# The Battle of Neighborhoods

# 1. Introduction & Business Problem

## Problem Background

The City of New York, is one of the most populous cities in the United States. It contains a diversity of multicultural ethnicity that provides good opportunities in several ways of business. It is the financial capital of USA, so it's an attractive city for the commerce. The city is considered as a center for banking and finance, retailing, world trade, transportation, tourism, traditional media, advertising, legal services, accountancy and other important business activities in the United States.

City brings good opportunities for people, but it also very competitive about markets, one of them is food market. As it is highly developed city so cost of doing business is also one of the highest. In other words, any new business or product need to be analyzed very carefully before to launch to the market. The objectives as result of the analysis could help to make a reasonable judge about introducing a new product or establish a good understanding of a new market environment. The analysis will help to reduce the risk in the investment making the return will be reasonable.

## Problem Description

A restaurant is a place where meals are prepared and served to customers in return for money. The New York City contains several types of excellent food related with the gastronomy of many parts of the world. Many restaurants are influenced for the immigrant history, so there is a competitive market to show the culture through the preparation of tasty dishes. Next, will be presented examples of kinds meals that there are in New York currently.

Ashkenazi Jewish cuisine: Much of the cuisine usually associated with New York City stems in part from its large community of Ashkenazi Jews and their descendants. Among their famous dishes are: New York-style pastrami, pastrami on rye, brisket, corned beef, tongue, knish, New York-style bagels and lox, Bagel and cream cheese, whitefish with and without pike and others.

Italian-American cuisine: Like the Askenazi-Jewish community, much of the cuisine usually associated with New York City stems in part from its large community of Italian-Americans and their descendants. Their main dishes are: Cappuccino, New York-style pizza, Spaghetti and meatballs, Cannoli, Chicken parmigiana, Sausage and peppers, New York-style Italian ice, Sicilian style pizza, pasta primavera and others.

Chino-Latino cuisine: It is a cuisine associated with New York City stems, by and large, to the earliest migration of Chinese migrants to Cuba in the mid-1800s. They have dishes as: Fried rice, Fried Pork Chop, Lumpiang Shanghai, Sesame Chicken, Chicken and Broccoli, Egg Drop Soup, Oxtail stew, Cuban chicharrones de pollo, White Rice with Black Beans and Churrasco

Cuban-Chino Food: Cuban and Chinese food are similar in many ways such that a huge portion of their dishes revolve around white meats such as pork and starches such as rice.

As we can see, there are many kinds of meals in New York city, so it is evident that there are a competitive market. It is important to develop a financial and strategy plan to decide to open this kind of business. It necessary consider factors related with the population of the city, meal business

and also topics about index of crime. These factors, help to make important decisions about the location to open a new restaurant.

### Target Audience

It helps to ABC company or a personal business to have an idea about the environment of restaurant in New York city. The main insight is to locate and recommend the management the correct location to open a restaurant through the help of data analysis and algorithms related with Data Science. The analysis will be included clusters about the borough of New York

# 2. Data Description

Neighborhood has a total of 5 boroughs and 306 neighborhoods. In order to segement 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 logitude coordinates of each neighborhood.

This dataset exists for free on the web. The link to the dataset is the following: https://geo.nyu.edu/catalog/nyu_2451_34572

The information related with Cuisine of New York can be easily founded through the following link: https://en.wikipedia.org/wiki/Cuisine_of_New_York_City

Crimes and delinquency information can be extracted from the following link: https://www1.nyc.gov/site/nypd/stats/crime-statistics/borough-and-precinct-crime-stats.page

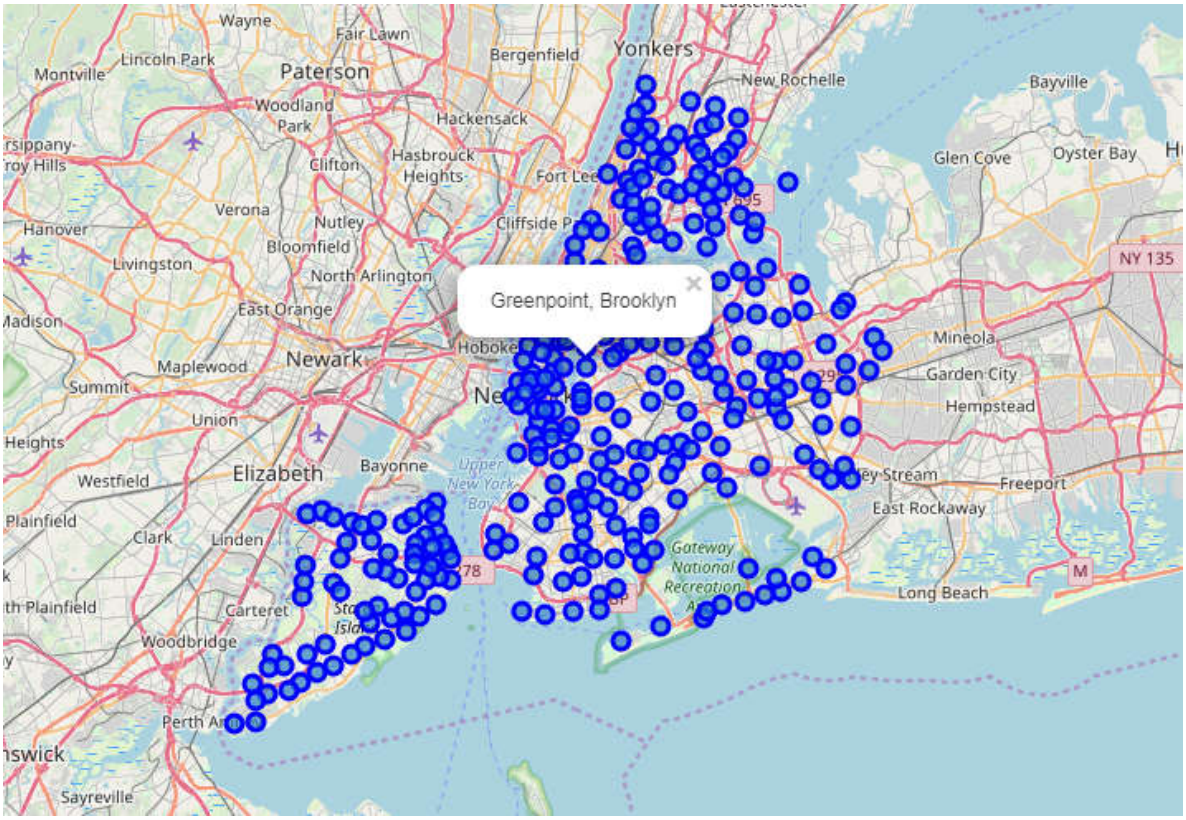
Finally, data related with geographical information and coordinates data can be used from Foursquare API, that will be leveraged to provision venues information for each neighborhood. This information will be very useful to explore conditions of neighborhoods in New York City.

# 3. Methodology of Analysis

### 3.1 Types of Cuisine

The goal is to give some recommendation for the company ABC to open a restaurant through a good location in New York city. It necessary to explore the data of how it is composed the city in Borough and Neighborhood

| | 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 |

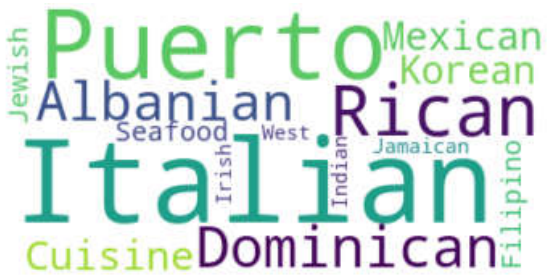



The types of food that are served can be resume in the following image.


In the same way, it is necessary to describe types of that each borough of New York City has.

- The Bronx borough has the following types of cuisine, where the Italian and Puerto Rican are the most preferred

| | Borough | Neighborhood | Cuisine |
|---|---|---|---|
| 0 | Bronx | Bedford Park | Mexican, Puerto Rican, Dominican, Korean |
| 1 | Bronx | Belmont | Italian, Albanian |
| 2 | Bronx | City Island | Italian, Seafood |
| 3 | Bronx | Morris Park | Italian, Albanian |
| 4 | Bronx | Norwood | Filipino |
| 5 | Bronx | Riverdale | Jewish |
| 6 | Bronx | South Bronx | Puerto Rican, Dominican |
| 7 | Bronx | Wakefield | Jamaican, West Indian |
| 8 | Bronx | Woodlawn | Irish |




- The Queens borough has the following types of cuisine. The most common types of food are the Italian and the Indian

| | Borough | Neighborhood | Cuisine |
|---|---|---|---|
| 0 | Queens | Astoria | Greek, Italian, Eastern European, Brazilian, E... |
| 1 | Queens | Bellerose | Indian and Pakistani |
| 2 | Queens | Flushing | Chinese and Korean |
| 3 | Queens | Forest Hills | Jewish, Russian, Uzbek |
| 4 | Queens | Kew Gardens Hills | Jewish, Russian, Uzbek |
| 5 | Queens | Rego Park | Jewish, Russian, Uzbek |
| 6 | Queens | Howard Beach | Italian |
| 7 | Queens | Ozone Park | Italian |
| 8 | Queens | Glendale | German and Polish |
| 9 | Queens | Jackson Heights | Indian, Pakistani, Bangladeshi, Colombian, Ecu... |
| 10 | Queens | Jamaica | Bangladeshi, Caribbean, American, African, Creole |
| 11 | Queens | Little Neck | Arab, Chinese, and Italian |
| 12 | Queens | Richmond Hill | Indian, Guyanese, West Indian, Pakistani, Bang... |
| 13 | Queens | The Rockaways | Irish, Jewish |
| 14 | Queens | Woodhaven | Irish, Dominican, Mexican, Guyanese |
| 15 | Queens | Woodside | Filipino, Irish, Mexican, Tibetan, Romanian |
| 16 | Queens | Sunnyside | Filipino, Irish, Mexican, Tibetan, Romanian |


- For the Brooklyn borough there are more restaurants that served Italian, Puerto Rican, Mexican and Chinesse food

| | Borough | Neighborhood | Cuisine |
|---|---|---|---|
| 0 | Brooklyn | Bay Ridge | Irish, Italian, Greek, Turkish, Lebanese, Pale... |
| 1 | Brooklyn | Bedford-Stuyvesant | African American, Jamaican, Trinidadian, Puert... |
| 2 | Brooklyn | Bensonhurst; | Italian, Chinese, Turkish, Russian, Mexican, U... |
| 3 | Brooklyn | Borough Park | Jewish, Italian, Mexican, Chinese |
| 4 | Brooklyn | Brighton Beach | Russian, Georgian, Turkish, Pakistani, Ukrainian |
| 5 | Brooklyn | Bushwick | Puerto Rican, Mexican, Dominican, Ecuadorian |
| 6 | Brooklyn | Canarsie | Jamaican, West Indian, African American |
| 7 | Brooklyn | Carroll Gardens | Italian |
| 8 | Brooklyn | Crown Heights | Jamaican, West Indian, Jewish |
| 9 | Brooklyn | East New York | African-American, Dominican, Puerto Rican |
| 10 | Brooklyn | Flatbush | Jamaican, Haitian, Creole |
| 11 | Brooklyn | Greenpoint | Polish, Ukrainian |
| 12 | Brooklyn | Kensington | Bengali, Pakistani, Mexican, Uzbek, Polish |
| 13 | Brooklyn | Midwood | Jewish, Italian, Russian, Pakistani |
| 14 | Brooklyn | Park Slope | Italian, Irish, French, Puerto Rican |
| 15 | Brooklyn | Red Hook | Puerto Rican, African American, Italian |
| 16 | Brooklyn | Sheepshead Bay | Seafood, Chinese, Russian, Italian |
| 17 | Brooklyn | Sunset Park | Puerto Rican, Chinese, Arab, Mexican, Italian |
| 18 | Brooklyn | Williamsburg | Italian, Jewish, Dominican, Puerto Rican |

- The Staten Island is the borough with the lowest number of neighborhoods. The most cuisine are Italian and Russian.

| | Borough | Neighborhood | Cuisine |
|---|---|---|---|
| 0 | Staten Island | Port Richmond | Mexican, Indian, Italian |
| 1 | Staten Island | Rossville | Italian, Russian, Arab, Polish |
| 2 | Staten Island | South Beach | Italian, Russian, Arab, Polish |
| 3 | Staten Island | Great Kills | Italian, Russian, Arab, Polish |
| 4 | Staten Island | Tompkinsville | Italian, Sri Lankan, Pakistani, Indian |

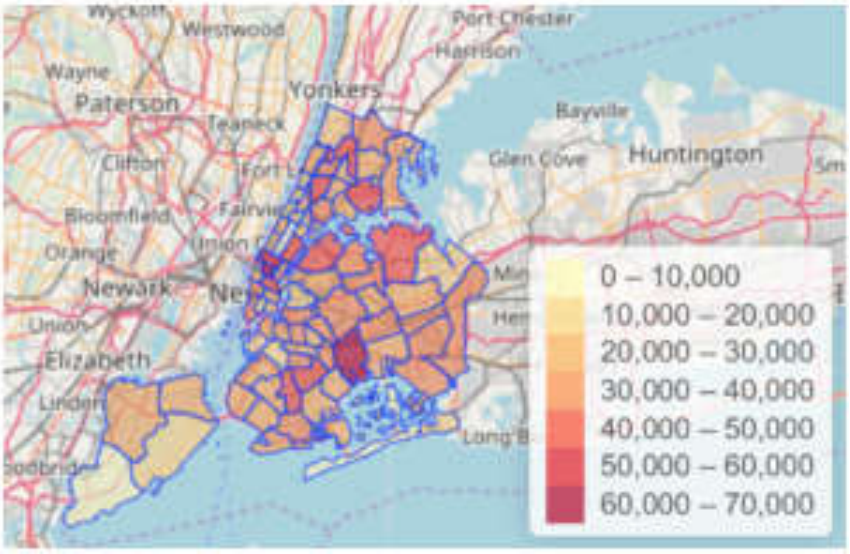

- The last borough Manhattan has the following types of cuisine

| | Borough | Neighborhood | Cuisine |
|---|---|---|---|
| 0 | Manhattan | Chinatown | Chinese and Vietnamese |
| 1 | Manhattan | East Harlem | Puerto Rican, Mexican, Dominican, Chinese, Cub... |
| 2 | Manhattan | East Village | Japanese, Korean, Indian and Ukrainian |
| 3 | Manhattan | Greenwich Village | Italian and Middle Eastern |
| 4 | Manhattan | Harlem | Italian, African American, Latin American, Wes... |
| 5 | Manhattan | Koreatown | Korean |
| 6 | Manhattan | Nolita | Australian |
| 7 | Manhattan | Little Italy | Italian |
| 8 | Manhattan | Lower East Side | Puerto Rican, Jewish, Italian, Latin American |
| 9 | Manhattan | Murray Hill | Indian, Pakistani, Bangladeshi |
| 10 | Manhattan | Upper West Side | Jewish, Chinese, Latin American |
| 11 | Manhattan | Manhattan | Jewish, Chinese, Latin American |
| 12 | Manhattan | Washington Heights | Dominican, Puerto Rican, Italian, Jewish |
| 13 | Manhattan | Upper East Side | German, Czech, Hungarian |

### 3.2 Index Crime in New York

The level of crime could be represented through the following table

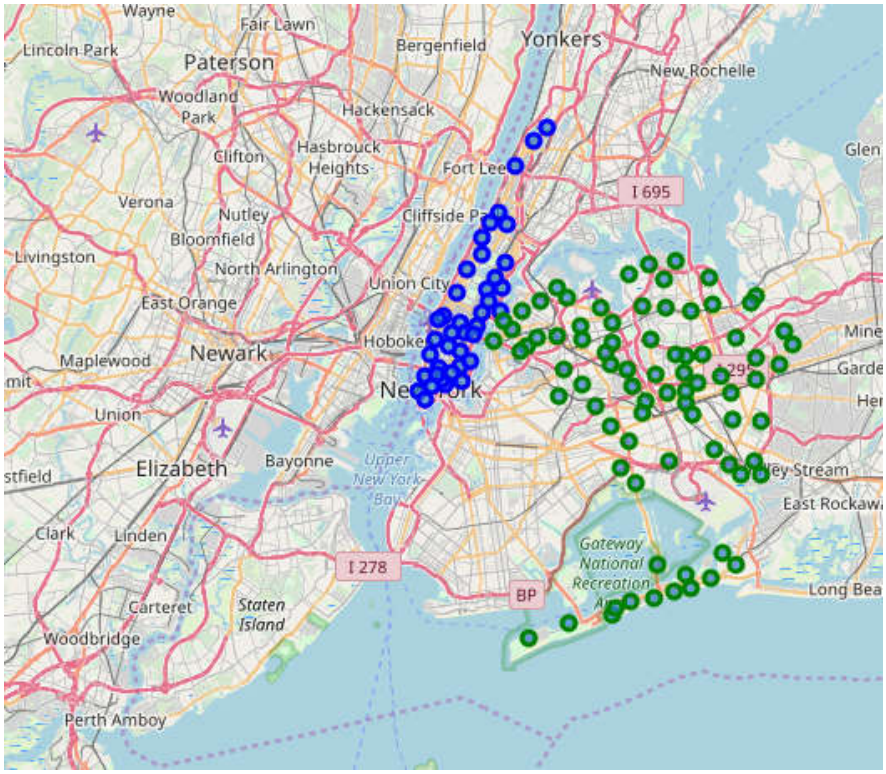
| | Borough | Quantity |
|---|---|---|
| 0 | Bronx | 19257 |
| 1 | Brooklyn | 27999 |
| 2 | Manhattan | 26828 |
| 3 | Queens | 18935 |
| 4 | Staten Island | 2699 |




# 4. Results

### 4.1 Exploring data of Manhattan and Queens

Using the Foursquare Api can we visualized the number of neighborhoods that are part of the Manhattan and Queens Borough. There are 121 points distributed between Manhattan and Queens.

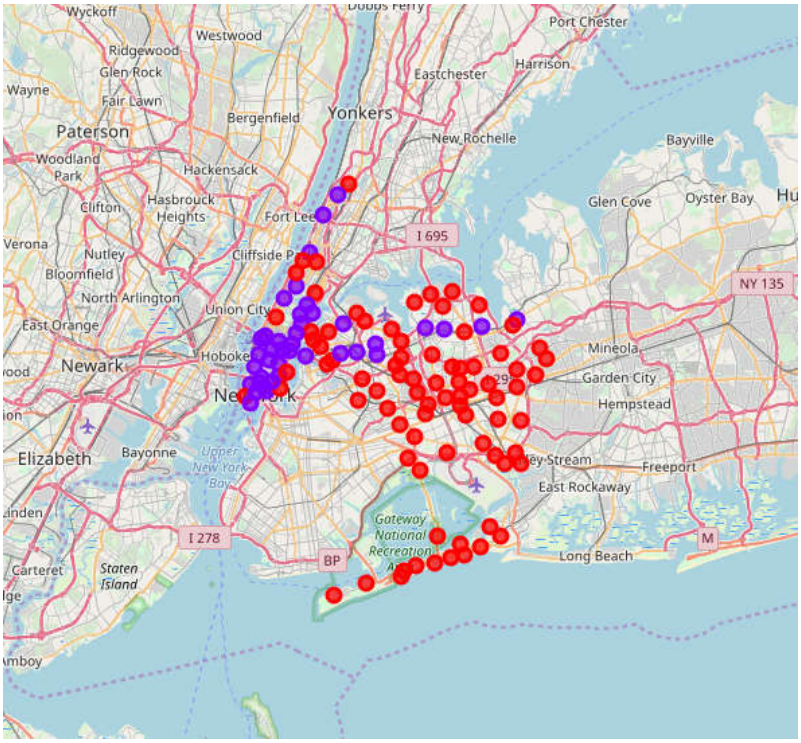



In the same way, using the Foursquare API we obtained that in Manhattan and Queens there are 5395 venues and 394 unique categories. The following table is an example of this

| | Neighborhood | Neighborhood Latitude | Neighborhood Longitude | Venue | Venue Latitude | Venue Longitude | Venue Category |
|---|---|---|---|---|---|---|---|
| 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 | Starbucks | 40.877531 | -73.905582 | Coffee Shop |
| 4 | Marble Hill | 40.876551 | -73.91066 | Dunkin' | 40.877136 | -73.906666 | Donut Shop |

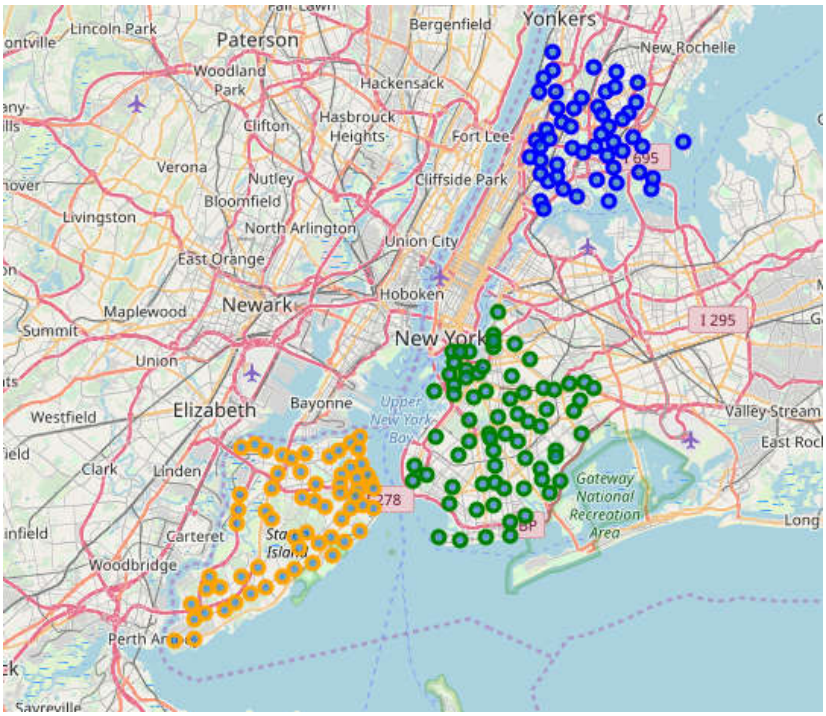
Using k-means algorithm we can check the neighborhoods with more quantity of restaurant. We divided 2 clusters that show places where the restaurant business is saturated and not.

| | Borough | Neighborhood | Latitude | Longitude | Total | Cluster_Labels |
|---|---|---|---|---|---|---|
| 0 | Manhattan | Marble Hill | 40.876551 | -73.910660 | 2 | 0 |
| 1 | Manhattan | Chinatown | 40.715618 | -73.994279 | 44 | 1 |
| 2 | Manhattan | Washington Heights | 40.851903 | -73.936900 | 21 | 1 |
| 3 | Manhattan | Inwood | 40.867684 | -73.921210 | 18 | 1 |
| 4 | Manhattan | Hamilton Heights | 40.823604 | -73.949688 | 18 | 1 |




### 4.2 Exploring data of Bronx, Brooklyn and Staten Island

Using the Foursquare Api can we visualized the number of neighborhoods that are part of the Bronx, Brooklyn and Staten Island Borough. There are 185 points distributed between the mentioned boroughs

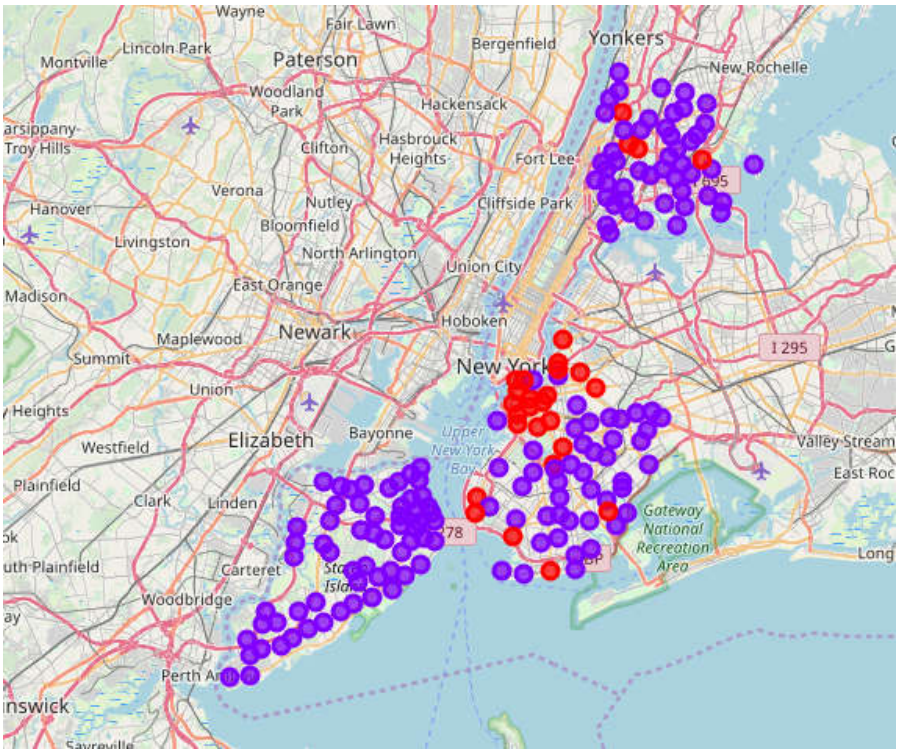


On the 3 boroughs mentioned previously, there are 4813 venues and 331 unique categories.

| | Neighborhood | Neighborhood Latitude | Neighborhood Longitude | Venue | Venue Latitude | Venue Longitude | Venue Category |
|---|---|---|---|---|---|---|---|
| 0 | Wakefield | 40.894705 | -73.847201 | Lollipops Gelato | 40.894123 | -73.845892 | Dessert Shop |
| 1 | Wakefield | 40.894705 | -73.847201 | Rite Aid | 40.896649 | -73.844846 | Pharmacy |
| 2 | Wakefield | 40.894705 | -73.847201 | Carvel Ice Cream | 40.890487 | -73.848568 | Ice Cream Shop |
| 3 | Wakefield | 40.894705 | -73.847201 | Shell | 40.894187 | -73.845862 | Gas Station |
| 4 | Wakefield | 40.894705 | -73.847201 | Dunkin' | 40.890459 | -73.849089 | Donut Shop |

Using the K-means algorithm we can visualize on the map the different clusters formed for the Bronx, Brooklyn and Staten Island borough

| | Borough | Neighborhood | Latitude | Longitude | Total | Cluster_Labels |
|---|---|---|---|---|---|---|
| 0 | Bronx | Wakefield | 40.894705 | -73.847201 | 0 | 1 |
| 1 | Bronx | Co-op City | 40.874294 | -73.829939 | 3 | 1 |
| 2 | Bronx | Eastchester | 40.887556 | -73.827806 | 6 | 1 |
| 3 | Bronx | Fieldston | 40.895437 | -73.905643 | 0 | 1 |
| 4 | Bronx | Riverdale | 40.890834 | -73.912585 | 0 | 1 |




# 5. Conclusions and recommendations

The number of clusters that formed in all borough are 2. The clusters represent the boroughs in which there are a high number of restaurants and where are a reduce number of these. These could show big opportunities to open a new business in a specific area.

Borough like Bronx, Brooklyn and Staten Island could be good alternatives to start a new business because the number of restaurants is low. However, it's very important to analyze the crime ratio in order to explain because there are a reduce number of restaurants. In the same way, could be necessary analyze economy factors to give a good recommendation about open or not a restaurant.