Final assigment:Battle of Neighborhoods

Roberto Mazo

Introduction

- New York has a lot of restaurants, especially sushi restaurants, which have spread out in the recent years.

- Everyone knows what is sushi, it is a Japanese dish of prepared vinegar rice, usually with some sugar and salt, accompanying a variety of ingredients, such as seafood, vegetables and occasionally tropical fruits.

- We don't know if it is worth has a restaurant with a excellent cuisine where the quality of the seafood must be brilliant.

Bussiness Problem

- Easily you can run a Sushi restaurant in New York that´s why our client is interested in it. However, if you want to success you can´t set up without a previous study.

- Therefore, he needs to know where it is the best place to do it because of the high competition. He is interested in setting up in Manhattan.

- We are going to analyze the area in order to avoid that his restaurant will be close to another ones.

Data:

- New York comprises boroughs sitting where the Hudson River meets the Atlantic Ocean. They are:

  1. Manhattan
  2. Brooklyn
  3. Queens
  4. The Bronx
  5. Staten Island

- The data will be obtained from several sources:

  - In order to explore and segment the neighborhoods we will use a dataset which contain the boroughs and its neighborhoods. In addition it should have neighborhoods coordinates. You can find this dataset, in the following link

  - FourSquare Venues categories. You can scroll down until Japanese restaurant and after that you should search the ID of Shusi Restaurant.

Methodology

▶ We will use FourSquare to explore the neighborhoods in Mahattan, New York

▶ We will use the latitude and longitude coordinates of addresses.

▶ We will use getNearbyVenues function to see sushi restaurants.

▶ We will print our results in a map using folium library

▶ We will suggest what is the best place to run a sushi restaurant

DataFrame with boroughs and neighbourhoods in NY

```python
with open('newyork_data.json') as json_data:
    newyork_data = json.load(json_data)
neighborhoods_data = newyork_data['features']
```

```python
# define the dataframe columns
column_names = ['Borough', 'Neighborhood', 'Latitude', 'Longitude']

# instantiate the dataframe
neighborhoods = pd.DataFrame(columns=column_names)

for data in neighborhoods_data:
    borough = neighborhood_name = data['properties']['borough']
    neighborhood_name = data['properties']['name']

    neighborhood_latlon = data['geometry']['coordinates']
    neighborhood_lat = neighborhood_latlon[1]
    neighborhood_lon = neighborhood_latlon[0]

    neighborhoods = neighborhoods.append({'Borough': borough,
                                          'Neighborhood': neighborhood_name,
                                          'Latitude': neighborhood_lat,
                                          'Longitude': neighborhood_lon}, ignore_index=True)

neighborhoods.head()
```

	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

Figure 1: DataFrame with boroughs and neighbourhoods in NY

```python
print('The dataframe has {} boroughs and {} neighborhoods.'.format(
        len(neighborhoods['Borough'].unique()),
        neighborhoods.shape[0]))
```

The dataframe has 5 boroughs and 306 neighborhoods.

We are interested only in Manhattan

```python
manhattan_data = neighborhoods[neighborhoods['Borough'] == 'Manhattan'].reset_index(drop=True)
manhattan_data.head()
```

	Borough	Neighborhood	Latitude	Longitude
0	Manhattan	Marble Hill	40.876551	-73.910660
1	Manhattan	Chinatown	40.715618	-73.994279
2	Manhattan	Washington Heights	40.851903	-73.936900
3	Manhattan	Inwood	40.867684	-73.921210
4	Manhattan	Hamilton Heights	40.823604	-73.949688

Figure 3: DataFrame with neighbourhoods in Manhattan

```
def getNearbyVenues(names, latitudes, longitudes, radius=5000, categoryIds=''):

    venues_list=[]
    for name, lat, lng in zip(names, latitudes, longitudes):
        #print(name)

        # create the API request URL
        url = 'https://api.foursquare.com/v2/venues/search?&client_id={}&client_secret={}&v={}&ll={},{}&ra
dius={}&limit={}'.format(CLIENT_ID, CLIENT_SECRET, VERSION, lat, lng, radius, LIMIT)
```

In Manhattan there are: 1098 Sushi restaurants

```
manhattan_sushi_venues.shape
```

```
(1098, 7)
```

	Neighborhood	Neighborhood Latitude	Neighborhood Longitude	Venue	Venue Latitude	Venue Longitude	Venue Category
0	Marble Hill	40.876551	-73.910660	Planet Tokyo	40.886233	-73.909479	Sushi Restaurant
1	Chinatown	40.715618	-73.994279	Shinsen	40.715608	-73.996611	Japanese Restaurant
2	Chinatown	40.715618	-73.994279	Amano Sushi	40.716017	-73.992818	Sushi Restaurant
3	Chinatown	40.715618	-73.994279	Douzo	40.719069	-73.990781	Japanese Restaurant
4	Chinatown	40.715618	-73.994279	Whole Foods Sushi Bar	40.724000	-73.992277	Sushi Restaurant

Figure 4: DataFrame with the coordinates of the Sushi Restaurants

Neighborhood	
Battery Park City	21
Carnegie Hill	21
Central Harlem	3
Chelsea	44
Chinatown	26
Civic Center	32
Clinton	38
East Harlem	3

Figure 5: Count how many Sushi restaurants there are in each neighbourhood

Results:
Sushi restaurants Manhattan

Figure 6: Sushi restaurants in Manhattan

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

Figure 7: Analizing each Neighborhood

	Neighborhood	Asian Restaurant	Bakery	Chinese Restaurant	Cocktail Bar	Deli / Bodega	Grocery Store	Hawaiian Restaurant	Japanese Restaurant	Noodle House
0	Battery Park City	0.000000	0.00	0.000000	0.000000	0.00000	0.000000	0.000000	0.095238	0.047619
1	Carnegie Hill	0.047619	0.00	0.047619	0.000000	0.00000	0.000000	0.000000	0.095238	0.000000
2	Central Harlem	0.000000	0.00	0.000000	0.000000	0.00000	0.000000	0.000000	0.000000	0.000000
3	Chelsea	0.045455	0.00	0.000000	0.000000	0.00000	0.000000	0.000000	0.113636	0.000000
4	Chinatown	0.000000	0.00	0.000000	0.000000	0.00000	0.000000	0.000000	0.192308	0.000000
5	Civic Center	0.000000	0.00	0.000000	0.000000	0.00000	0.000000	0.000000	0.093750	0.031250
6	Clinton	0.026316	0.00	0.026316	0.026316	0.00000	0.000000	0.000000	0.105263	0.000000
7	East Harlem	0.000000	0.00	0.000000	0.000000	0.00000	0.000000	0.000000	0.000000	0.000000
8	East Village	0.000000	0.00	0.000000	0.000000	0.00000	0.000000	0.000000	0.120000	0.000000
9	Financial District	0.000000	0.00	0.000000	0.000000	0.00000	0.000000	0.000000	0.190476	0.000000
10	Flatiron	0.020000	0.00	0.020000	0.000000	0.00000	0.000000	0.000000	0.100000	0.000000
11	Gramercy	0.000000	0.00	0.021277	0.000000	0.00000	0.000000	0.000000	0.148936	0.000000
12	Greenwich Village	0.000000	0.00	0.000000	0.000000	0.00000	0.000000	0.000000	0.061224	0.000000

Figure 8: Group rows by neighborhood and mean of the frequency of occurrence of each category

▶ Using K-means clustering algorithm we will find the most common venues and we will be able to know where is the best place to run the restaurant.

	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
1	Chinatown	Sushi Restaurant	Japanese Restaurant	Vegetarian / Vegan Restaurant	Noodle House	Bakery	Chinese Restaurant	Cocktail Bar	Deli / Bodega	Grocery Store
8	Upper East Side	Sushi Restaurant	Japanese Restaurant	Asian Restaurant	Noodle House	Bakery	Chinese Restaurant	Cocktail Bar	Deli / Bodega	Grocery Store
9	Yorkville	Sushi Restaurant	Japanese Restaurant	Asian Restaurant	Chinese Restaurant	Noodle House	Bakery	Cocktail Bar	Deli / Bodega	Grocery Store
13	Lincoln Square	Sushi Restaurant	Japanese Restaurant	Smoothie Shop	Chinese Restaurant	Grocery Store	Vegetarian / Vegan Restaurant	Noodle House	Bakery	Cocktail Bar
17	Chelsea	Sushi Restaurant	Japanese Restaurant	Asian Restaurant	Vegetarian / Vegan Restaurant	Smoothie Shop	Seafood Restaurant	Sandwich Place	Sake Bar	Restaurant
19	East Village	Sushi Restaurant	Japanese Restaurant	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
22	Little Italy	Sushi Restaurant	Japanese Restaurant	Noodle House	Vegetarian / Vegan Restaurant	Bakery	Chinese Restaurant	Cocktail Bar	Deli / Bodega	Grocery Store

Cluster 0

	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
1	Chinatown	Sushi Restaurant	Japanese Restaurant	Vegetarian / Vegan Restaurant	Noodle House	Bakery	Chinese Restaurant	Cocktail Bar	Deli / Bodega	Grocery Store
8	Upper East Side	Sushi Restaurant	Japanese Restaurant	Asian Restaurant	Noodle House	Bakery	Chinese Restaurant	Cocktail Bar	Deli / Bodega	Grocery Store
9	Yorkville	Sushi Restaurant	Japanese Restaurant	Asian Restaurant	Chinese Restaurant	Noodle House	Bakery	Cocktail Bar	Deli / Bodega	Grocery Store
13	Lincoln Square	Sushi Restaurant	Japanese Restaurant	Smoothie Shop	Chinese Restaurant	Grocery Store	Vegetarian / Vegan Restaurant	Noodle House	Bakery	Cocktail Bar
17	Chelsea	Sushi Restaurant	Japanese Restaurant	Asian Restaurant	Vegetarian / Vegan Restaurant	Smoothie Shop	Seafood Restaurant	Sandwich Place	Sake Bar	Restaurant
19	East Village	Sushi Restaurant	Japanese Restaurant	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
22	Little Italy	Sushi Restaurant	Japanese Restaurant	Noodle House	Vegetarian / Vegan Restaurant	Bakery	Chinese Restaurant	Cocktail Bar	Deli / Bodega	Grocery Store
23	Soho	Sushi Restaurant	Japanese Restaurant	Noodle House	Theme Restaurant	Vegetarian / Vegan Restaurant	Bakery	Chinese Restaurant	Cocktail Bar	Deli / Bodega

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
10	Lenox Hill	Sushi Restaurant	Asian Restaurant	Japanese Restaurant	Noodle House	Bakery	Chinese Restaurant	Cocktail Bar	Deli / Bodega	Grocery Store
14	Clinton	Sushi Restaurant	Japanese Restaurant	Poke Place	Chinese Restaurant	Cocktail Bar	Asian Restaurant	Seafood Restaurant	Sandwich Place	Sake Bar
15	Midtown	Sushi Restaurant	Asian Restaurant	Seafood Restaurant	Japanese Restaurant	Ramen Restaurant	Bakery	Vegetarian / Vegan Restaurant	Sandwich Place	Sake Bar
16	Murray Hill	Sushi Restaurant	Japanese Restaurant	Asian Restaurant	Restaurant	Bakery	Chinese Restaurant	Ramen Restaurant	Vegetarian / Vegan Restaurant	Sake Bar
33	Midtown South	Sushi Restaurant	Asian Restaurant	Japanese Restaurant	Restaurant	Bakery	Chinese Restaurant	Ramen Restaurant	Vegetarian / Vegan Restaurant	Sake Bar
34	Sutton Place	Sushi Restaurant	Asian Restaurant	Japanese Restaurant	Steakhouse	Seafood Restaurant	Deli / Bodega	Bakery	Chinese Restaurant	Cocktail Bar
39	Hudson Yards	Sushi Restaurant	Asian Restaurant	Japanese Restaurant	Cocktail Bar	Poke Place	Seafood Restaurant	Sandwich Place	Sake Bar	Restauran

Cluster 2

	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	Japan Resta
2	Washington Heights	Sushi Restaurant	Vegetarian / Vegan Restaurant	Noodle House	Bakery	Chinese Restaurant	Cocktail Bar	Deli / Bodega	Grocery Store	Hawaiian Restaurant	Japan Resta
3	Inwood	Sushi Restaurant	Vegetarian / Vegan Restaurant	Noodle House	Bakery	Chinese Restaurant	Cocktail Bar	Deli / Bodega	Grocery Store	Hawaiian Restaurant	Japan Resta
4	Hamilton Heights	Sushi Restaurant	Vegetarian / Vegan Restaurant	Noodle House	Bakery	Chinese Restaurant	Cocktail Bar	Deli / Bodega	Grocery Store	Hawaiian Restaurant	Japan Resta
5	Manhattanville	Sushi Restaurant	Vegetarian / Vegan Restaurant	Noodle House	Bakery	Chinese Restaurant	Cocktail Bar	Deli / Bodega	Grocery Store	Hawaiian Restaurant	Japan Resta
6	Central Harlem	Sushi Restaurant	Vegetarian / Vegan Restaurant	Noodle House	Bakery	Chinese Restaurant	Cocktail Bar	Deli / Bodega	Grocery Store	Hawaiian Restaurant	Japan Resta
7	East Harlem	Sushi Restaurant	Vegetarian / Vegan Restaurant	Noodle House	Bakery	Chinese Restaurant	Cocktail Bar	Deli / Bodega	Grocery Store	Hawaiian Restaurant	Japan Resta

Cluster 3

	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	Haw Res
20	Lower East Side	Sushi Restaurant	Japanese Restaurant	Vegetarian / Vegan Restaurant	Noodle House	Bakery	Chinese Restaurant	Cocktail Bar	Deli / Bodega	Grocery Store	Haw Res

Cluster 4

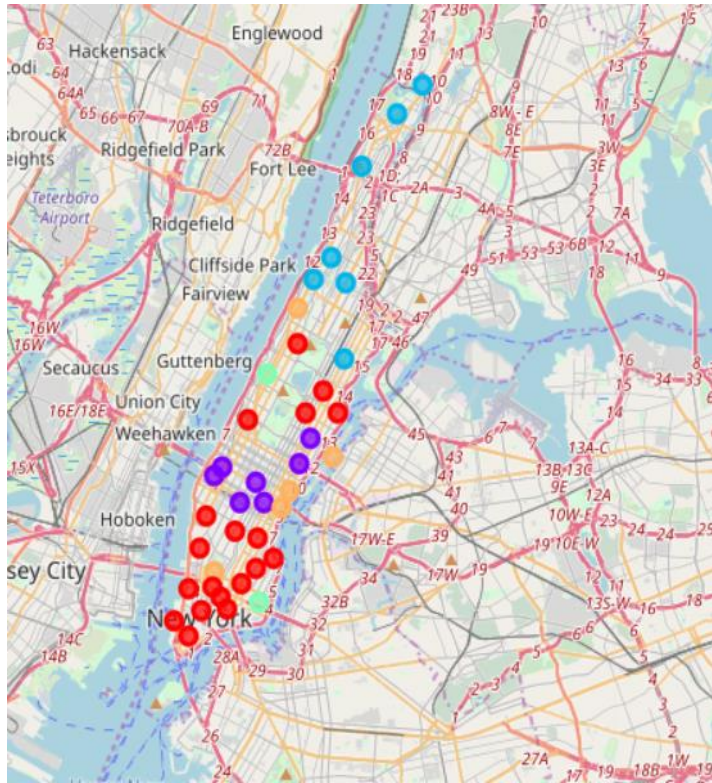|	Neighborhood	1st Most Common Venue	2nd Most Common Venue	3rd Most Common Venue	4th Most Common Venue	5th Most Common Venue	6th Most Common Venue	7th Most Common Venue	8th Most Common Venue	9th Most Common Venue	10th Most Common Venue
11	Roosevelt Island	Sushi Restaurant	Asian Restaurant	Noodle House	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
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
36	Tudor City	Sushi Restaurant	Asian Restaurant	Japanese Restaurant	Vegetarian / Vegan Restaurant	Steakhouse	Smoothie Shop	Seafood Restaurant	Sandwich Place	Sake Bar	Restaurant

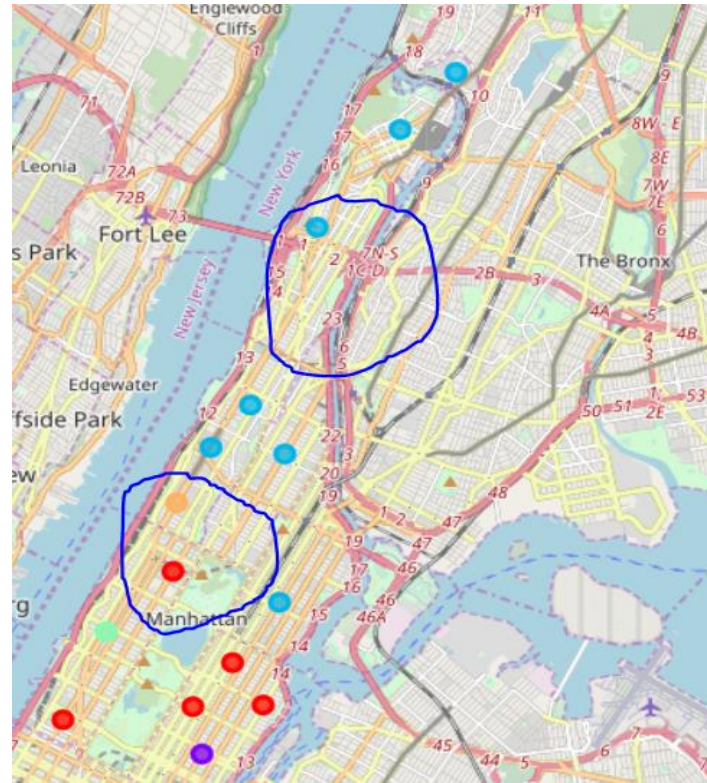Figure 9: Clustering Sushi
Restaurant Manhattan

Figure 10: Best places to set up Sushi
Restaurant in Manhattan

Discussion

▶ The bests areas to run a sushi restaurant are in the north of Manhattan and in the centre near to Central Park

▶ It is very risky to open a restaurant in the south due to high competition

▶ A possible improvement may be to consider the population in the different areas and know the number of tourists

Conclusion

- The objective of the project was reached successfully, it is a good approach but of course some improvements should be done before run the restaurant.

- If you want to run a Sushi restaurant I suggest that you should do in the north of Manhattan or in the centre close to Central Park.