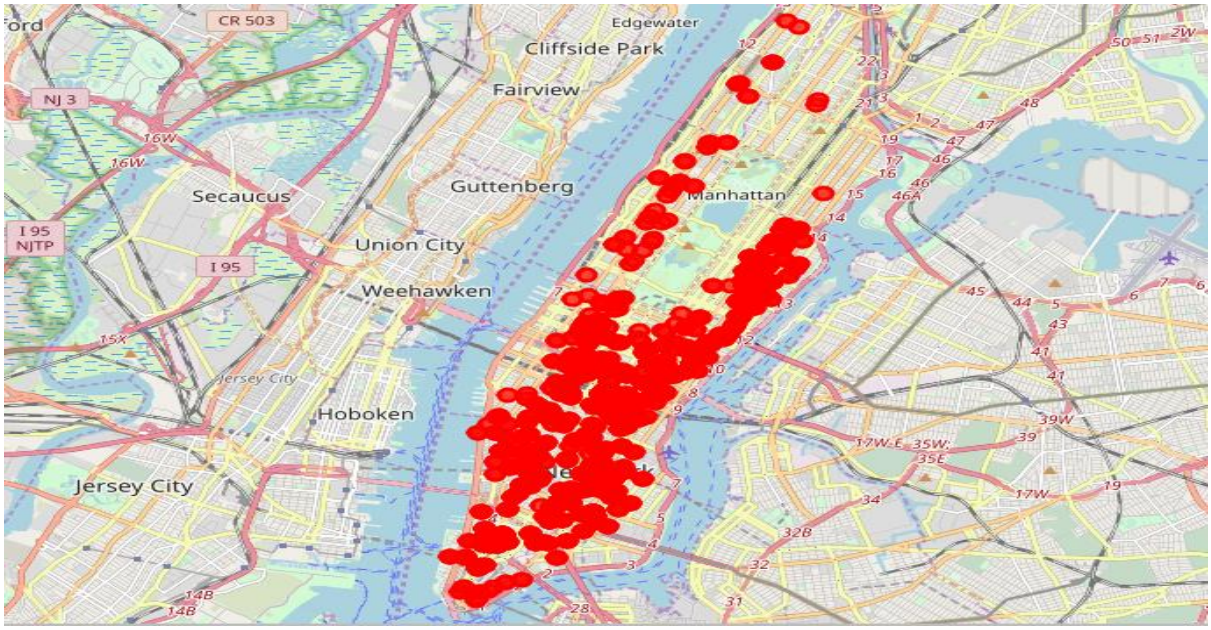
Next, we also used Google Map API to find their geographic coordinates of the 5 locations shortlisted for our sushi bar:

	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

3. Methodology

Addresses are converted into their equivalent latitude and longitude values. Foursquare API is used to explore neighbourhoods in Manhattan, New York. After that, explore function to get sushi restaurant categories in each neighbourhood.

	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	



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
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

We used K-mean to clustering data area to find areas with less number of sushi bars.

Cluster 1:

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In [26]: manhattan_merged.loc[manhattan_merged['Cluster Labels'] == 0, 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	10th Most Common Venue
1	Chinatown	Sushi Restaurant	Japanese Restaurant	Vegetarian / Vegan Restaurant	Bakery	Chinese Restaurant	Cocktail Bar	Deli / Bodega	Fish Market	Grocery Store	Hawaiian Restaurant
11	Roosevelt Island	Sushi Restaurant	Asian Restaurant	Japanese Restaurant	Bakery	Chinese Restaurant	Cocktail Bar	Deli / Bodega	Fish Market	Grocery Store	Hawaiian Restaurant
19	East Village	Sushi Restaurant	Japanese Restaurant	Vegetarian / Vegan Restaurant	Bakery	Chinese Restaurant	Cocktail Bar	Deli / Bodega	Fish Market	Grocery Store	Hawaiian Restaurant
21	Tribeca	Sushi Restaurant	Noodle House	Theme Restaurant	Indian Chinese Restaurant	Bakery	Chinese Restaurant	Cocktail Bar	Deli / Bodega	Fish Market	Grocery Store
22	Little Italy	Sushi Restaurant	Japanese Restaurant	Noodle House	Bakery	Chinese Restaurant	Cocktail Bar	Deli / Bodega	Fish Market	Grocery Store	Hawaiian Restaurant
23	Soho	Sushi Restaurant	Japanese Restaurant	Noodle House	Theme Restaurant	Indian Chinese Restaurant	Bakery	Chinese Restaurant	Cocktail Bar	Deli / Bodega	Fish Market
27	Gramercy	Sushi Restaurant	Japanese Restaurant	Vegetarian / Vegan Restaurant	Deli / Bodega	Bakery	Chinese Restaurant	Cocktail Bar	Fish Market	Grocery Store	Hawaiian Restaurant
29	Financial District	Sushi Restaurant	Japanese Restaurant	Vegetarian / Vegan Restaurant	Bakery	Chinese Restaurant	Cocktail Bar	Deli / Bodega	Fish Market	Grocery Store	Hawaiian Restaurant
31	Noho	Sushi Restaurant	Japanese Restaurant	Vegetarian / Vegan Restaurant	Bakery	Chinese Restaurant	Cocktail Bar	Deli / Bodega	Fish Market	Grocery Store	Hawaiian Restaurant
32	Civic Center	Sushi Restaurant	Japanese Restaurant	Noodle House	Theme Restaurant	Indian Chinese Restaurant	Bakery	Chinese Restaurant	Cocktail Bar	Deli / Bodega	Fish Market
35	Turtle Bay	Sushi Restaurant	Japanese Restaurant	Asian Restaurant	Steakhouse	Seafood Restaurant	Hawaiian Restaurant	Bakery	Chinese Restaurant	Cocktail Bar	Deli / Bodega
36	Tudor City	Sushi Restaurant	Asian Restaurant	Japanese Restaurant	Vegetarian / Vegan Restaurant	Steakhouse	Smoothie Shop	Hawaiian Restaurant	Bakery	Chinese Restaurant	Cocktail Bar
37	Stuyvesant Town	Sushi Restaurant	Japanese Restaurant	Vegetarian / Vegan Restaurant	Bakery	Chinese Restaurant	Cocktail Bar	Deli / Bodega	Fish Market	Grocery Store	Hawaiian Restaurant
38	Flatiron	Sushi Restaurant	Japanese Restaurant	Vegetarian / Vegan Restaurant	Deli / Bodega	Asian Restaurant	Seafood Restaurant	Sandwich Place	Sake Bar	Restaurant	Ramen Restaurant
39	Hudson Yards	Sushi Restaurant	Asian Restaurant	Japanese Restaurant	Cocktail Bar	Bakery	Chinese Restaurant	Deli / Bodega	Fish Market	Grocery Store	Hawaiian Restaurant

Cluster 2:

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In [27]: manhattan_merged.loc[manhattan_merged['Cluster Labels'] == 1, manhattan_merged.columns[[1] + list(range(5, manhattan_merged.shape[1]))]]
```

Out[27]:

	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	Bakery	Chinese Restaurant	Cocktail Bar	Deli / Bodega	Fish Market	Hawaiian Restaurant
20	Lower East Side	Sushi Restaurant	Japanese Restaurant	Vegetarian / Vegan Restaurant	Bakery	Chinese Restaurant	Cocktail Bar	Deli / Bodega	Fish Market	Grocery Store	Hawaiian Restaurant

Cluster 3:

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In [28]: manhattan_merged.loc[manhattan_merged['Cluster Labels'] == 2, manhattan_merged.columns[[1] + list(range(5, manhattan_merged.shape[1]))]]
```

Out[28]:

	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	Fish Market	Vegetarian / Vegan Restaurant	Seafood Restaurant	Sandwich Place	Sake Bar	Restaurant	Ramen Restaurant
9	Yorkville	Sushi Restaurant	Japanese Restaurant	Vegetarian / Vegan Restaurant	Fish Market	Indian Chinese Restaurant	Asian Restaurant	Sandwich Place	Sake Bar	Restaurant	Ramen Restaurant
10	Lenox Hill	Sushi Restaurant	Asian Restaurant	Japanese Restaurant	Fish Market	Vegetarian / Vegan Restaurant	Seafood Restaurant	Sandwich Place	Sake Bar	Restaurant	Ramen Restaurant
13	Lincoln Square	Sushi Restaurant	Japanese Restaurant	Smoothie Shop	Chinese Restaurant	Grocery Store	Vegetarian / Vegan Restaurant	Indian Chinese Restaurant	Bakery	Cocktail Bar	Deli / Bodega
14	Clinton	Sushi Restaurant	Japanese Restaurant	Asian Restaurant	Chinese Restaurant	Seafood Restaurant	Cocktail Bar	Indian Chinese Restaurant	Bakery	Deli / Bodega	Fish Market
15	Midtown	Sushi Restaurant	Asian Restaurant	Japanese Restaurant	Seafood Restaurant	Restaurant	Bakery	Ramen Restaurant	Vegetarian / Vegan Restaurant	Sandwich Place	Sake Bar
16	Murray Hill	Sushi Restaurant	Japanese Restaurant	Asian Restaurant	Restaurant	Bakery	Ramen Restaurant	Vegetarian / Vegan Restaurant	Sake Bar	Sandwich Place	Seafood Restaurant
17	Chelsea	Sushi Restaurant	Japanese Restaurant	Asian Restaurant	Fish Market	Vegetarian / Vegan Restaurant	Seafood Restaurant	Sandwich Place	Sake Bar	Restaurant	Ramen Restaurant
24	West Village	Sushi Restaurant	Japanese Restaurant	Vegetarian / Vegan Restaurant	Sake Bar	Fish Market	Asian Restaurant	Sandwich Place	Seafood Restaurant	Restaurant	Ramen Restaurant
28	Battery Park City	Sushi Restaurant	Japanese Restaurant	Noodle House	Theme Restaurant	Indian Chinese Restaurant	Bakery	Chinese Restaurant	Cocktail Bar	Deli / Bodega	Fish Market
30	Carnegie Hill	Sushi Restaurant	Japanese Restaurant	Vegetarian / Vegan Restaurant	Indian Chinese Restaurant	Asian Restaurant	Seafood Restaurant	Sandwich Place	Sake Bar	Restaurant	Ramen Restaurant
33	Midtown South	Sushi Restaurant	Japanese Restaurant	Asian Restaurant	Restaurant	Bakery	Ramen Restaurant	Vegetarian / Vegan Restaurant	Sake Bar	Sandwich Place	Seafood Restaurant
34	Sutton Place	Sushi Restaurant	Asian Restaurant	Japanese Restaurant	Steakhouse	Seafood Restaurant	Deli / Bodega	Hawaiian Restaurant	Bakery	Chinese Restaurant	Cocktail Bar

Cluster 4:

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In [29]: manhattan_merged.loc[manhattan_merged['Cluster Labels'] == 3, manhattan_merged.columns[[1] + list(range(5, manhattan_merged.shape[1]))]]
```

Out[29]:

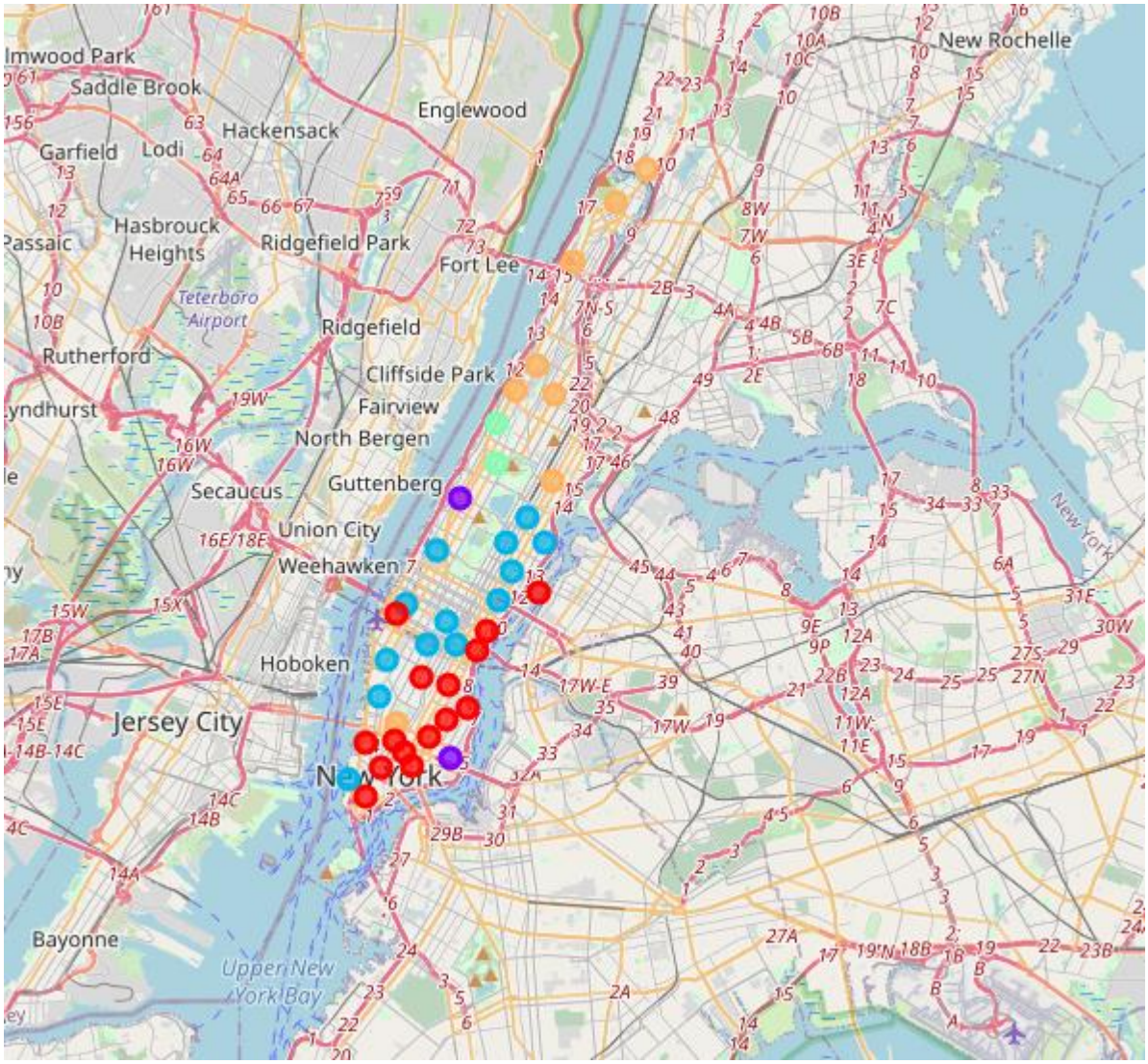
	Neighborhood	1st Most Common Venue	2nd Most Common Venue	3rd Most Common Venue	4th Most Common Venue	5th Most Common Venue	6th Most Common Venue	7th Most Common Venue	8th Most Common Venue	9th Most Common Venue	10th Most Common Venue
25	Manhattan Valley	Sushi Restaurant	Japanese Restaurant	Hawaiian Restaurant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

Cluster 5:

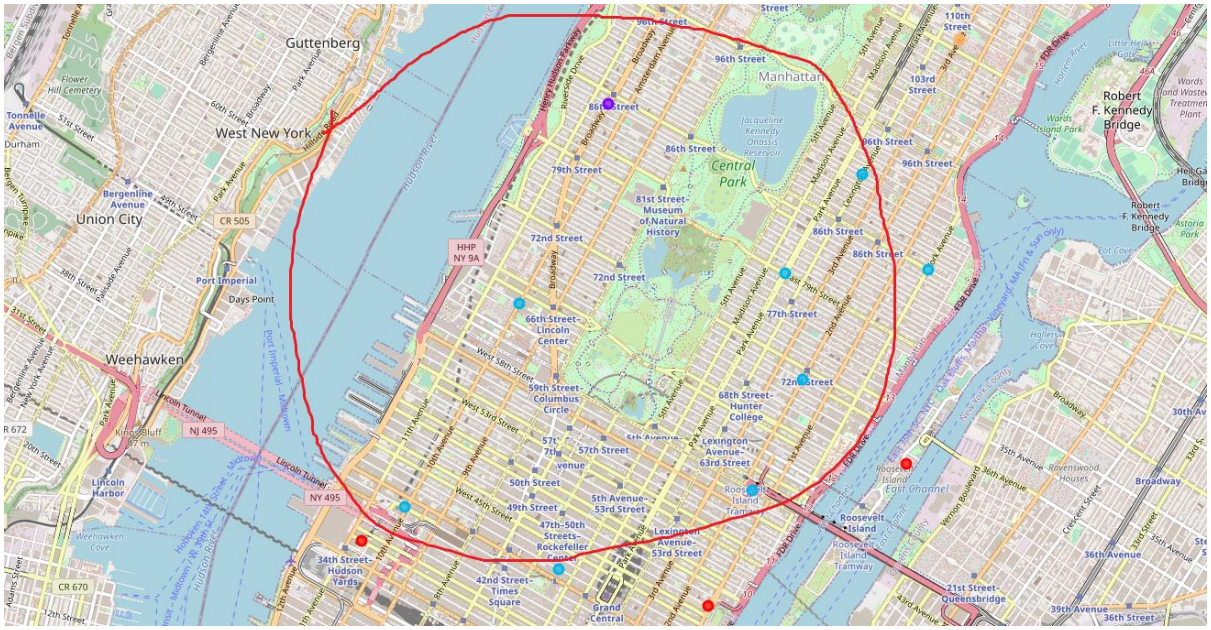
```
In [30]: manhattan_merged.loc[manhattan_merged['Cluster Labels'] == 4, manhattan_merged.columns[[1] + list(range(5, manhattan_merged.shape[1]))]]
```

Out[30]:

	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	Japanese Restaurant	Bakery	Chinese Restaurant	Cocktail Bar	Deli / Bodega	Fish Market	Grocery Store	Hawaiian Restaurant
2	Washington Heights	Sushi Restaurant	Vegetarian / Vegan Restaurant	Japanese Restaurant	Bakery	Chinese Restaurant	Cocktail Bar	Deli / Bodega	Fish Market	Grocery Store	Hawaiian Restaurant
3	Inwood	Sushi Restaurant	Vegetarian / Vegan Restaurant	Japanese Restaurant	Bakery	Chinese Restaurant	Cocktail Bar	Deli / Bodega	Fish Market	Grocery Store	Hawaiian Restaurant
4	Hamilton Heights	Sushi Restaurant	Vegetarian / Vegan Restaurant	Japanese Restaurant	Bakery	Chinese Restaurant	Cocktail Bar	Deli / Bodega	Fish Market	Grocery Store	Hawaiian Restaurant
5	Manhattanville	Sushi Restaurant	Vegetarian / Vegan Restaurant	Japanese Restaurant	Bakery	Chinese Restaurant	Cocktail Bar	Deli / Bodega	Fish Market	Grocery Store	Hawaiian Restaurant
6	Central Harlem	Sushi Restaurant	Vegetarian / Vegan Restaurant	Japanese Restaurant	Bakery	Chinese Restaurant	Cocktail Bar	Deli / Bodega	Fish Market	Grocery Store	Hawaiian Restaurant
7	East Harlem	Sushi Restaurant	Vegetarian / Vegan Restaurant	Japanese Restaurant	Bakery	Chinese Restaurant	Cocktail Bar	Deli / Bodega	Fish Market	Grocery Store	Hawaiian Restaurant
18	Greenwich Village	Sushi Restaurant	Sake Bar	Japanese Restaurant	Vegetarian / Vegan Restaurant	Indian Chinese Restaurant	Bakery	Chinese Restaurant	Cocktail Bar	Deli / Bodega	Fish Market



Based on data frame analysis above Cluster 2 and Cluster 4 areas are the best places to open a new sushi bar business.



5. Discussion

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.

6. Conclusion

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 developed into a fully pledged application that could support the opening a business idea in an unknown location.