# The Battle of the Neighborhoods – Final Report

## Introduction:

New York City is a global hub of business and commerce, as a center for banking and finance, retailing, world trade, transportation, tourism, real estate, new media, traditional media, advertising, legal services, accountancy, insurance, theater, fashion, and the arts in the United States; while Silicon Alley, metonymous for New York's broad-spectrum high technology sphere, continues to expand. The Port of New York and New Jersey is also a major economic engine, handling record cargo volume. New York City, is the most densely populated city in the United States, the city is the center of the New York metropolitan area, the largest metropolitan area in the world by urban landmass. It is an environment that provides lot of business opportunities.

## Business Problem:

New York is the most densely populated City in the United States with 2019 estimates of over 8.4 Million people. It is also a major tourist attraction seeing upwards of 60 Million tourists each year. This makes it the perfect place to open a pizza restaurant due to the fast paced lifestyle and booming nightlife of New York Residents and tourists. New York is a competitive markets so a new business venture or expansion needs to be thought out carefully.

My objective will be to find a suitable neighborhood in the city to open a new restaurant based on various facts to include population, demographics, saturated markets and density of nearby venues. This information will be made available to ABC company to assist businesses or entrepreneurs looking to open/relocate a restaurant in NYC.

## DATA:

### Source: New York City will be used as the area for this project

Data from three different areas will be compiled as labeled below to find a prospective area for opening a new restaurant.

**Data 1:**
I will use a New York City Neighborhood dataset from 2014 that is free from the NYU website at https://geo.nyu.edu/catalog/nyu_2451_34572. This data provides information on the five boroughs and neighborhoods contained within for all of NYC and includes latitude and longitude information.

**Data 2:**
My analysis will include information from the following wikipedia pages to scrape for Population and Cuisine Data.

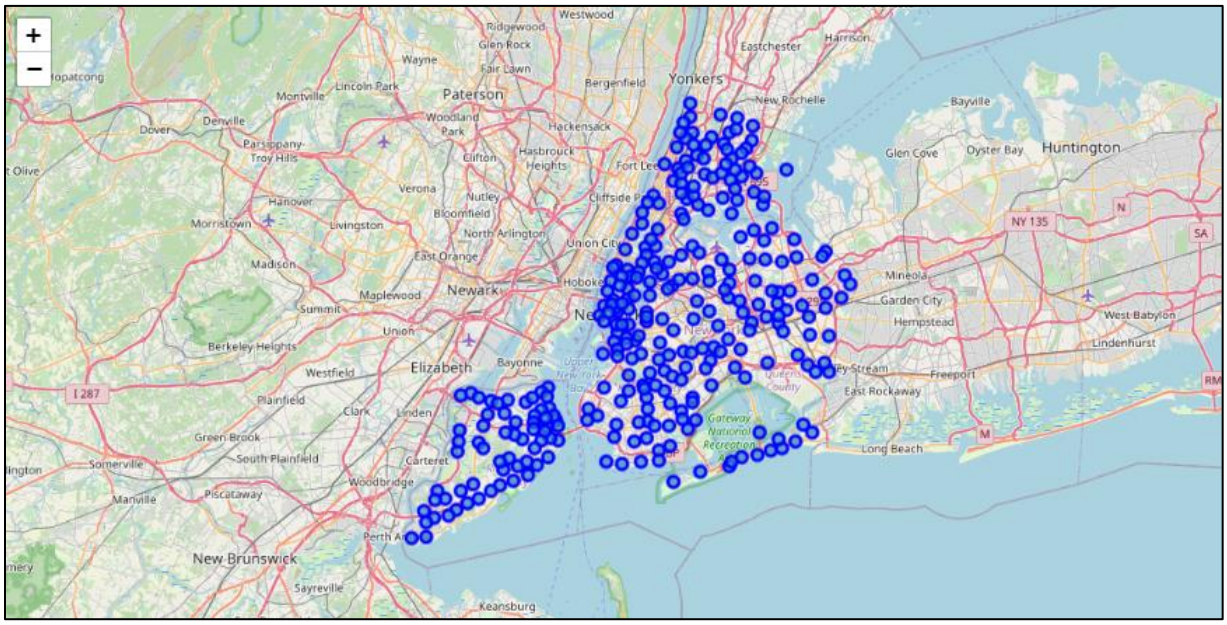
1. **https://en.wikipedia.org/wiki/New_York_City**
2. **https://en.wikipedia.org/wiki/Portal:New_York_City**
3. **https://en.wikipedia.org/wiki/Cuisine_of_New_York_City**

**Data 3:**
I will use **Data 1-2** as the reference for my input into the **Foursquare API** and then leverage that data to find the best location to open a new restaurant in NYC.

# Methodology:

**Analytic Approach :**

**Data 1** - Consisted of New York City Geographical Coordinates Data.
1. I loaded the data and explored it from newyork_data.json file.
2. I transformed the data of nested python dictionaries into a pandas dataframe containing the geographical coordinates of New York City neighborhoods and tested it by creating a map using Geopy with Folium (see below)



New York City neighborhood visualization

**Data 2** - Consisted of extracting information from Wikipedia pages on NYC population and cuisine data

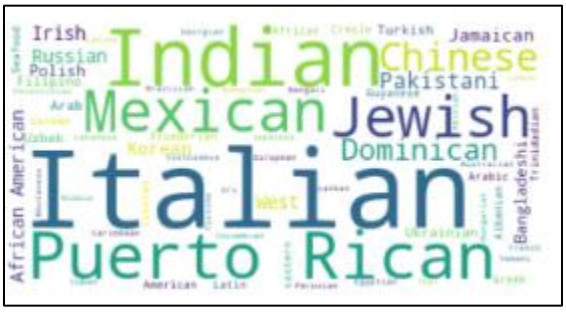
1. New York Population : Insights from the data
   - Manhattan (New York County) is the geographically smallest and most densely populated borough.
   - Brooklyn (Kings County), on the western tip of Long Island, is the city's most populous borough.
   - Queens (Queens County), on Long Island north and east of Brooklyn, is geographically the largest borough and second most populous.
   - Staten Island followed by The Bronx are the least populous boroughs.

| | Borough | County | Estimate_2018 | GDP | square_miles | square_km | persons_sq_mi |
|---|---|---|---|---|---|---|---|
| 0 | The Bronx | Bronx | 1,432,132 | 42.695 | 29,200 | 42.10 | 109.04 |
| 1 | Brooklyn | Kings | 2,582,830 | 91.559 | 34,600 | 70.82 | 183.42 |
| 2 | Manhattan | New York | 1,628,701 | 600.244 | 360,900 | 22.83 | 59.13 |
| 3 | Queens | Queens | 2,278,906 | 93.310 | 39,600 | 108.53 | 281.09 |
| 4 | Staten Island | Richmond | 476,179 | 14.514 | 30,300 | 58.37 | 151.18 |
| 5 | | City of New York | 8,398,748 | 842.343 | 97,700 | 302.64 | 783.83 |
| 6 | | State of New York | 19,745,289 | 1,701.399 | 85,700 | 47,214 | 122,284 |

New York Population Data

2. 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 . This data was using to create word clouds to show the most common cuisine in NYC city and then broken down by borough.

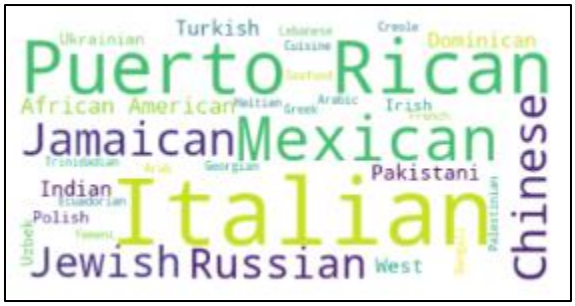
NEW YORK CITY: Most Preferred Cuisine is – Italian, Puerto Rican and Indian.




MANHATTAN: Most Preferred Cuisine is – Italian, Chinese, Puerto Rican and Indian.


BRONX: Most Preferred Cuisine is – Italian, Puerto Rican, Dominican and Albanian.

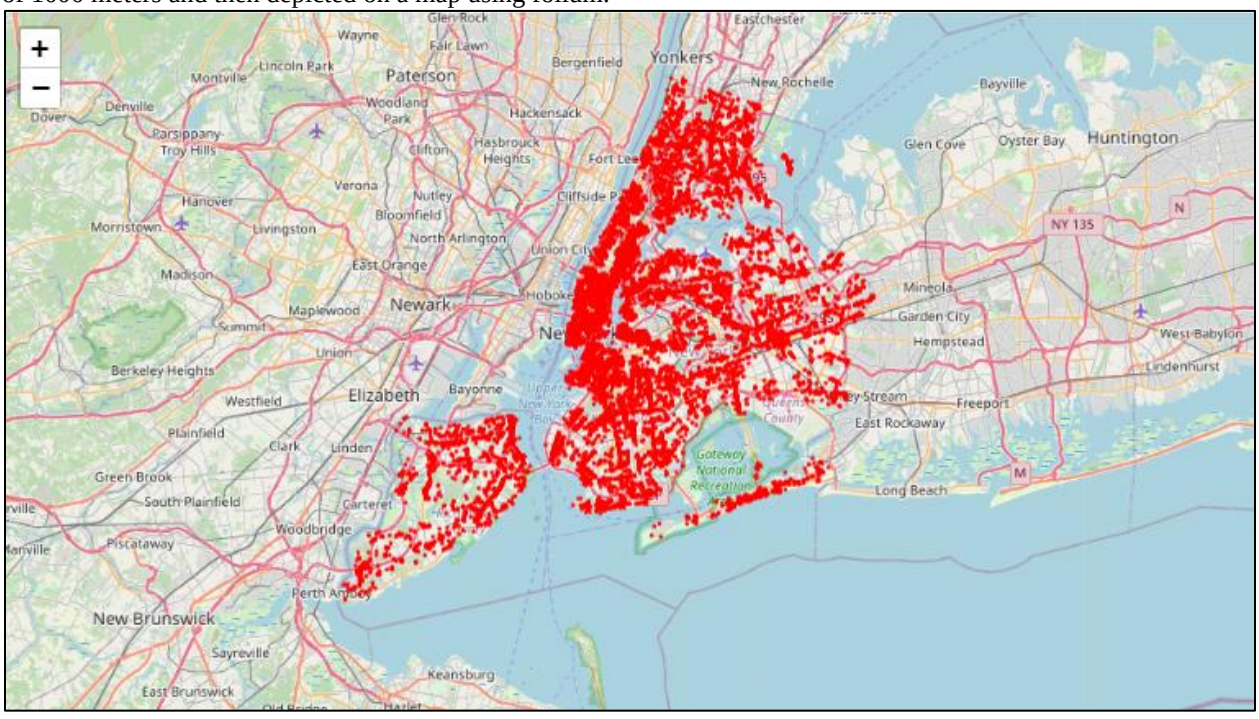

BROOKLYN: Most Preferred Cuisine is – Italian, Puerto Rican and Mexican.



QUEENS: Most Preferred Cuisine is – Italian, Indian, and Pakistani.


STATEN ISLAND: Most Preferred Cuisine is – Italian and Indian.


**Data 3** - NewYork City data input into Foursquare API to return venues information explore neighborhoods in New York City using the geographical coordinates. FourSquare API calls were made to get the top 200 venues in a radius of 1000 meters and then depicted on a map using folium.



# Results:

Using the venue data I filtered and used only the restaurant data for New York City neighborhoods using K-Means clustering based on mean occurrence of venue category.

To cluster the neighborhoods into two clusters I 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 an iterative refinement approach.

My results showed:

| | Afghan Restaurant | African Restaurant | American Restaurant | Arepa Restaurant | Argentinian Restaurant | Asian Restaurant | Australian Restaurant |
|---|---|---|---|---|---|---|---|
| **cluster0** | 0.009950 | 0.019900 | 0.681592 | 0.024876 | 0.004975 | 0.189055 | 0.004975 |
| **cluster1** | 0.009901 | 0.079208 | 1.584158 | 0.128713 | 0.148515 | 0.603960 | 0.148515 |

First few columns

| Turkish Restaurant | Udon Restaurant | Ukrainian Restaurant | Vegetarian / Vegan Restaurant | Venezuelan Restaurant | Vietnamese Restaurant | Total | Total Sum |
|---|---|---|---|---|---|---|---|
| 0.009950 | 1.908196e-17 | -8.673617e-18 | 0.094527 | -1.734723e-17 | 0.049751 | 9.189055 | 18.378109 |
| 0.277228 | 2.970297e-02 | 9.900990e-03 | 0.435644 | 1.980198e-02 | 0.445545 | 27.940594 | 55.881188 |

Last few columns

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.

In New York City there are currently untapped neighborhoods in Staten Island and Bronx.

| | Borough | Neighborhood | Latitude | Longitude | Total | Cluster_Labels |
|---|---|---|---|---|---|---|
| **0** | Bronx | Clason Point | 40.806551 | -73.854144 | 0 | 0 |
| **1** | Staten Island | Todt Hill | 40.597069 | -74.111329 | 0 | 0 |
| **2** | Staten Island | Port Ivory | 40.639683 | -74.174645 | 0 | 0 |
| **3** | Staten Island | Butler Manor | 40.506082 | -74.229504 | 0 | 0 |
| **4** | Staten Island | Bloomfield | 40.605779 | -74.187256 | 0 | 0 |

This map shows the locations of the untapped neighborhoods.


# Discussion:

There is a wide scope of choices to explore cuisines of various countries and ethnicities in New York City. Although the data shows untapped markets in Staten Island and the Bronx. This just shows less competition vs other markets. It may not be risky to open a restaurant in Brooklyn where the population is the highest or in Manhattan where tourism data was not really implemented. High risk and high reward can be the outcome of the saturated markets if you have great ambiance and an even greater menu.

# Conclusion:

The analysis was performed on just a fraction of available data. Concurrence and validity of the actual data was not confirmed and so may contain errors or bad data. Going into more detail on available information could yield better results. Like looking at the hours of operation of nearby businesses, mean income, rents… etc. An area saturated with restaurants may just be meeting the demand of that area as you see in Brooklyn and Manhattan. Bronx, Queens and Staten Island have a less robust number of restaurants but also less population, so the demand may or may not be there. It would require more data to be used for a more refined finished product.

So when can I come visit your new restaurant?

Links to Data:
The Notebook for this project was too large to upload to GitHub It can be downloaded here → Capstone or the link can be found on my GitHub page here → MyGitHub or view from here → IBM