

## **Battles of the Neighborhood**

### 1.) Introduction/Business Problem

New York is a city full of cultural and ethnical diversity. One part of this diversity also presents itself when it comes to food. In New York one can find all kinds and types of food such as Chinese, Indian, European, or Japanese food. Japanese sushi restaurants in particular have become extremely popular in New York and in the United States overall. Therefore, starting a sushi restaurant in New York can be a great business. However, the competition is fierce and therefore one needs to set himself apart from the competition.

This leads me to my Business problem at hand. I want to open my sushi restaurant in the Manhattan area since it's the absolute center of New York City. Therefore, I am trying to define potential neighborhoods in which are less sushi restaurants so that the competition is a little bit lower and my restaurant can attract more customers.

### 2.) Data

New York City consists of five boroughs and 306 neighborhoods. The goal is to segment and explore these neighborhoods. Therefore, a dataset containing the boroughs and its neighborhoods its necessary combined with latitude and longitude values of the neighborhoods. The needed dataset was available under <https://geo.nyu.edu/catalog/nyu>.

	<b>Borough</b>	<b>Neighborhood</b>	<b>Latitude</b>	<b>Longitude</b>
<b>0</b>	Bronx	Wakefield	40.894705	-73.847201
<b>1</b>	Bronx	Co-op City	40.874294	-73.829939
<b>2</b>	Bronx	Eastchester	40.887556	-73.827806
<b>3</b>	Bronx	Fieldston	40.895437	-73.905643
<b>4</b>	Bronx	Riverdale	40.890834	-73.912585

The Foursquare API will be used to explore neighborhoods in New York City. The geographical coordinates data will be used as an input for the Foursquare API.

### 3.) Methodology

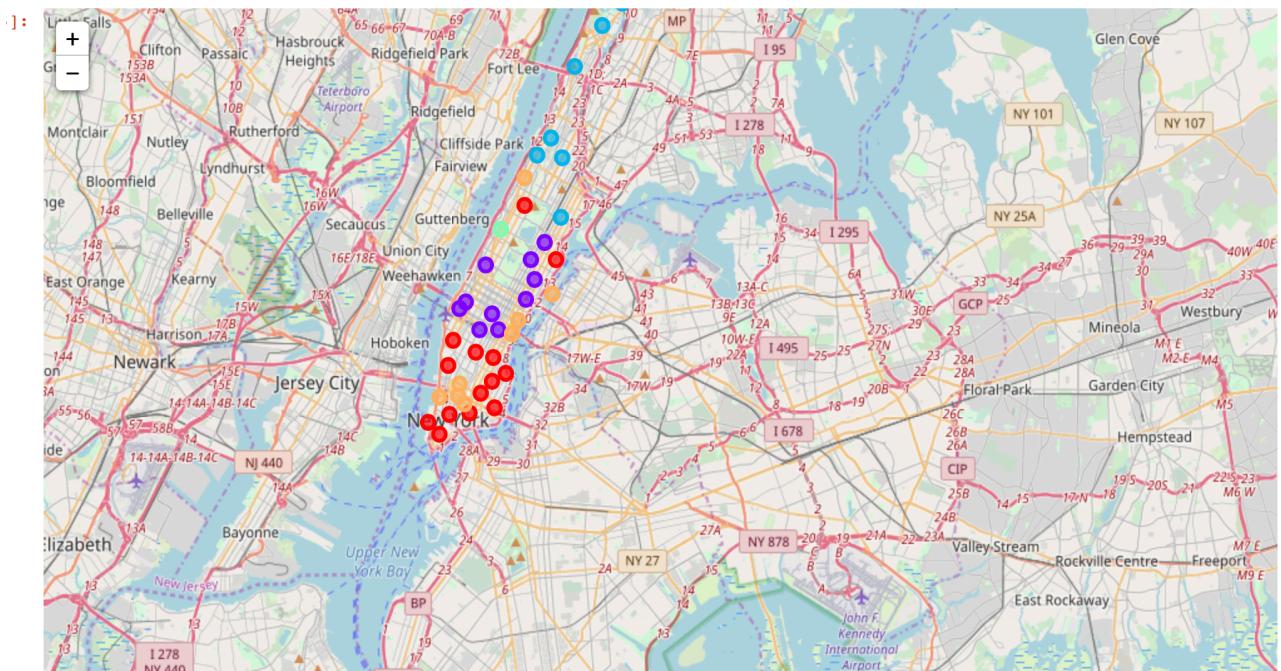
My first step is to get the latitude and longitude values. After that I will use Foursquare API to explore the neighborhoods in Manhattan. Through the explore function I get the sushi restaurant categories in each neighborhood. Below is the table of the latitude and longitude values.

	<b>Borough</b>	<b>Neighborhood</b>	<b>Latitude</b>	<b>Longitude</b>
<b>0</b>	Bronx	Wakefield	40.894705	-73.847201
<b>1</b>	Bronx	Co-op City	40.874294	-73.829939
<b>2</b>	Bronx	Eastchester	40.887556	-73.827806
<b>3</b>	Bronx	Fieldston	40.895437	-73.905643
<b>4</b>	Bronx	Riverdale	40.890834	-73.912585

	Neighborhood	Asian Restaurant	Bakery	Chinese Restaurant	Cocktail Bar	Deli / Bodega	Grocery Store	Hawaiian Restaurant	Japanese Restaurant	Noodle House	Poke Place	Ramen Restaurant	Restaurant	Sak Bar
<b>0</b>	Marble Hill	0	0	0	0	0	0	0	0	0	0	0	0	0
<b>1</b>	Chinatown	0	0	0	0	0	0	0	0	0	0	0	0	0
<b>2</b>	Chinatown	0	0	0	0	0	0	0	1	0	0	0	0	0
<b>3</b>	Chinatown	0	0	0	0	0	0	0	0	0	0	0	0	0
<b>4</b>	Chinatown	0	0	0	0	0	0	0	0	0	0	0	0	0

After that we group the neighborhoods into clusters through the K-means clustering algorithm.

	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 Mo Commc Venu
<b>0</b>	Manhattan	Marble Hill	40.876551	-73.910660	2	Sushi Restaurant	Vegetarian / Vegan Restaurant	Noodle House	Bakery	Chinese Restaurant	Cocktail Bar	Deli / Bodega	Grocery Store
<b>1</b>	Manhattan	Chinatown	40.715618	-73.994279	0	Sushi Restaurant	Japanese Restaurant	Vegetarian / Vegan Restaurant	Noodle House	Bakery	Chinese Restaurant	Cocktail Bar	Deli / Bodega
<b>2</b>	Manhattan	Washington Heights	40.851903	-73.936900	2	Sushi Restaurant	Vegetarian / Vegan Restaurant	Noodle House	Bakery	Chinese Restaurant	Cocktail Bar	Deli / Bodega	Grocery Store
<b>3</b>	Manhattan	Inwood	40.867684	-73.921210	2	Sushi Restaurant	Vegetarian / Vegan Restaurant	Noodle House	Bakery	Chinese Restaurant	Cocktail Bar	Deli / Bodega	Grocery Store
<b>4</b>	Manhattan	Hamilton Heights	40.823604	-73.949688	2	Sushi Restaurant	Vegetarian / Vegan Restaurant	Noodle House	Bakery	Chinese Restaurant	Cocktail Bar	Deli / Bodega	Grocery Store



#### 4.) Results

We used K-mean to find the area with the least number of sushi bars. The tables below show the results with the different 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 Ven	8th Most Comm
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
1	Manhattan	Chinatown	40.715618	-73.994279	0	Sushi Restaurant	Japanese Restaurant	Vegetarian / Vegan Restaurant	Noodle House	Bakery	Chinese Restaurant	Cocktail Bar	Deli / Bodega
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
3	Manhattan	Inwood	40.867684	-73.921210	2	Sushi Restaurant	Vegetarian / Vegan Restaurant	Noodle House	Bakery	Chinese Restaurant	Cocktail Bar	Deli / Bodega	Grocery Store
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

## 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
1	Chinatown	Sushi Restaurant	Japanese Restaurant	Vegetarian / Vegan Restaurant	Noodle House	Bakery	Chinese Restaurant	Cocktail Bar	Deli / Bodega	Grocery Store	Hawaiian Restaurant
9	Yorkville	Sushi Restaurant	Japanese Restaurant	Asian Restaurant	Chinese Restaurant	Noodle House	Bakery	Cocktail Bar	Deli / Bodega	Grocery Store	Hawaiian Restaurant
17	Chelsea	Sushi Restaurant	Japanese Restaurant	Asian Restaurant	Vegetarian / Vegan Restaurant	Smoothie Shop	Seafood Restaurant	Sandwich Place	Sake Bar	Restaurant	Ramen Restaurant
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
24	West Village	Sushi Restaurant	Japanese Restaurant	Vegetarian / Vegan Restaurant	Sake Bar	Asian Restaurant	Seafood Restaurant	Sandwich Place	Smoothie Shop	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

## Cluster 2

```
manhattan_merged.loc[manhattan_merged['Cluster Labels'] == 1, manhattan_merged.columns[[1] + list(range(5, manhattan_m
erged.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	Noodle House	Bakery	Chinese Restaurant	Cocktail Bar	Deli / Bodega	Grocery Store	Hawaiian Restaurant
10	Lenox Hill	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	Seafood Restaurant	Japanese 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
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

## Cluster 3

```
: 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
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 4

```
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 5

```
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
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
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
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
		Sushi	Asian	.Japanese	Vegetarian /	Smoothie	Seafood	Sandwich			

## 5.) Discussion

The analysis was performed with limited data so it can be argued if the results are fully representative or not. In the following, I will give my recommendations based on my findings.

Firstly, there is very fierce competition in Midtown and Soho, therefore opening a restaurant in this area is very risky and does not seem too promising. However, Central Harlem has good potential for a sushi restaurant. The analysis could be done more detailed by adding further factors such as transportation or demographics of the inhabitants.

## 6.) Conclusion

The goals of this project were met even though there is some room for improvement and development. The neighborhood with the lowest competition and therefore best place to open a new sushi restaurant could be identified.