

Capstone Project – The Battle of Neighborhoods

Selecting the best location to open an Italian Restaurant in Brooklyn, NYC.

Introduction:

- The City of New York, is the most populous city in the United States. It is diverse and is the financial capital of USA. It is multicultural with 19.45 million people. New York City welcomed a record of 65.2 million visitors, comprising 51.6 million domestic and 13.5 million international visitors in 2019, It provides lot of business opportunities and business friendly environment. one of Largest cities by population in New York is Brooklyn, this city has a lot of immigrants from all over the world with many cultural diversity which allowing a huge types of cuisines one can offer in the restaurant business.

Demographics of Brooklyn:-

Ancestry	number	% of total population
Italian	157,068	6.1%
Irish	100,923	3.9%
Russian	88,766	3.5%
Polish	71,099	2.8%
German	53,188	2.1%
English	36,174	1.4%

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 carefully. The insights derived from analysis will give good understanding of the business environment which help in strategically targeting the market. This will help in reduction of risk and the return on investment will be reasonable.

Our analysis will be covered the following factors:

- The best location to start the business.
- The types of our target Customers.
- defined our Potential competitors?

Business Problem

- My client wants to open an Italian restaurant in Brooklyn, NYC. There are a big challenge to start a business in Brooklyn because of high competition.
- We want to choose the best location based on the number of Italian restaurant which are open in each neighborhood.
- To start a new business, the business should be opened in neighborhood with less competitors.
- We will focus in our analysis to choose the best location to start the business to ensure that the location has enough customers and we are not close to other Italian restaurants.

Data Selection

- To Identify the best location to start the business in Brooklyn, I need to find out the number of our competitors in each neighborhoods in Brooklyn .
- I used NYC OpenData to import the data of "Neighborhoods in New York City"
<https://data.cityofnewyork.us/City-Government/Neighborhood-Tabulation-Areas-NTA-/cpf4-rkhq>
- I used **Forsquare API** to get the most common venues of given Borough of Brooklyn.
<https://foursquare.com/>
- In Brooklyn, there is 576 Italian restaurants are currently operating.

```
| newyork_venues_italian.shape  
(576, 7)
```

Data Selection

- I used Google API to find their geographic coordinates of the 5 locations shortlisted for our Italian restaurant:-

	Neighborhood	Neighborhood Latitude	Neighborhood Longitude	Venue	Venue Latitude	Venue Longitude	Venue Category
0	Bay, Ridge	40.625801	-74.030621	Zio Toto	40.624791	-74.030551	Italian Restaurant
1	Bay, Ridge	40.625801	-74.030621	Sofia Ristorante Italiano	40.624847	-74.030522	Italian Restaurant
2	Bay, Ridge	40.625801	-74.030621	Paneantico	40.619368	-74.032814	Bakery
3	Bay, Ridge	40.625801	-74.030621	The Pearl Room	40.623936	-74.030979	Seafood Restaurant
4	Bay, Ridge	40.625801	-74.030621	Sofia's	40.624862	-74.030405	Italian Restaurant

Methodology

- As a database I used OpenData in my study. My master data which has the main components Borough, Neighborhood, Latitude and Longitude

	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

Methodology

- I used python **folium** library to visualize geographic details of Brooklyn and its boroughs and I created a map of NYC with Brooklyn Neighborhood. I used latitude and longitude values to get the visual as below:

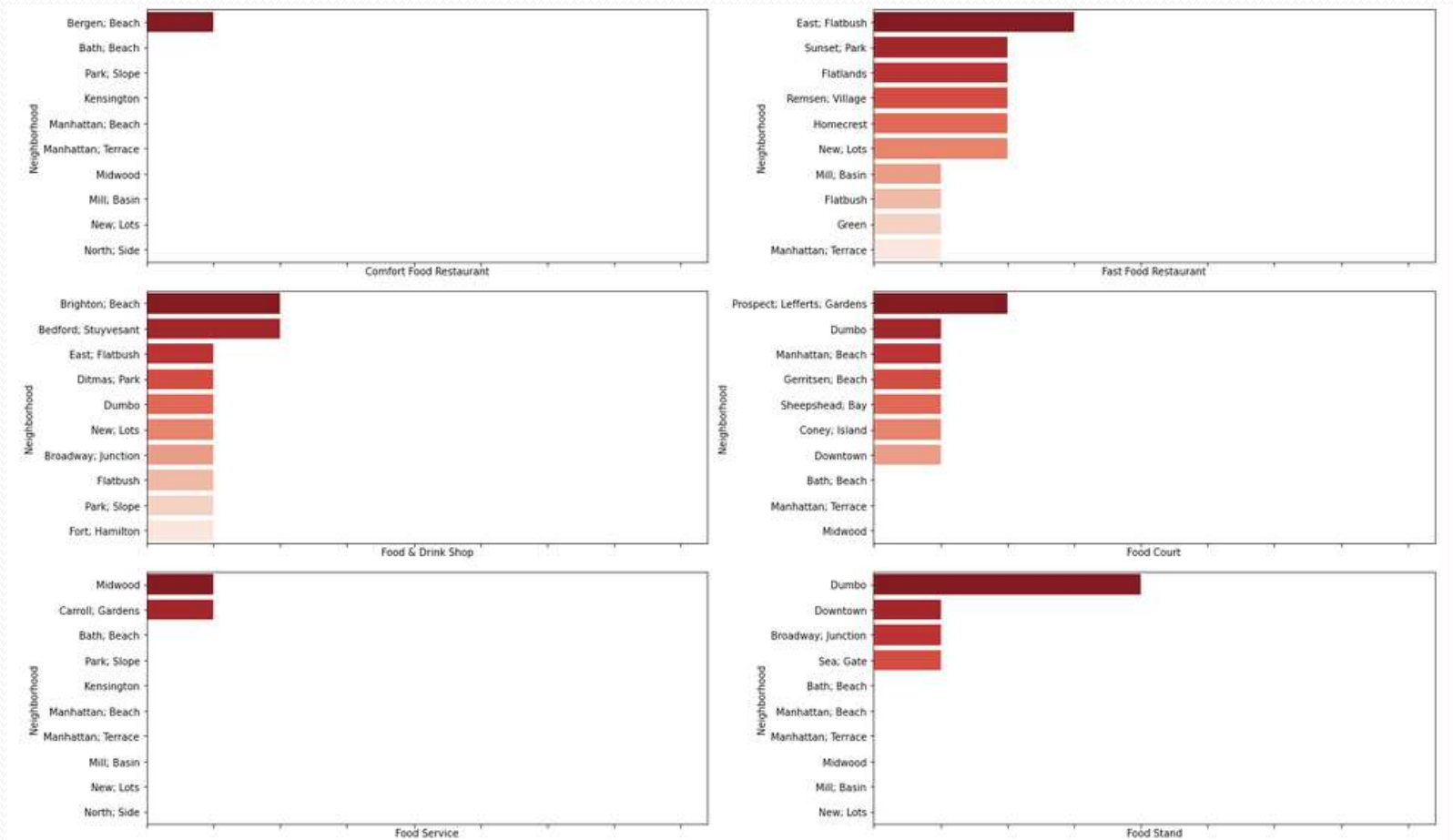


Methodology

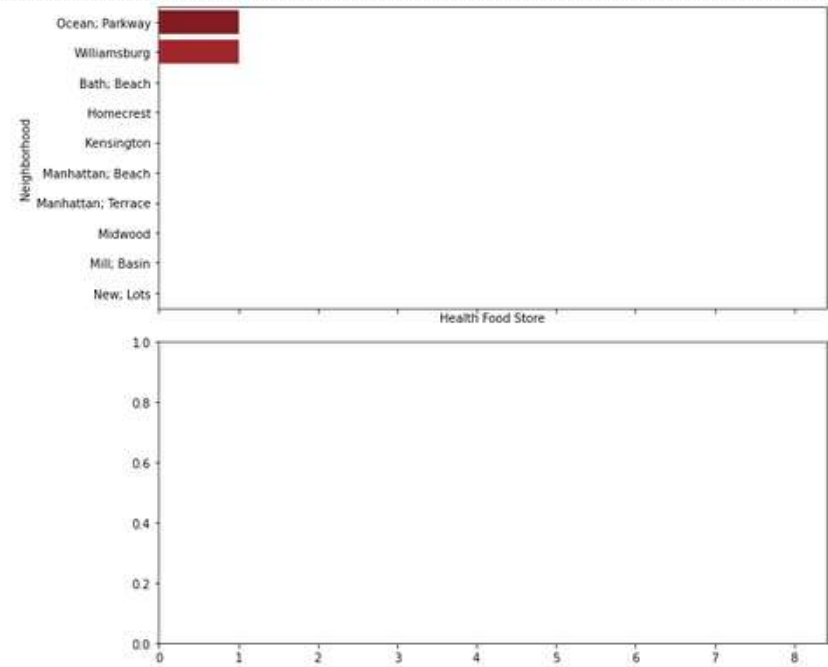
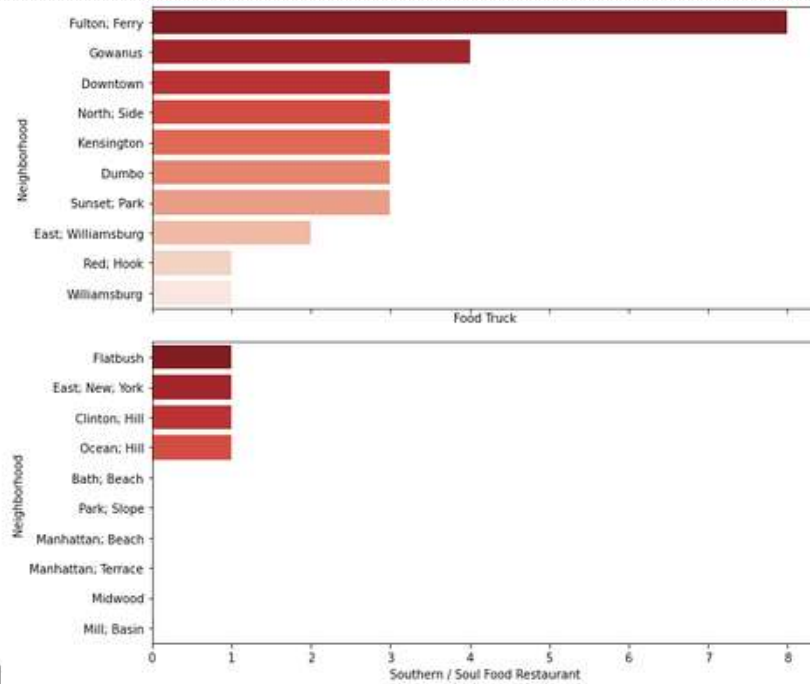
- find out the top 10 food categories in Brooklyn:

	count	mean	std	min	25%	50%	75%	max
Comfort Food Restaurant	108.0	0.009259	0.096225	0.0	0.0	0.0	0.0	1.0
Fast Food Restaurant	108.0	0.259259	0.440271	0.0	0.0	0.0	1.0	1.0
Food & Drink Shop	108.0	0.129630	0.337461	0.0	0.0	0.0	0.0	1.0
Food Court	108.0	0.074074	0.263112	0.0	0.0	0.0	0.0	1.0
Food Service	108.0	0.018519	0.135445	0.0	0.0	0.0	0.0	1.0
Food Stand	108.0	0.064815	0.247347	0.0	0.0	0.0	0.0	1.0
Food Truck	108.0	0.388889	0.489771	0.0	0.0	0.0	1.0	1.0
Health Food Store	108.0	0.018519	0.135445	0.0	0.0	0.0	0.0	1.0
Southern / Soul Food Restaurant	108.0	0.037037	0.189733	0.0	0.0	0.0	0.0	1.0

Methodology

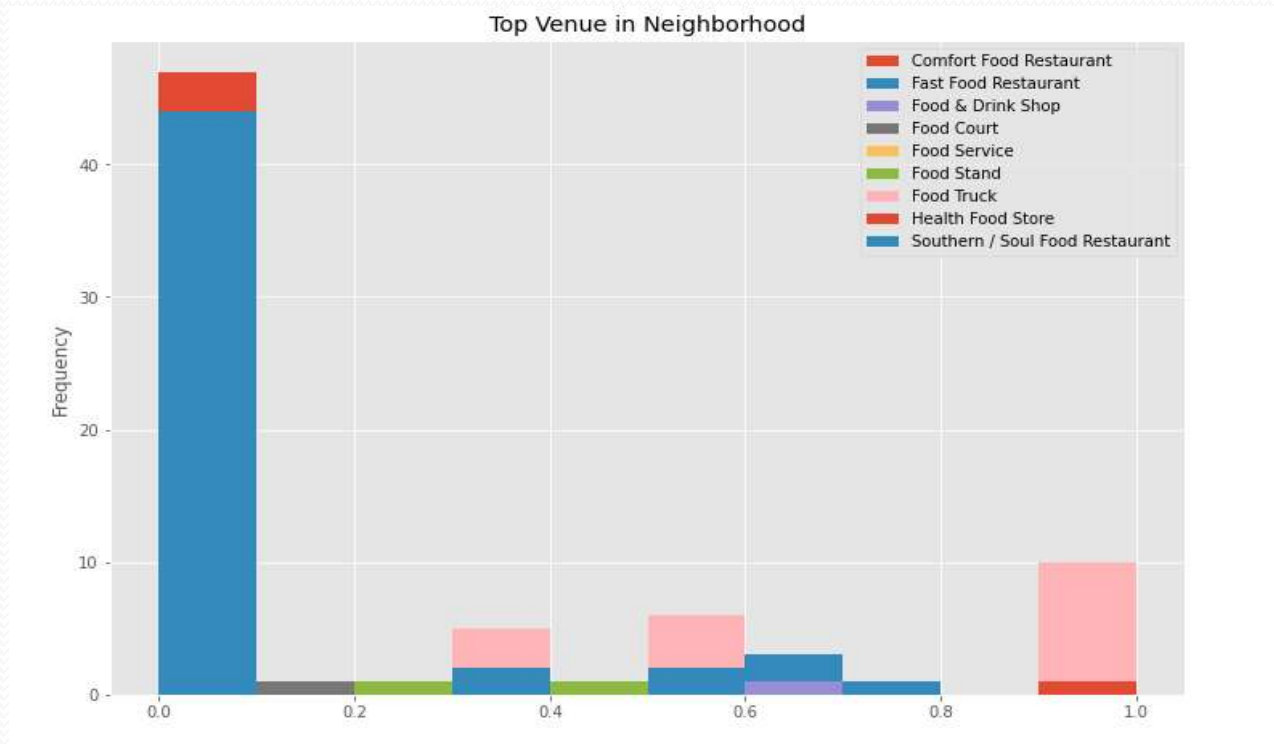


Methodology



Methodology

- We can see that Comfort Food Restaurant and Fast Food how reached the **45** limit of venues. On the other hand; Food Court, Food Stand and Southern / Soul Food Restaurant are below **5** venues in our given coordinates with Latitude and Longitude, in below graph.



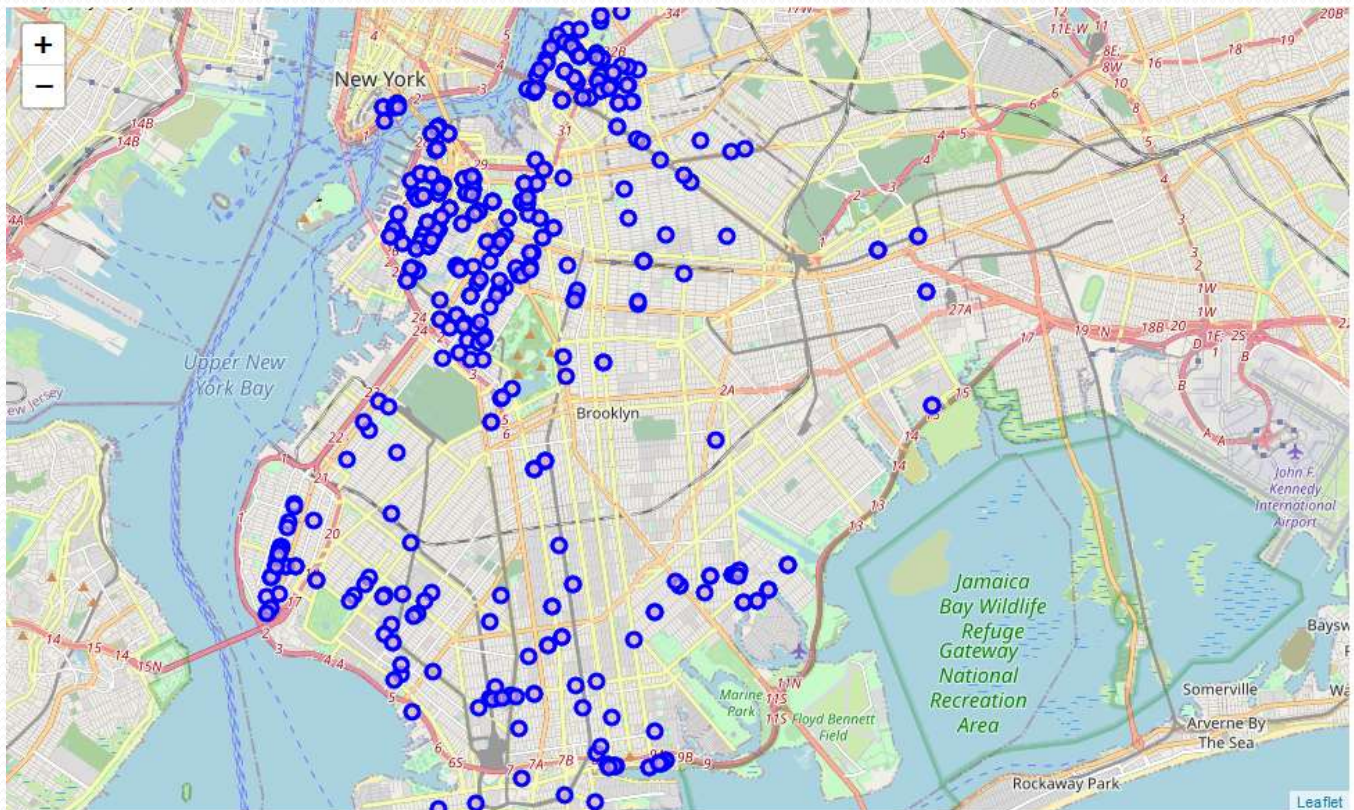
Methodology

In summary of this graph **63** unique categories were returned by Foursquare, then I created a table which shows list of top 10 venue category for each borough in below table.

	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	Bath; Beach	Italian Restaurant	Wine Bar	Seafood Restaurant	Sandwich Place	Pizza Place	New American Restaurant	Latin American Restaurant	Ice Cream Shop	French Restaurant	Food Truck
1	Bay; Ridge	Italian Restaurant	Pizza Place	Seafood Restaurant	Bakery	American Restaurant	Wine Bar	Sandwich Place	New American Restaurant	Latin American Restaurant	Ice Cream Shop
2	Bedford; Stuyvesant	Pizza Place	Italian Restaurant	Wine Bar	Seafood Restaurant	Sandwich Place	New American Restaurant	Latin American Restaurant	Ice Cream Shop	French Restaurant	Food Truck
3	Bensonhurst	Italian Restaurant	Pizza Place	Bakery	American Restaurant	Wine Bar	Seafood Restaurant	Sandwich Place	New American Restaurant	Latin American Restaurant	Ice Cream Shop
4	Bergen; Beach	Pizza Place	Italian Restaurant	Wine Bar	Seafood Restaurant	Sandwich Place	New American Restaurant	Latin American Restaurant	Ice Cream Shop	French Restaurant	Food Truck

Methodology

- I used python **folium** library to visualize geographic details of Italian restaurants in Brooklyn and I created a map.



Results

Using K-mean to clustering data area with less number of Italian restaurants.

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	10th Most Common Venue
34	Kensington	Food & Drink Shop	Wine Bar	Seafood Restaurant	Sandwich Place	Pizza Place	New American Restaurant	Latin American Restaurant	Italian Restaurant	Ice Cream Shop	French Restaurant

```
Food & Drink Shop      1
```

```
Name: 1st Most Common Venue, dtype: int64
```

```
Wine Bar      1
```

```
Name: 2nd Most Common Venue, dtype: int64|
```

```
New American Restaurant    1
```

```
Name: 6th Most Common Venue, dtype: int64
```


Results

- 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	Bay; Ridge	Italian Restaurant	Pizza Place	Seafood Restaurant	Bakery	American Restaurant	Wine Bar	Sandwich Place	New American Restaurant	Latin American Restaurant	Ice Cream Shop
3	Bensonhurst	Italian Restaurant	Pizza Place	Bakery	American Restaurant	Wine Bar	Seafood Restaurant	Sandwich Place	New American Restaurant	Latin American Restaurant	Ice Cream Shop
5	Boerum; Hill	Italian Restaurant	Pizza Place	Sandwich Place	French Restaurant	Food Truck	Wine Bar	Seafood Restaurant	New American Restaurant	Latin American Restaurant	Ice Cream Shop
8	Brooklyn; Heights	Italian Restaurant	Pizza Place	Sandwich Place	Food Truck	Wine Bar	Seafood Restaurant	New American Restaurant	Latin American Restaurant	Ice Cream Shop	French Restaurant
9	Bushwick	Italian Restaurant	Pizza Place	Wine Bar	Seafood Restaurant	Sandwich Place	New American Restaurant	Latin American Restaurant	Ice Cream Shop	French Restaurant	Food Truck

```
Italian Restaurant      23
Name: 1st Most Common Venue, dtype: int64
```

```
Pizza Place            22
Seafood Restaurant      1
Name: 2nd Most Common Venue, dtype: int64
```

```
New American Restaurant  13
Seafood Restaurant       6
Wine Bar                 2
Sandwich Place           2
Name: 6th Most Common Venue, dtype: int64
```

Results

- Cluster2

	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
16	Cypress; Hills	Pizza Place	Wine Bar	Seafood Restaurant	Sandwich Place	New American Restaurant	Latin American Restaurant	Italian Restaurant	Ice Cream Shop	French Restaurant	Food Truck
32	Highland; Park	Pizza Place	Wine Bar	Seafood Restaurant	Sandwich Place	New American Restaurant	Latin American Restaurant	Italian Restaurant	Ice Cream Shop	French Restaurant	Food Truck
39	Midwood	Pizza Place	Wine Bar	Seafood Restaurant	Sandwich Place	New American Restaurant	Latin American Restaurant	Italian Restaurant	Ice Cream Shop	French Restaurant	Food Truck

Pizza Place 3

Name: 1st Most Common Venue, dtype: int64

Wine Bar 3

Name: 2nd Most Common Venue, dtype: int64

Latin American Restaurant 3|

Name: 6th Most Common Venue, dtype: int64

Results

- 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
0	Bath; Beach	Italian Restaurant	Wine Bar	Seafood Restaurant	Sandwich Place	Pizza Place	New American Restaurant	Latin American Restaurant	Ice Cream Shop	French Restaurant	Food Truck
7	Brighton; Beach	Italian Restaurant	Wine Bar	Seafood Restaurant	Sandwich Place	Pizza Place	New American Restaurant	Latin American Restaurant	Ice Cream Shop	French Restaurant	Food Truck
10	Carroll; Gardens	Italian Restaurant	Pizza Place	French Restaurant	Wine Bar	Seafood Restaurant	Sandwich Place	New American Restaurant	Latin American Restaurant	Ice Cream Shop	Food Truck
14	Coney; Island	Italian Restaurant	Wine Bar	Seafood Restaurant	Sandwich Place	Pizza Place	New American Restaurant	Latin American Restaurant	Ice Cream Shop	French Restaurant	Food Truck
25	Fort; Hamilton	Italian Restaurant	Sandwich Place	Bakery	Wine Bar	Seafood Restaurant	Pizza Place	New American Restaurant	Latin American Restaurant	Ice Cream Shop	French Restaurant

```
Italian Restaurant      22
Name: 1st Most Common Venue, dtype: int64
```

```
-----
Wine Bar                17
Pizza Place             3
Seafood Restaurant      1
Sandwich Place          1
Name: 2nd Most Common Venue, dtype: int64
```

```
-----
New American Restaurant  20
Sandwich Place           1
Pizza Place              1
Name: 6th Most Common Venue, dtype: int64
```

Results

- 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	City; Line	Pizza Place	Food Truck	Wine Bar	Seafood Restaurant	Sandwich Place	New American Restaurant	Latin American Restaurant	Italian Restaurant	Ice Cream Shop	French Restaurant
21	East; New; York	Pizza Place	Food Truck	Wine Bar	Seafood Restaurant	Sandwich Place	New American Restaurant	Latin American Restaurant	Italian Restaurant	Ice Cream Shop	French Restaurant

```
Pizza Place      2
Name: 1st Most Common Venue, dtype: int64
-----
```

```
Food Truck      2|
Name: 2nd Most Common Venue, dtype: int64
-----
```

```
New American Restaurant      2
Name: 6th Most Common Venue, dtype: int64
-----
```

Results

- Cluster 5

	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
2	Bedford; Stuyvesant	Pizza Place	Italian Restaurant	Wine Bar	Seafood Restaurant	Sandwich Place	New American Restaurant	Latin American Restaurant	Ice Cream Shop	French Restaurant	Food Truck
4	Bergen; Beach	Pizza Place	Italian Restaurant	Wine Bar	Seafood Restaurant	Sandwich Place	New American Restaurant	Latin American Restaurant	Ice Cream Shop	French Restaurant	Food Truck
15	Crown; Heights	Pizza Place	Italian Restaurant	Wine Bar	Seafood Restaurant	Sandwich Place	New American Restaurant	Latin American Restaurant	Ice Cream Shop	French Restaurant	Food Truck
17	Ditmas; Park	Pizza Place	Italian Restaurant	Wine Bar	Seafood Restaurant	Sandwich Place	New American Restaurant	Latin American Restaurant	Ice Cream Shop	French Restaurant	Food Truck
22	East; Williamsburg	Italian Restaurant	Pizza Place	Latin American Restaurant	Café	Wine Bar	Seafood Restaurant	Sandwich Place	New American Restaurant	Ice Cream Shop	French Restaurant

```
Pizza Place          7
Italian Restaurant   3
Name: 1st Most Common Venue, dtype: int64
-----
```

```
Italian Restaurant   7
Pizza Place          3
Name: 2nd Most Common Venue, dtype: int64
-----
```

```
New American Restaurant    9
Seafood Restaurant         1
Name: 6th Most Common Venue, dtype: int64
-----
```

Results

- Cluster 6

	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
6	Borough; Park	Italian Restaurant	Event Space	Wine Bar	Seafood Restaurant	Sandwich Place	Pizza Place	New American Restaurant	Latin American Restaurant	Ice Cream Shop	French Restaurant

```
Italian Restaurant    1
Name: 1st Most Common Venue, dtype: int64
-----
```

```
Event Space          1
Name: 2nd Most Common Venue, dtype: int64
-----
```

```
Pizza Place          1
Name: 6th Most Common Venue, dtype: int64
-----
```

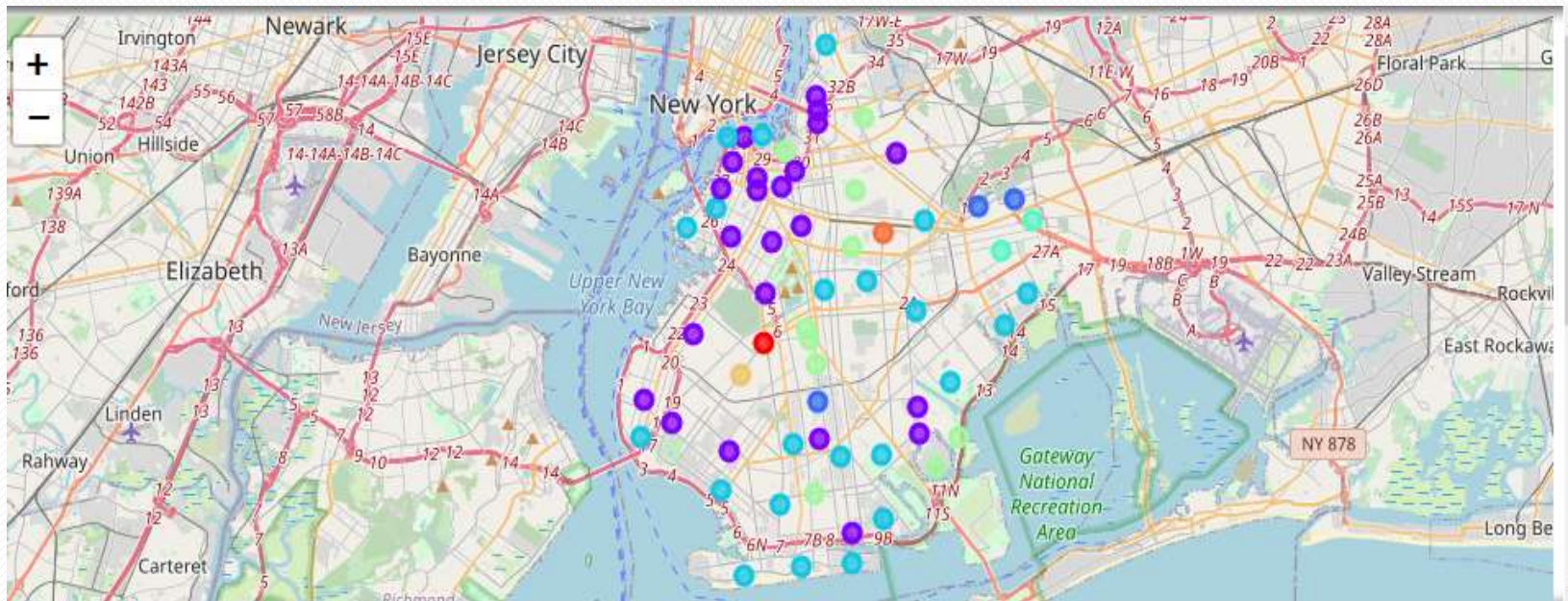

Results

- Cluster 7

	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
59	Weeksville	Italian Restaurant	Caribbean Restaurant	Wine Bar	Seafood Restaurant	Sandwich Place	Pizza Place	New American Restaurant	Latin American Restaurant	Ice Cream Shop	French Restaurant

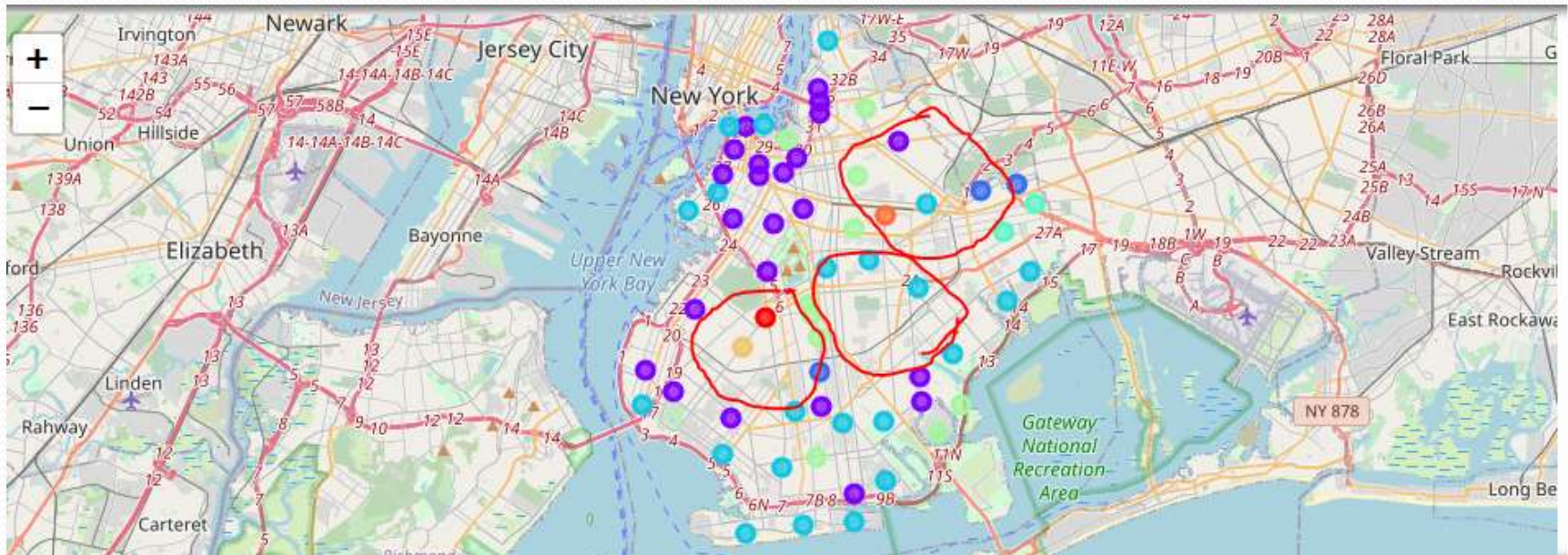
```
Italian Restaurant      1
Name: 1st Most Common Venue, dtype: int64
-----
Caribbean Restaurant   1
Name: 2nd Most Common Venue, dtype: int64
-----
Pizza Place            1
Name: 6th Most Common Venue, dtype: int64
-----
```

Results



Results

- Based on the dataframe analysis above cluster0, cluster4, cluster6 and cluster7 areas are the best place to start an new Italian Restaurant.



Discussion

- As I mentioned before, The City of New York, is the most populous city in the United States. It is diverse and is the financial capital of USA. It is multicultural with 19.45 million people, It provides lot of business opportunities and business friendly environment. one of Largest cities by population in New York is Brooklyn, this city has a lot of immigrants from all over the world with many cultural diversity which allowing a huge types of cuisines one can offer in the restaurant business.
- I used the K-means algorithm as part of this clustering study. When I tested the Elbow method, I set the optimum k value to 8. However, only 7 district coordinates were used. For more detailed and accurate guidance, the data set can be expanded and the details of the neighborhood or street can also be drilled.
- There is a high competition in the Brooklyn downtown and Beach area.

Conclusion

- All the goals of this study were met there is a room for further improvement and development, however we successfully defined:-
 - 1- The best location to start the business.
 - 2- The types of our target Customers.
 - 3- defined our Potential competitors.

References:

- [1] Brooklyn – Wikipedia
- [2] NYC OpenData
- [3] [Forsquare API](#)
- [4] [Google Map](#)