

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 excellent 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.

BUSINESS PROBLEM

- ▶ 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.

DATA SELECTION

- ▶ 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)
```


DATA SELECTION

- ▶ 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 |

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

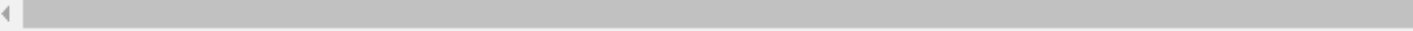
METHODOLOGY

- ▶ 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 sushi restaurant categories in each neighborhood.
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- A series of three parallel white lines of increasing length, slanted upwards from left to right, located in the bottom right corner of the slide.

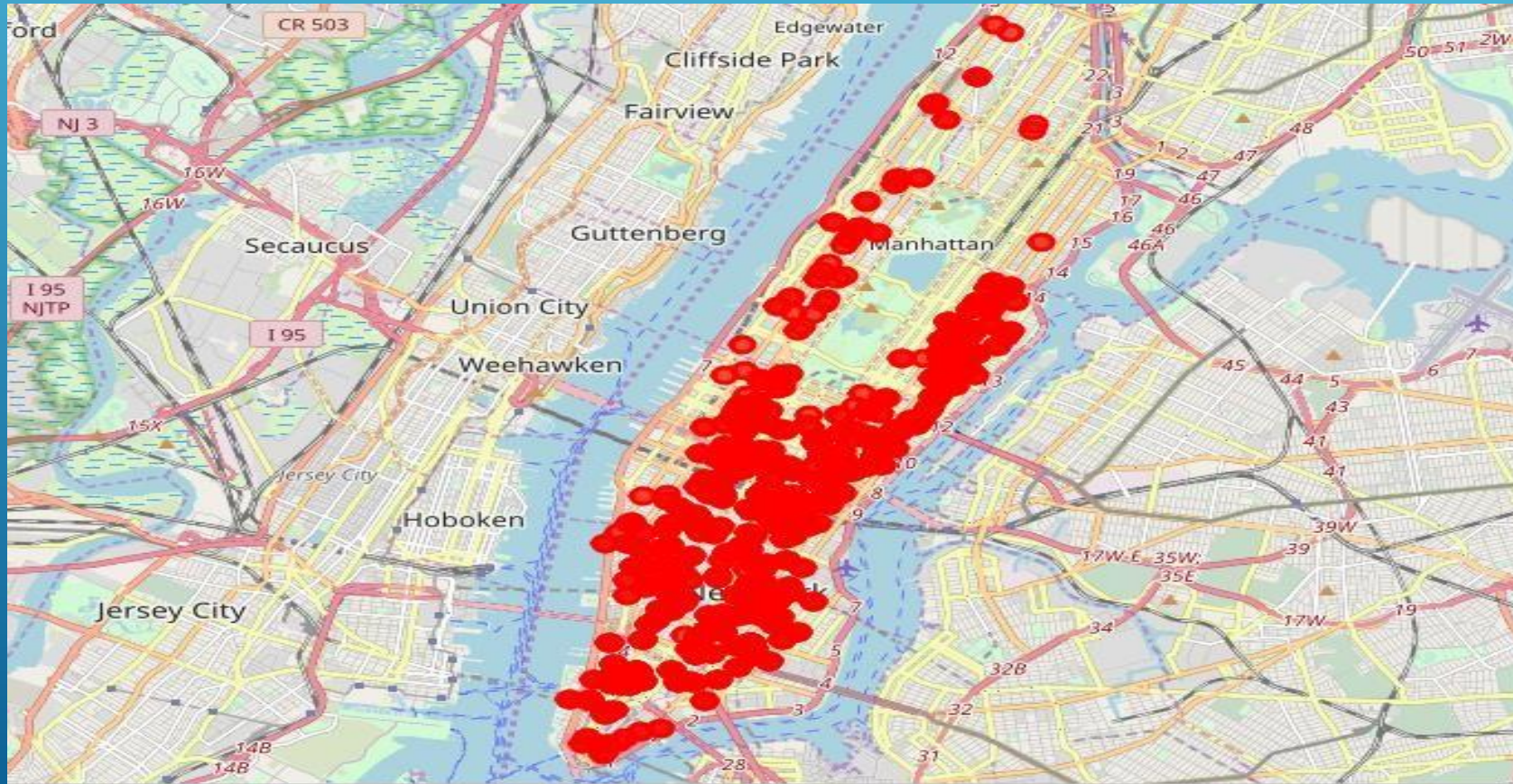
METHODOLOGY



| | 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 | |



METHODOLOGY



Sushi bars in Manhattan

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.

| | 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 |

RESULTS

- 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 |
|---|-----------|--------------------|-----------|------------|----------------|-----------------------|-------------------------------|-------------------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|
| 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 |

Result

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 |

RESULT

► 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 |

Result

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 |

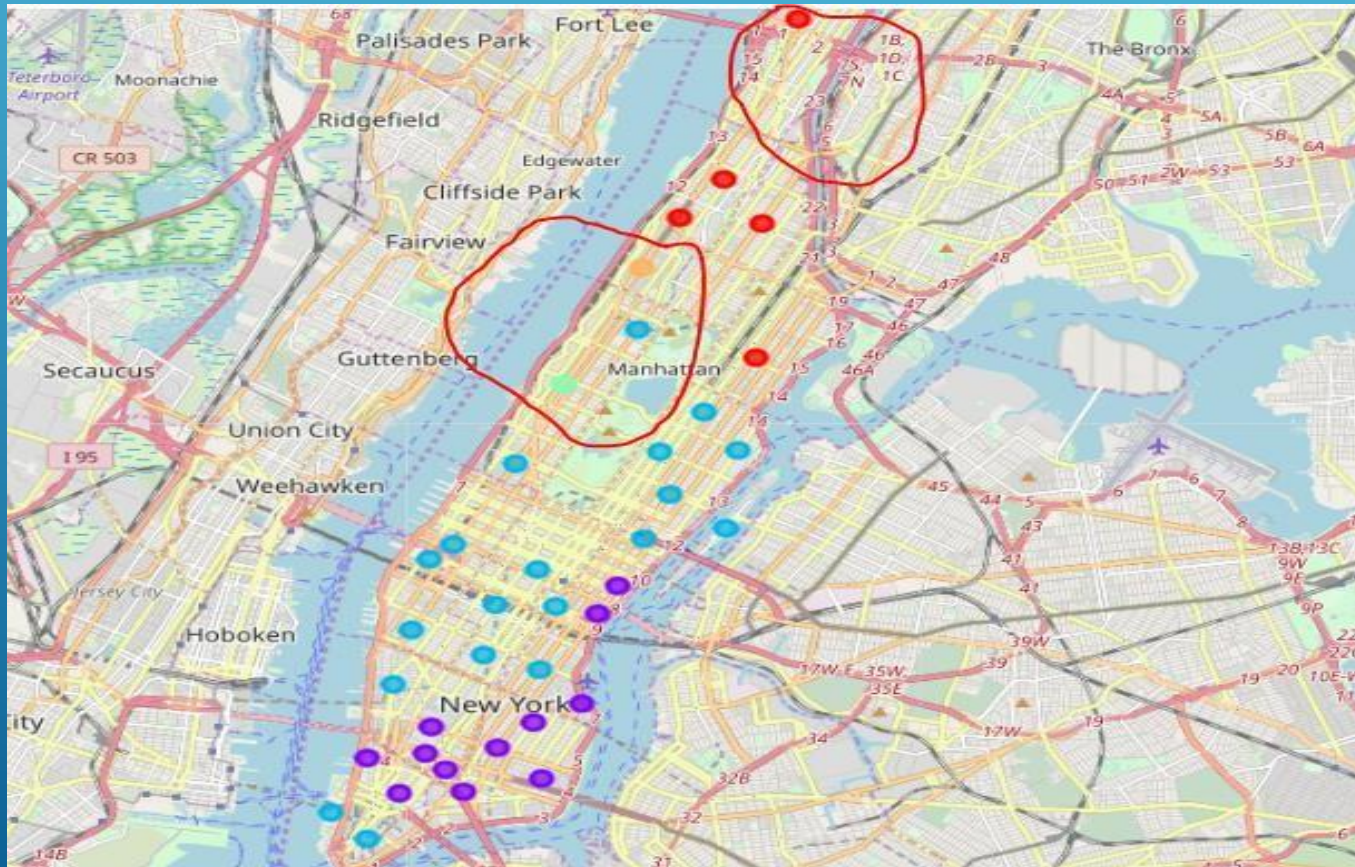
Result

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 |

RESULT



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.

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.
- 
- A series of three parallel white diagonal lines are positioned in the bottom right corner of the slide, extending from the bottom edge towards the right edge.

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 phledged application that could support the opening a business idea in an unknown location.