The Battle of the Neighborhoods - Week 2

Introduction:

Background New York City (NYC) is considered as one of the most populous city in the United Stated. The City comprises of five Boroughs with an estimate population of 8 million people distributed over the areas. New York is known as the City that is populated by people of various ethnic groups. Indians in New York City metropolitan region constitute one of the largest and fastest growing ethnicities in the New York City metropolitan area of the United States. The New York City region is home to the largest Indian American population among metropolitan areas by a significant margin. With the density of population and high level of business activities in New York, NYC is one of the cities that have high potential for a Indian food restaurant.

Problem Statement:

When it comes to Indian food restaurant it can be looked in two ways like.

- Which areas have potential Indian restaurant market.
- What is best place in New York City for Indian Cuisine.

Also, there can be cases where a person would like to open a new business venture. It can be a grocery store, office place or someone starting their own business. What would be the best possible place from where one can start off.

So, in this project we will try to find the solution of above mentioned questions and try to find out best places in New York for Indian Cuisine along with the best borough where a person can start their own business.

Data:

For resolving the above mentioned problems, we need the following data:

- Indian restaurants in each neighborhood of New York City
    1) Data Source: Foursquare API
    2) Description: By using this API we will get all the venues in each neighborhood. We can filter these venues to get only Indian restaurants

- New York City data which contains list Boroughs, Neighborhoods along with their latitude and longitude
    1) Description: This data set contains the required information. And we will use this data set to explore various neighborhoods of New York City

- GeoSpace data
    1) Description: By using this geo space data we will get the New York Borough boundaries that will help us in visualizing choropleth map

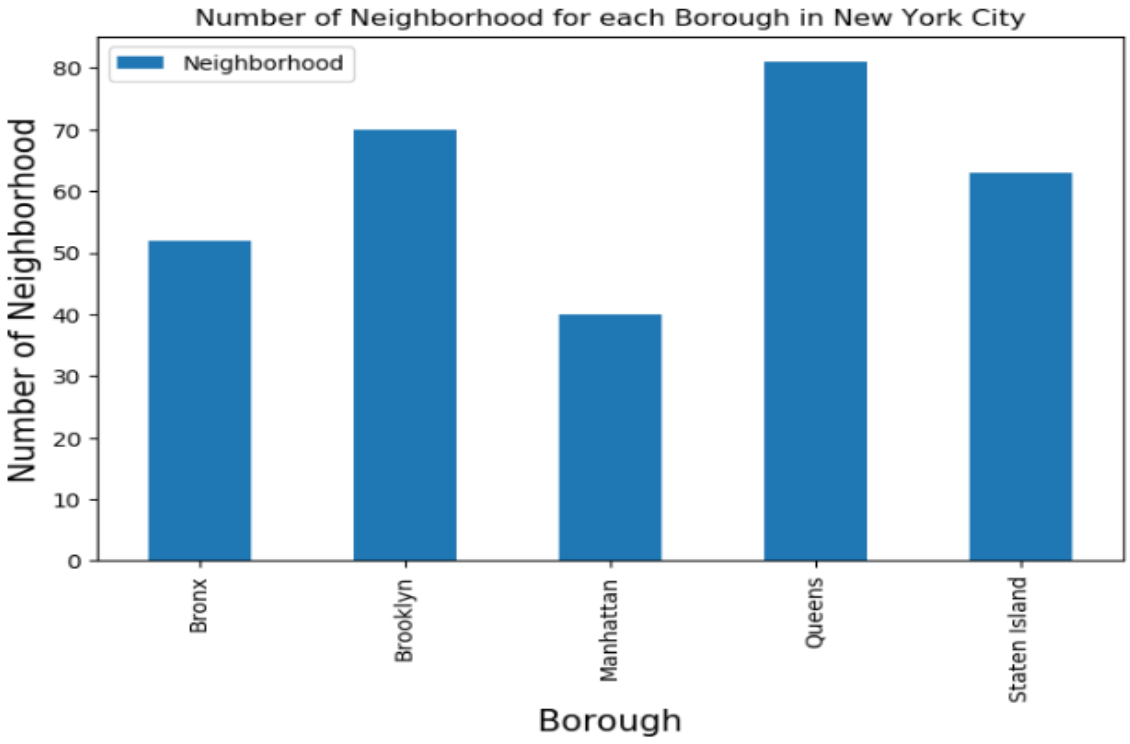
Methodology:

To answer all the above questions, following steps were performed:

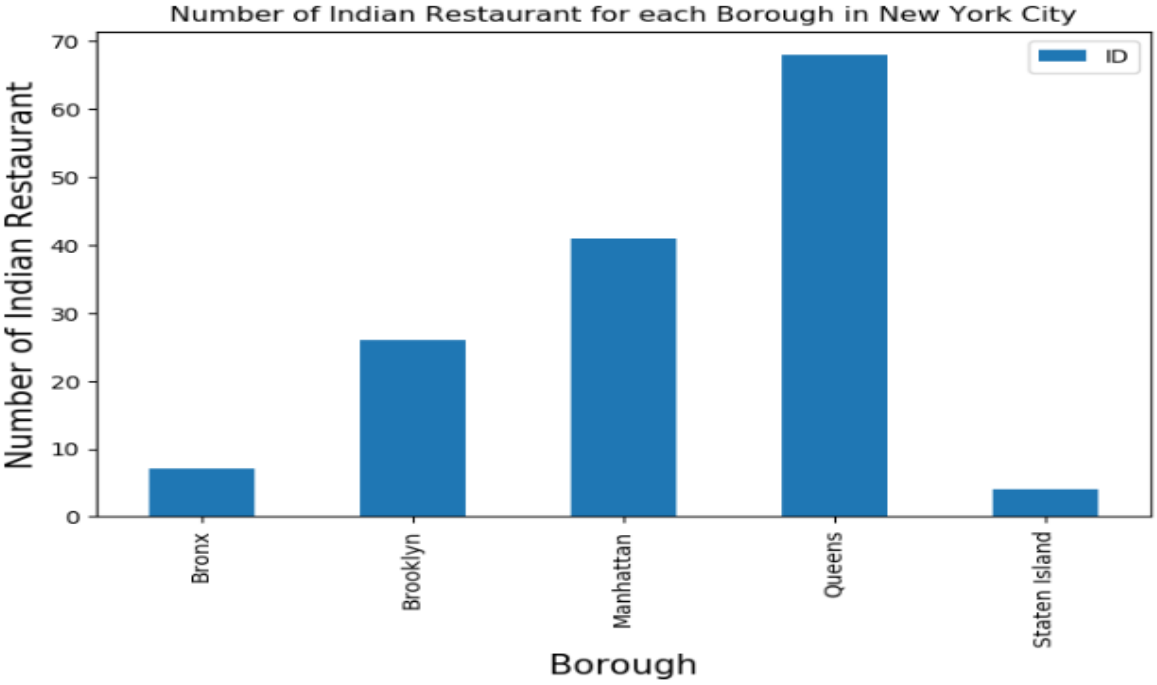
- Python libraries such as Numpy and pandas were imported to handle and perform data analysis.
- Json library was also imported in order to retrieve data from a Jason file.
- Request module for using FourSquare API
- Geopy library was imported in order to find out the co-ordinates of New York city.
- The geojson data for New York city's neighborhood was obtained
- The data was analyzed and venues were collected using the Foursquare API
- From the collected list of venues, all the Indian Restaurants were listed out.
- Bar plots were plotted for availability of Indian Restaurants as per Borough as well as for each neighbourhood.
- Along with finding out Indian restaurants, also popular places or venues were listed out and clusters were formed. For e.g. If some tries to open a new restaurant or if some plans to open a grocery store, which area/neighborhood would be suitable.
- Map of New York was created with neighborhoods superimposed on top using folium library.
- Most common venues were listed out for each neighborhood using foursquare API.
- Neighborhoods were grouped into number of clusters using K-means clustering algorithm.
- Finally Folium library is used to visualize the neighborhoods in New York City and their emerging clusters where each cluster specifies a particular place of interest.

Results:

- The below bar chart shows the number of neighborhood for each Borough in New York city.



- The below bar chart shows the number of Indian Restaurants for each Borough in New York City.

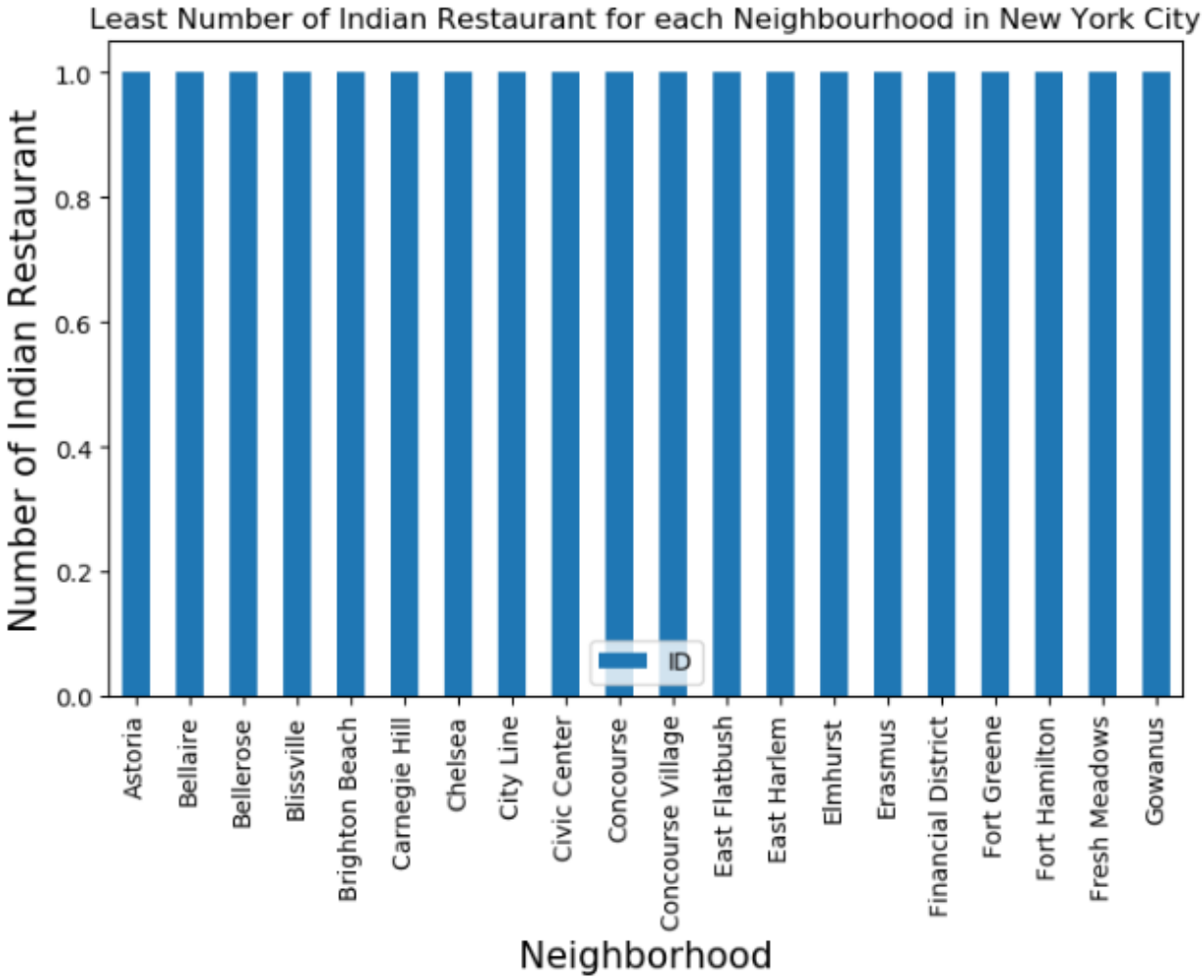


- It is quite evident from the above bar chart that both Staten Island and Bronx have less than 10 Indian restaurants, so these both places are suitable for opening a new restaurant.
- Queens have highest number of Indian restaurants followed by Manhattan and Brooklyn.

- Below bar chart shows number of Indian Restaurants for top 10 Neighborhoods in New York City.

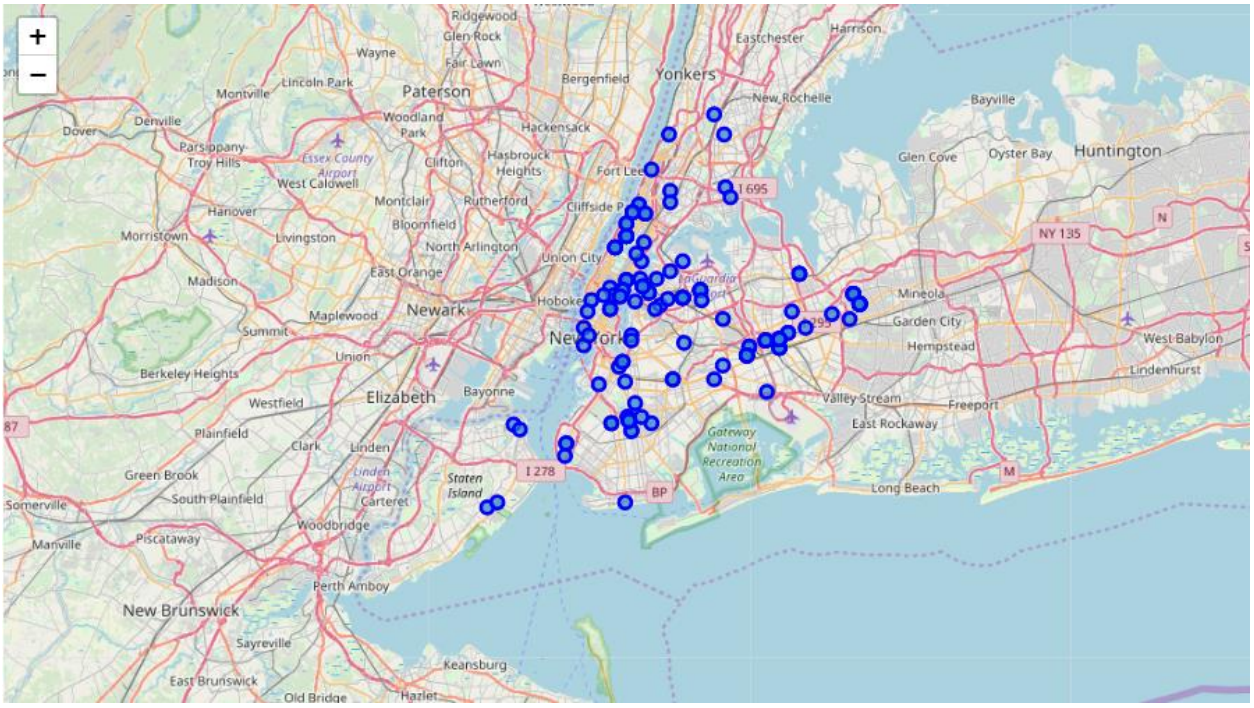
- It's quite evident from above bar chart that Floral Park in Queens has the highest number of Indian Restaurants with a total count of 9.

- Below bar chart shows least number of Indian Restaurants for each Neighborhoods in New York City.



- From the bar chart above, it can be noted that there are many neighborhoods where the presence of Indian restaurants are very few.
- These neighborhoods can be viewed as a potential place to start any Indian cuisine centre.

- The map below shows the Indian restaurants marked in blue color across New York City.



- The below figure shows one of the clusters formed from neighborhoods in New York.

	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
4	Bronx	Riverdale	40.890834	-73.912585	0	Bus Station	Park	Bank	Food Truck	Home Service	Plaza	Gym	Financial or Legal Service	Eye Doctor
27	Bronx	Clason Point	40.806551	-73.854144	0	Park	Pool	Scenic Lookout	Bus Stop	Business Service	Boat or Ferry	Grocery Store	South American Restaurant	Factory
35	Bronx	Spuyten Duyvil	40.881395	-73.917190	0	Park	Bank	Waste Facility	Thai Restaurant	Tennis Stadium	Scenic Lookout	Pharmacy	Bus Line	Intersection
148	Queens	South Ozone Park	40.668550	-73.809865	0	Deli / Bodega	Park	Bar	Hotel	Sandwich Place	Gym / Fitness Center	Fast Food Restaurant	Donut Shop	Food Truck
171	Queens	Broad Channel	40.603027	-73.820055	0	Deli / Bodega	Pizza Place	Bus Station	Other Nightlife	Dive Bar	Park	Women's Store	Fish Market	Falafel Restaurant
192	Queens	Somerville	40.597711	-73.796648	0	Park	Women's Store	Fish Market	Eye Doctor	Factory	Falafel Restaurant	Farm	Farmers Market	Fast Food Restaurant
193	Queens	Brookville	40.660003	-73.751753	0	Deli / Bodega	Women's Store	Flea Market	Eye Doctor	Factory	Falafel Restaurant	Farm	Farmers Market	Fast Food Restaurant
198	Staten Island	New Brighton	40.640615	-74.087017	0	Bus Stop	Deli / Bodega	Park	Bowling Alley	Playground	Convenience Store	Discount Store	Filipino Restaurant	Fish & Chips Shop
203	Staten Island	Todt Hill	40.597069	-74.111329	0	Park	Women's Store	Fish Market	Eye Doctor	Factory	Falafel Restaurant	Farm	Farmers Market	Fast Food Restaurant

- It can be seen that the above cluster indicates venues or places like Parks, Bus station as most common for Borough's like Bronx, Queens and the neighborhoods around it.

- The below figure shows another cluster that is formed from neighborhoods in New York.

	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
0	Bronx	Wakefield	40.894705	-73.847201	1	Caribbean Restaurant	Donut Shop	Pharmacy	Gas Station	Dessert Shop	Food Truck	Sandwich Place
1	Bronx	Co-op City	40.874294	-73.829939	1	Baseball Field	Restaurant	Bus Station	Pharmacy	Ice Cream Shop	Chinese Restaurant	Fast Food Restaurant
2	Bronx	Eastchester	40.887556	-73.827806	1	Caribbean Restaurant	Bus Station	Deli / Bodega	Diner	Bus Stop	Metro Station	Donut Shop
3	Bronx	Fieldston	40.895437	-73.905643	1	River	High School	Bus Station	Playground	Plaza	Financial or Legal Service	Exhibit
5	Bronx	Kingsbridge	40.881687	-73.902818	1	Pizza Place	Sandwich Place	Deli / Bodega	Discount Store	Bar	Latin American Restaurant	Supermarket
6	Manhattan	Marble Hill	40.876551	-73.910660	1	Coffee Shop	Discount Store	Sandwich Place	Yoga Studio	Donut Shop	Spa	Steakhouse
7	Bronx	Woodlawn	40.898273	-73.867315	1	Pub	Playground	Deli / Bodega	Food & Drink Shop	Pizza Place	Rental Car Location	Laundromat
8	Bronx	Norwood	40.877224	-73.879391	1	Pizza Place	Deli / Bodega	Park	Bank	Pharmacy	Convenience Store	Sandwich Place
9	Bronx	Williamsbridge	40.881039	-73.857446	1	Bar	Nightclub	Caribbean Restaurant	Soup Place	Fish Market	Factory	Falafel Restaurant
10	Bronx	Baychester	40.866858	-73.835798	1	Pet Store	Donut Shop	Electronics Store	BBQ Joint	Baseball Field	Sandwich Place	Pizza Place
11	Bronx	Pelham Parkway	40.857413	-73.854756	1	Italian Restaurant	Pizza Place	Bus Station	Metro Station	Food	Liquor Store	Bakery

- The above cluster lists out places like Restaurants, coffee shops, bars and pubs as the most common venues. In a nutshell it gives us all the places where people can have a quick snack or any eatable item that they wish to eat.
- The Borough and neighborhoods involved can be good for someone looking to open any restaurants, coffee shops or any shops for eateries.

Discussion & Conclusion:

- Based on above results we have found out answers of the problems mentioned in the introduction section and the observations are pointed below.

- Manhattan has potential Indian Restaurant Market.
- Borough named Queens has more number of Indian restaurants.
- Neighborhood named Flora Park has more number of Indian Restaurants.
- Boroughs like Staten Island and Bronx both have least number of Indian Restaurants, so both these places are suitable for opening a new Indian restaurant.
- There are number of neighborhoods such as Astoria, Bellaire, Brighton beach etc where the presence of Indian cuisine centre is close to none.
- These neighborhoods can be targeted as a potential place in order to start any Indian cuisine centre.
- When it comes to group of cluster that shows potential to start a new business, cluster 1 from above result section certainly suggests that the Boroughs and the neighborhoods falling under this cluster would be very useful to come up with any new business venture such as Restaurants, shops etc but initial set up investment would be more as the cluster is densely populated with markets.

- Cluster 0 consists of venues or places like Parks, Bus station as most common for Borough's like Bronx, Queens and the neighborhoods around it and hence based on results it can be said ideal for starting any new business venture as initial set up investment would be less as the cluster is not so densely populated with markets.