The Battle of the Neighborhoods - Week 1¶

Introduction & Business Problem :¶

Problem Background:¶

New York is the most populous city in the United States. It is the financial capital of USA. Due to this, it gives lot of business opportunities for people from around the world. This has attracted various businessman and entrepreneurs to invest in New York. NewYork is a global hub of business and commerce where people of various background live and visit. The city is a hub for everything known to human from food to arts to anything and everything. This gives rise to a competitive market. It is a highly developed city and expensive city and hence running a business is also expensive. Hence, starting a new business needs to be analyzed to avoid loss in the future. This project will insights on the market in NewYork and the scope of starting any business that will help in starting a new venture.

Problem Description:¶

A restaurants is an excellent business opportunity in the NewYork given the diversity. The people from various parts of the world reside in NewYor. People from Central and Eastern Europe, Italy, Jewish and China are here and this gives an opportunity to open a restaurant with a great good variety. The city is home to "nearly one thousand of the finest and most diverse haute cuisine restaurants in the world", according to Michelin.

Hence, it can be seen New York is a competitive market and hence it is essential to plan and analyze. There are different aspects that need to be analyzed in-order to

decide on the perfect location to open the restaurant. The different things that need to be though through are:

1. Population
2. City Demographics
3. Farmers Markets or Wholesale markets
4. venues like Gyms, Entertainment zones, Parks etc
5. The competitors
6. Cuisine people like most

Company's Interested:¶

We are analyzing data for Chaffer Company. The objective is to locate and recommend the neighborhood of New York city that will be best place to start a restaurant. This project would help everyone, who are interested in opening a business.

Project completion:¶

The success completion of the project is to provide a good recommendation of borough/Neighborhood choice to Chaffer Company based on analysis and the points mentioned in the problem description.

2. Data :

Newyork City will be analysed for this project.We will be using the below datasets for analyzing New York city

Data 1 :

Neighborhood has a total of 5 boroughs and 306 neighborhoods. In order to segment the neighborhoods and explore them, we will essentially need a dataset that contains the 5 boroughs and the neighborhoods that exist in each borough as well as the the latitude and longitude coordinates of each neighborhood.

This dataset exists for free on the web. Link to the dataset is :

https://geo.nyu.edu/catalog/nyu_2451_34572

Data 2 : Second data which will be used is the DOHMH Farmers Markets and Food Boxes dataset. In this we will be using the data of Farmers Markets.

https://data.cityofnewyork.us/dataset/DOHMH-Farmers-Markets-and-Food-Boxes/8vwk-6iz2

GrowNYC's Fresh Food Box Program is a food access initiative that enables under-served communities to purchase fresh, healthy, and primarily regionally grown produce well below traditional retail prices.

	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

A farmers' market is often defined as a public site used by two or more local or regional producers for the direct sale of farm products to consumers. In addition to fresh fruits and vegetables, markets may sell dairy products, fish, meat, baked goods, and other minimally processed foods.

	FacilityName	Service Category	Service_Type	Address	Address 2	Borough	ZipCode	Latitude	Longitude	AdditionalInfo	StartDate	EndDate	Monday	Tuesday	Wednesday	Thursday
0	Inwood Park Greenmarket	Farmers Markets and Food Boxes	Farmers Markets	Isham St bet Seaman & Cooper	NaN	Manhattan	10034	40.869009	-73.920320	Open year-round	NaN	NaN	NaN	NaN	NaN	NaN
1	82nd Street Greenmarket	Farmers Markets and Food Boxes	Farmers Markets	82nd St bet 1st & York Aves	NaN	Manhattan	10028	40.773448	-73.948954	Open year-round	NaN	NaN	NaN	NaN	NaN	NaN
3	125th Street Farmers Market	Farmers Markets and Food Boxes	Farmers Markets	125th St & Adam Clayton Powell Jr Blvd	NaN	Manhattan	10027	40.808981	-73.948327	Market open dates: 6/13/2017 to 11/21/2017	06/13/2017	11/21/2017	NaN	10am-7pm	NaN	NaN
4	170 Farm Stand	Farmers Markets and Food Boxes	Farmers Markets	170th St & Townsend Ave	NaN	Bronx	10452	40.840095	-73.916827	Market open dates: 7/5/2017 to 11/22/2017	07/05/2017	11/22/2017	NaN	NaN	2:30pm-6:30pm	NaN
5	175th Street Greenmarket	Farmers Markets and Food Boxes	Farmers Markets	175th St bet Wadsworth Ave & Broadway	NaN	Manhattan	10033	40.845956	-73.937813	Market open dates: 6/29/2017 to 11/30/2017	06/29/2017	11/30/2017	NaN	NaN	NaN	8am-5pm

Data 3 : For the below analysis we will get data from wikipedia as given below:

1. New York Population
2. New York City Demographics
3. Cuisine of New York city

https://en.wikipedia.org/wiki/New_York_City https://en.wikipedia.org/wiki/Economy_of_New_York_City https://en.wikipedia.org/wiki/Portal:New_York_City https://en.wikipedia.org/wiki/Cuisine_of_New_York_City

Data 4

New York city geographical coordinates data will be utilized as input for the Foursquare API, that will be leveraged to provision venues information for each neighborhood.We will use the Foursquare API to explore neighborhoods in New York City. The below is image of the Foursquare API data.

3.Methodology :

Our main goal is to get optimum location for new restaurant business in New York City for Chaffer Company.

	Neighborhood	NeighborhoodLatitude	NeighborhoodLongitude	Venue	VenueLatitude	VenueLongitude	VenueCategory
0	Marble Hill	40.876551	-73.91066	Arturo's	40.874412	-73.910271	Pizza Place
1	Marble Hill	40.876551	-73.91066	Bikram Yoga	40.876844	-73.906204	Yoga Studio
2	Marble Hill	40.876551	-73.91066	Tibbett Diner	40.880404	-73.908937	Diner
3	Marble Hill	40.876551	-73.91066	Sam's Pizza	40.879435	-73.905859	Pizza Place
4	Marble Hill	40.876551	-73.91066	Loeser's Delicatessen	40.879242	-73.905471	Sandwich Place

Analytic Approach :

New York city neighborhood has a total of 5 boroughs and 306 neighborhoods. In this project first part is clustering of Manhattan and Brooklyn . And second part is clustering of Bronx, Queens and Staten Island. This is done because of the following Exploratory data analysis.

Exploratory Data Analysis :

Data 1- New York city Geographical Coordinates Data.

1. In this we load the data and explore data from newyork_data.json file.

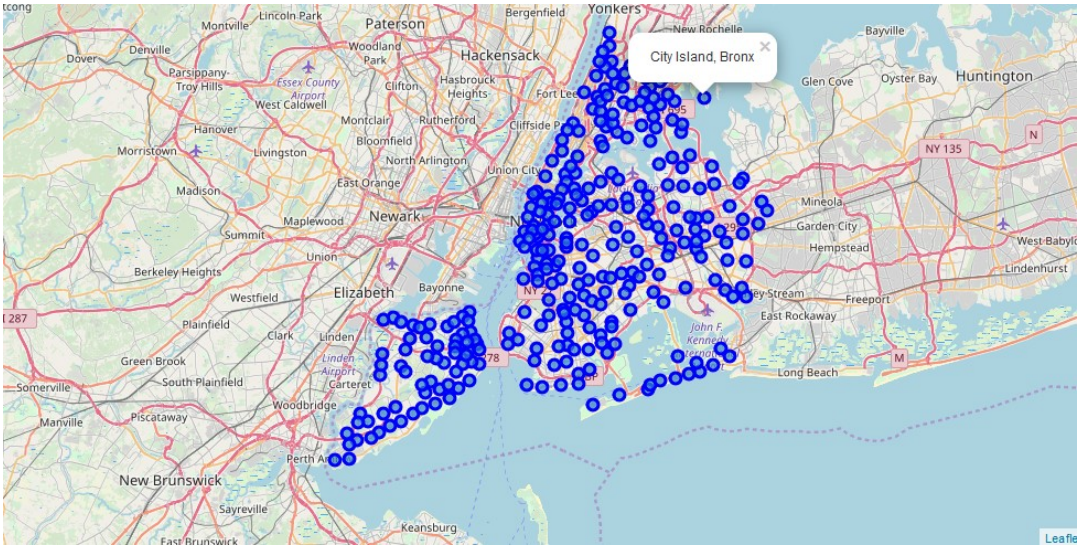
2. Transform the data of nested python dictionaries into a pandas data-frame.

3. This data-frame contains the geographical coordinates of New York city neighborhoods.

4. This data will used to get Venues data from Foursquare.

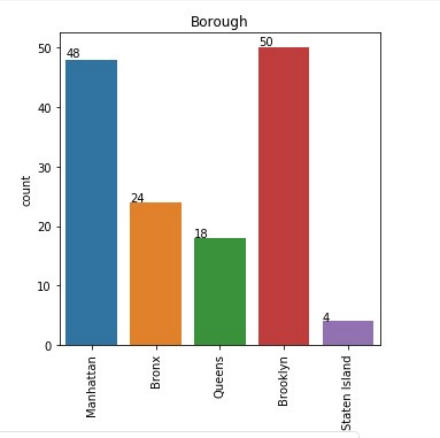
5. We used geopy and folium libraries to create a map of New York city with neighborhoods superimposed on top.

New York neighbourhood visualization



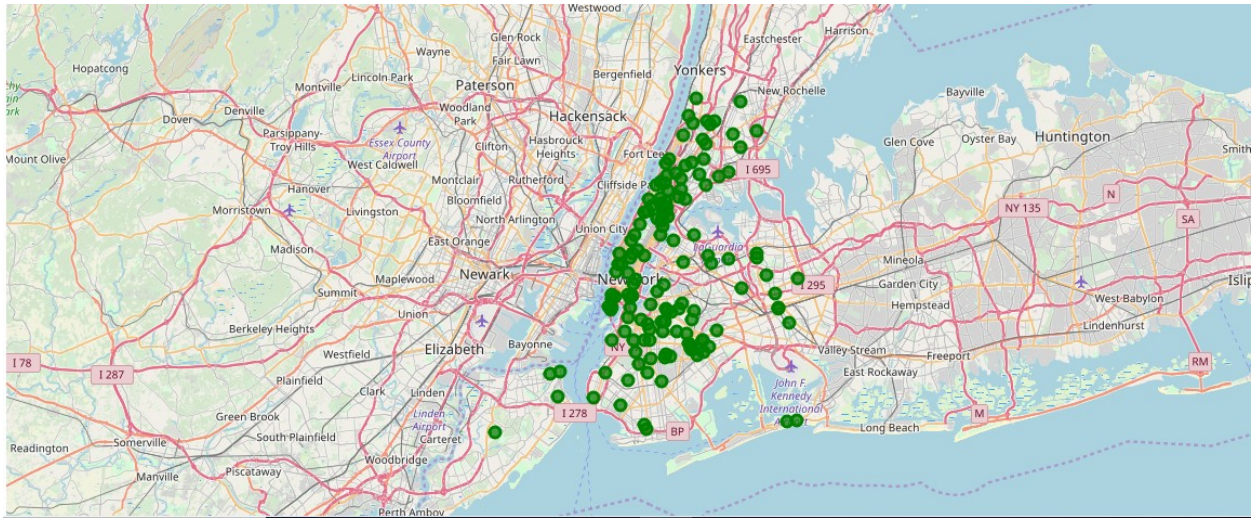
Data 2- Second data is used from DOHMH Farmers Markets and Food Boxes dataset. In this we will be using the data of Farmers Markets data.

There are totally 144 Farmers Markets in New York city. Highest number are in Manhattan and Brooklyn.
And lowest in Queens, Bronx and Staten Island.



We used geopy and folium libraries to create a map to visualise farmers markets of New York city.

Farmers Market visualisation-New York City



Data 3 : To analyize New York city Population, Demographics and Cuisine , scrapped the data from Wikipedia pages given above in the data section. We used BeautifulSoup python library. Beautiful Soup is a Python package for parsing HTML and XML documents (including having malformed markup, i.e. non-closed tags, so named after tag soup). It creates a parse tree for parsed pages that can be used to extract data from HTML, which is useful for web scraping

1.New York Population : Insights from the data :

- Manhattan (New York County) is the geographically smallest and most densely populated borough.
- Manhattan’s (New York County's) population density of 72,033 people per square mile (27,812/km2) in 2015 makes it the highest of any county in the United States and higher than the density of any individual American city.
- Brooklyn (Kings County), on the western tip of Long Island, is the city's most populous borough.
- Queens (Queens County), on Long Island north and east of Brooklyn, is geographically the largest borough.

	Borough	County	Estimate_2017	square_miles	square_km	persons_sq_mi	persons_sq_km
0	Manhattan	New York	1,664,727	22.83	59.13	72,033	27,826
1	The Bronx	Bronx	1,471,160	42.10	109.04	34,653	13,231
2	Brooklyn	Kings	2,648,771	70.82	183.42	37,137	14,649
3	Queens	Queens	2,358,582	108.53	281.09	21,460	8,354
4	Staten Island	Richmond	479,458	58.37	151.18	8,112	3,132
5		City of New York	8,622,698	302.64	783.83	28,188	10,947
6		State of New York	19,849,399	47,214	122,284	416.4	159

2.New York City Demographics : New York City is the most populous city in the United States, [9] [7] into the city than outmigration since the 2010 United States Census. with an estimated record high of 8,622,698 residents as of 2017, incorporating more immigration

The racial composition is as given below. This is the reason New York city has restaurants serving cuisine from many countries such as Indian, African, Japan etc. This also increases the scope for restaurants business in New York City.

	Racialcomposition	2010	1990	1970	1940
0	White	44.0%	52.3%	76.6%	93.6%
1	—Non-Hispanic	33.3%	43.2%	62.9%	92.0%
2	Black or African American	25.5%	28.7%	21.1%	6.1%
3	Hispanic or Latino (of any race)	28.6%	24.4%	16.2%	1.6%
4	Asian	12.7%	7.0%	1.2%	–

3.Cuisine of New York city : This data has been manually prepared.

Data is taken from Wikipedia page - https://en.wikipedia.org/wiki/Cuisine_of_New_York_City .

After analyzing we found the popular cusined in NewYork City.

NEW YORK CITY CUISINE :

Most Preferred Food in New York City –Italian, Purto Rican, Mexican, Jewish, Indian, Pakistani & Dominican.

BROOKLYN CUISINE -Most Preferred Food in Brooklyn is –Italian, Purto Rican & Mexican

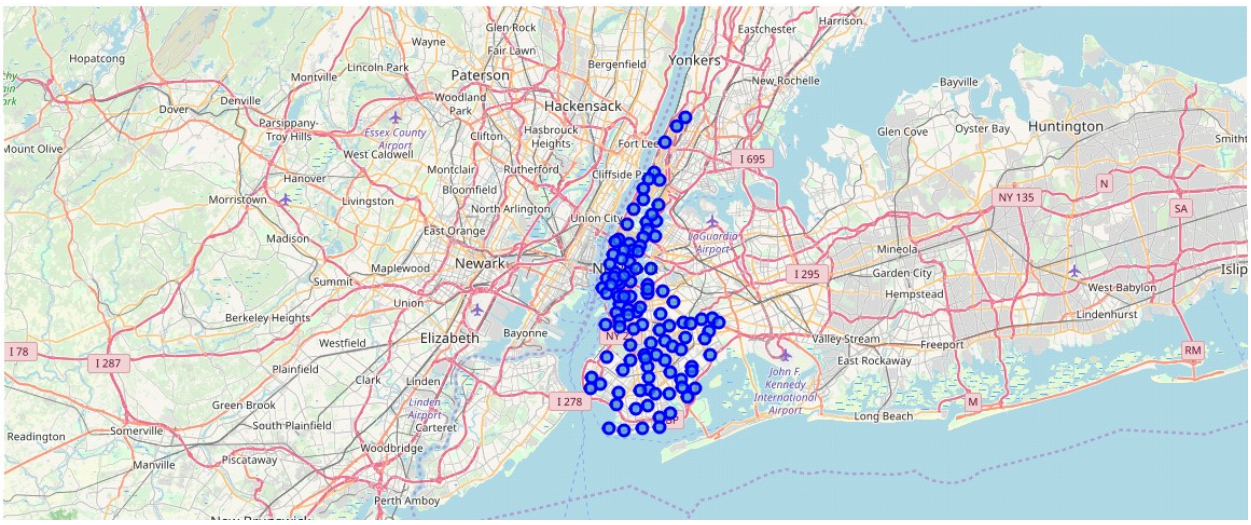
MANHATTAN CUISINE - Most Preferred Food in Manhattan is – Italian, American, Puerto Rican and Indian.

QUEENS CUISINE - Most Preferred Food in Queens is – Indian, Irish, Pakistani and Mexican.

THE BRONX CUISINE - Most Preferred Food in The Bronx is – Italian,Puerto Rican, Albanian and Dominican.

Data 4 : NewYork city geographical coordinates data has be utilized as input for the Foursquare API, that has been leveraged to provision venues information for each neighborhood. We used the Foursquare API data to explore neighborhoods in New York City.

Brooklyn and Manhattan Visualization :



Using the geographical coordinates of each neighborhood foursquare API calls are made to get top 200 venues in a radius of 1000 meters. The venues data is as given below :

Brooklyn and Manhattan Venues :

	Neighborhood	NeighborhoodLatitude	NeighborhoodLongitude	Venue	VenueLatitude	VenueLongitude	VenueCategory
0	Marble Hill	40.876551	-73.91066	Arturo's	40.874412	-73.910271	Pizza Place
1	Marble Hill	40.876551	-73.91066	Bikram Yoga	40.876844	-73.906204	Yoga Studio
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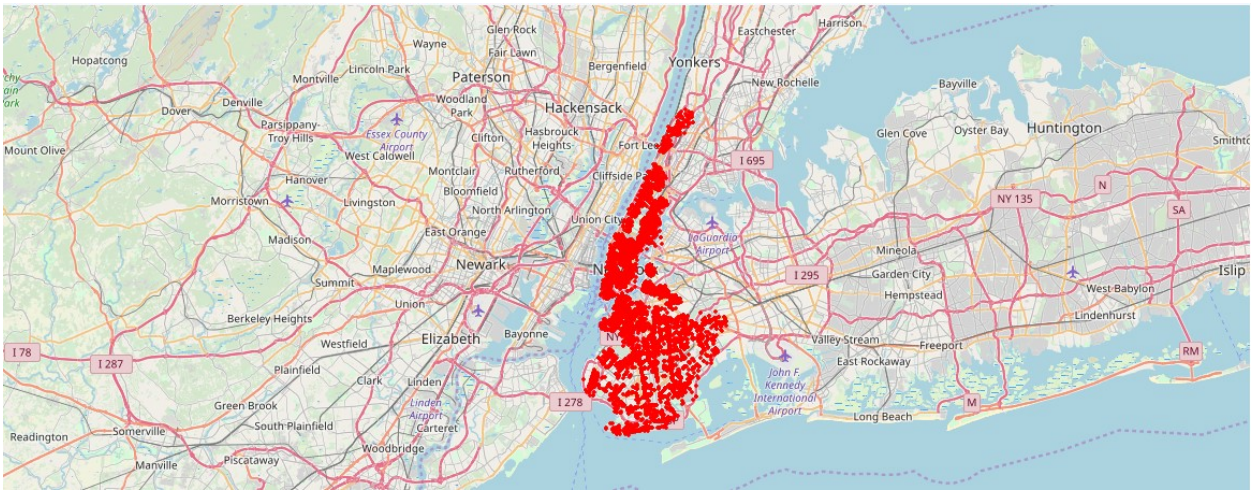
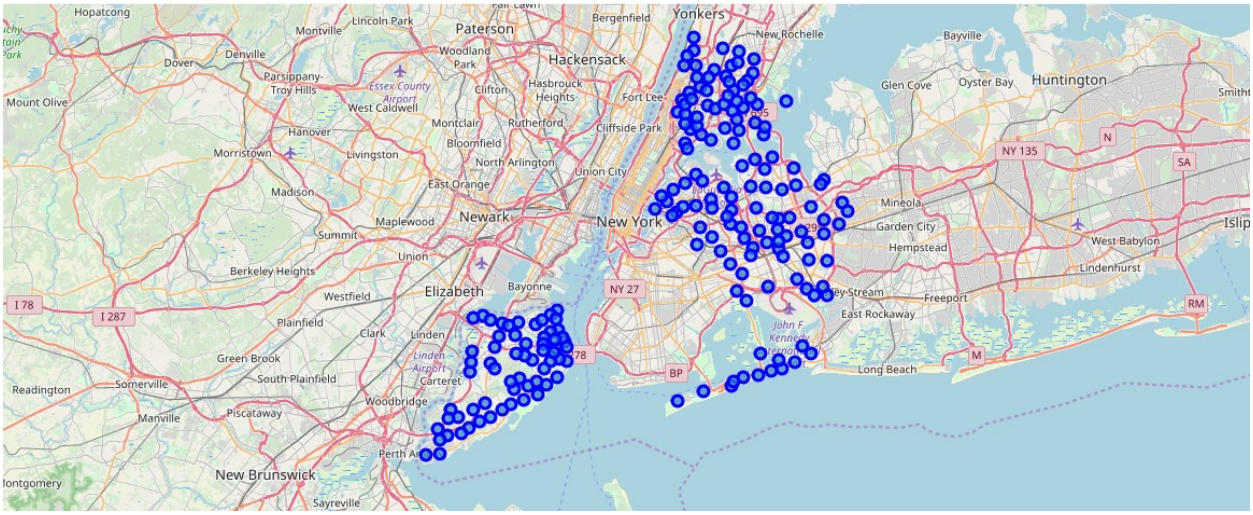
4	Marble Hill	40.876551	-73.91066	Loeser's Delicatessen	40.879242	-73.905471	Sandwich Place

Brooklyn and Manhattan Venues Visualization : Generated the below Brooklyn and Manhattan Venues Visualization. The "BM_venues" dataframe has 9708 venues and 397 unique venue types.



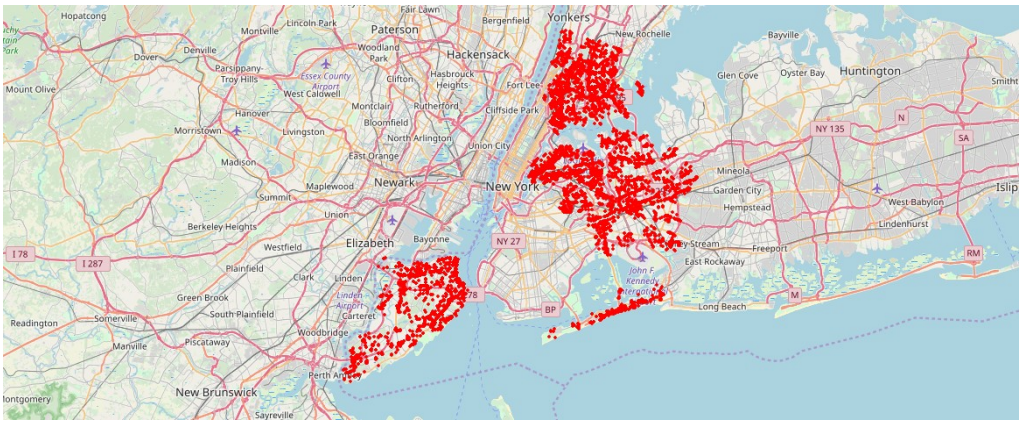
Bronx, Queens and Staten Island Neighborhoods Visualization :



Bronx, Queens and Staten Island Venues Visualization : The "BQS_venues" data-frame has 10805 venues and 387 unique venue types.

	Neighborhood	NeighborhoodLatitude	NeighborhoodLongitude	Venue	VenueLatitude	VenueLongitude	VenueCategory
0	Wakefield	40.894705	-73.847201	Lollipops Gelato	40.894123	-73.845892	Dessert Shop
1	Wakefield	40.894705	-73.847201	Ripe Kitchen & Bar	40.898152	-73.838875	Caribbean Restaurant
2	Wakefield	40.894705	-73.847201	Jackie's West Indian Bakery	40.889283	-73.843310	Caribbean Restaurant
3	Wakefield	40.894705	-73.847201	Ali's Roti Shop	40.894036	-73.856935	Caribbean Restaurant
4	Wakefield	40.894705	-73.847201	Rite Aid	40.896521	-73.844680	Pharmacy

Bronx, Queens and Staten Island Venues Map Visualization :



4.RESULTS :

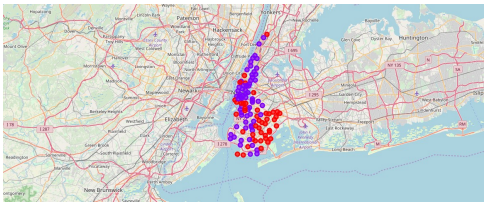
From this venues data we filtered and used only the restaurant data for Brooklyn & Manhattan clustering and Bronx, Queens and Staten Island clustering. As we focussed only on restaurants business.

Neighborhood K-Means clustering based on mean occurrence of venue category :

To cluster the neighborhoods into two clusters we used the K-Means clustering Algorithm. k-means clustering aims to partition n observations into k clusters in which each observation belongs to the cluster with the nearest mean. It uses iterative refinement approach.

Brooklyn & Manhattan :

In the below Map Visualization, we can see the different types of clusters created by using K-Means for Brooklyn & Manhattan



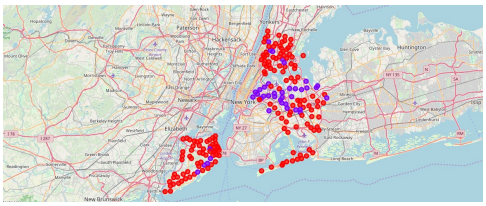
Cluster0 : The Total and Total Sum of cluster0 has smallest value. It shows that the market is not saturated.

Cluster1 : The Total and Total Sum of cluster1 has highest value. It shows that the markets are saturated. Number of restaurants are very high.

There are no untapped neighborhoods in Brooklyn and Manhattan.

Bronx, Queens and Staten Island :

In the below Map Visualization, we can see the different types of clusters created by using K-Means for Bronx, Queens and Staten Island.



Cluster0 : The Total and Total Sum of cluster0 has smallest value. It shows that the market is not saturated. There are untapped neighborhoods. List is as given below.

	Borough	Neighborhood	Latitude	Longitude	Total	Cluster_Labels
0	Staten Island	Todt Hill	40.597069	-74.111329	0	0
1	Staten Island	Port Ivory	40.639683	-74.174645	0	0
2	Staten Island	Bloomfield	40.605779	-74.187256	0	0

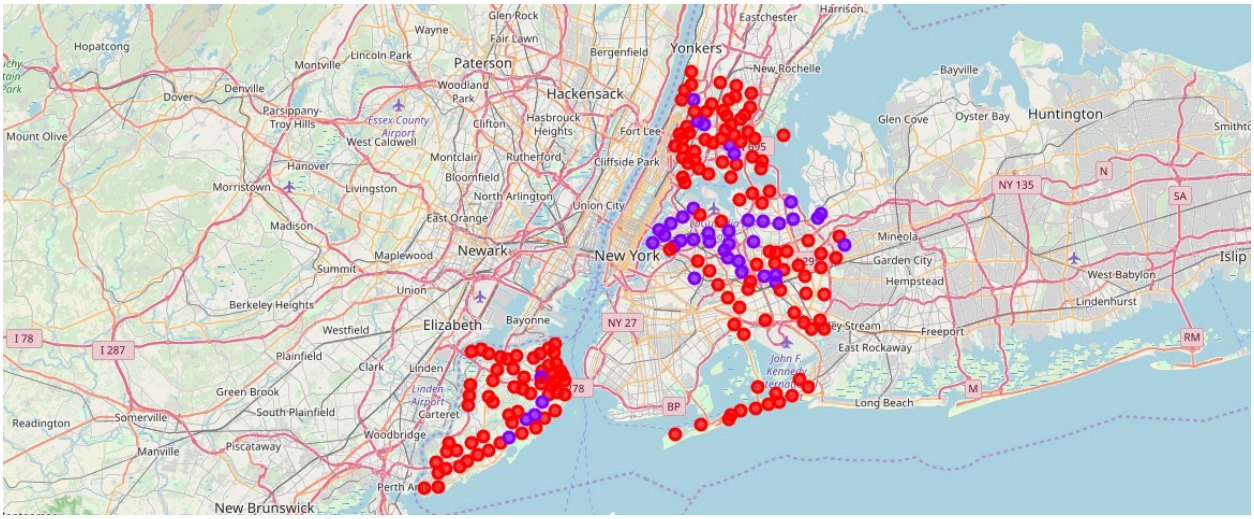
Cluster0 : The Total and Total Sum of cluster0 has smallest value. It shows that the market is not saturated.

Cluster1 : The Total and Total Sum of cluster1 has highest value. It shows that the markets are saturated. Number of restaurants are very high.

There are no untapped neighborhoods in Brooklyn and Manhattan.

Bronx, Queens and Staten Island :

In the below Map Visualization, we can see the different types of clusters created by using K-Means for Bronx, Queens and Staten Island.



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Cluster1 : The Total and Total Sum of cluster1 has highest value. It shows that the markets are saturated. Number of restaurants are very high.

5.DISCUSSION:

1. There is scope to increase Farmers markets in Bronx, Queens and Staten Island.

2. There is scope to explore cuisines of various countries in Bronx, Queens and Staten Island.

3. In Manhattan and Brooklyn restaurants of cuisines of many countries are available. It also shows people enjoy eating cuisines of various countries as they have variety of options.

6.CONCLUSION:

This analysis is performed on limited data. If good amount of data is available there is scope to come up with better results. If there are lot of restaurants probably there is lot of demand. Brooklyn and Manhattan has high concentration of restaurant business. It is a Very competitive market. Bronx, Queens and Staten Island also has good number of restaurants .As per the neighborhood or restaurant type mentioned like Indian Restaurant analysis can be checked. A venue with lowest risk and competition can be identified.