The Battle of the Neighborhoods – NYC

IBM Professional Certificate of Data Science

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Table of Contents

Business Problem

If someone is looking to open a restaurant in Manhattan, where and which type would you recommend?

Explore NYC

Data from boroughs in NYC available to work with is from IBM developer Skill Network database and looks like this:

	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

For the purposes of this Project, we selected Manhattan as location to develop a restaurant. So now, we need to analyze the data and generate valuable insights.

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

Map of neighborhoods in Manhattan by Folium

Foursquare API

Using Foursquare API this is the available information to work with in this project.

	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	Rite Aid	40.875467	-73.908906	Pharmacy
4	Marble Hill	40.876551	-73.91066	Subway	40.874667	-73.909586	Sandwich Place
5	Marble Hill	40.876551	-73.91066	Vitamin Shoppe	40.877160	-73.905632	Supplement Shop
6	Marble Hill	40.876551	-73.91066	Baskin-Robbins	40.877132	-73.906678	Ice Cream Shop
7	Marble Hill	40.876551	-73.91066	Starbucks	40.877531	-73.905582	Coffee Shop
8	Marble Hill	40.876551	-73.91066	America's Best Contacts & Eyeglasses	40.874001	-73.909693	Optical Shop
9	Marble Hill	40.876551	-73.91066	The Children's Place	40.873672	-73.908156	Kids Store

Exploratory Data Analysis

Given the dataset we observed:

- **3244** business in Manhattan.
- **Coffee shops, Italian restaurants and Pizza places** represent the larger number of venues.
- **Circus, Cooking School and many others** represent the smallest number of venues.

Then, how do we find the **best neighborhood** for opening a restaurant?

We organized the data in 4 topics in order to lead us to a good recommendation, based on the data collected and another source that provides population information.

1 - Number and type of restaurants in Manhattan - First insight

2 - Clustering and analysis of restaurants - Second insight

3 - Population of each neighborhood - Third insight

4 - Complementary businesses - Fourth Insight

1 – Number and type of restaurants in Manhattan - First insight

Example of the first rows of the dataset

	Venue Category
Italian Restaurant	139
American Restaurant	79
Mexican Restaurant	52
Sushi Restaurant	49
Chinese Restaurant	45
French Restaurant	42
Japanese Restaurant	41
Seafood Restaurant	37
Thai Restaurant	35
Mediterranean Restaurant	31

There are **927** restaurants in Manhattan

and there are from **74** different types

Also, we find that **Italian, American, Sushi, and Mexican** restaurant are the most popular ones and other cuisines like Himalayan, Swiss, Afghan, Moroccan, Czech are the least ones.

2 – Clustering and analysis of restaurants - Second insight

We perform a K-Mean clustering method to cluster restaurants in neighborhoods. The selected k was 4, so the data were cluster into four groups

Neighborhood	Neighborhood Latitude	Neighborhood Longitude	Venue	Venue Latitude	Venue Longitude	Venue Category	Cluster_labels
Marble Hill	40.876551	-73.910660	Land & Sea Restaurant	40.877885	-73.905873	Seafood Restaurant	2
Marble Hill	40.876551	-73.910660	Grill 26 at TCR	40.878802	-73.915672	American Restaurant	2
Chinatown	40.715618	-73.994279	Kiki's	40.714476	-73.992036	Greek Restaurant	3
Chinatown	40.715618	-73.994279	Spicy Village	40.717010	-73.993530	Chinese Restaurant	3
Chinatown	40.715618	-73.994279	Xi'an Famous Foods	40.715232	-73.997263	Chinese Restaurant	3

Map of clusters

Analysis from clusters:

Each cluster has their preferred Cuisine and in this theoretical exercise, we will not recommend compete with most popular categories, such as Korean, Italian, American, Mexican and Chinese.

Also, data provides insight about restaurant types and variety across all clusters: There are not many healthy food restaurants in Manhattan. For example, considering veggie/ vegan food as healthy food, data shows there are less than twenty restaurants in the entire city that offer this type of food.

3 - Population of each neighborhood - Third insight

Using an external source, with the help of the web scraping method, we include in our analysis ***https://www.worldatlas.com/articles/manhattan-neighborhoods-by-population.html*** population data to find which neighborhoods are the most populated.

Rank	Neighborhood	Population
1	Midtown	391,371
2	Lower Manhattan	382,654
3	Harlem	335,109
4	Upper East Side	229,688
5	Upper West Side	209,084
6	Washington Heights	158,318
7	East Harlem	115,921
8	Chinatown	100,000
9	Lower East Village	72,957
10	Alphabet City	63,347

According to this data and considering that Manhattan is a world-class tourist location, it is important to highlight the most populated neighborhoods so to develop the business in at least one of them.

After considering all the data, we find one possible neighborhood that combines small number of restaurants, and it is one of the top 10 most populated neighborhoods: **Lower East Side** (The East Village is a neighborhood on the East Side of Lower Manhattan in New York City)

4 – Complementary businesses - Fourth Insight

	Venue Category
Art Gallery	3
Pizza Place	2
Café	2
Bakery	2
Park	2
Performing Arts Venue	1
Theater	1
Pharmacy	1
Shoe Store	1
Diner	1
Rock Club	1
Wine Shop	1
Women's Store	1
Juice Bar	1
Coffee Shop	1
Pet Café	1
Bagel Shop	1
Dance Studio	1
Flower Shop	1
Cocktail Bar	1
Tennis Court	1
Speakeasy	1
Yoga Studio	1
Clothing Store	1
Sandwich Place	1

After analyzing our selected neighborhood (Lower East Side) we discovered that there is small number of other different shops/venues. An attractive indicator of the interests of the Lower East Side population is the presence of three art galleries and two parks.

Conclusion

The purpose of this project was to collect data on NYC neighborhoods by performing an analysis of data on restaurants and other venues, in order to help stakeholders determine the best location to open a new restaurant.

For the previously mentioned insights we can conclude that we recommend a **Healthy food restaurant in the Lower East Side** neighborhood of Manhattan. The main reasons that lead us to this conclusion are the following:

- Lower East Side is within the **Top 10** with the largest population in Manhattan.
- There are just a **few healthy food restaurants in Manhattan**. Competing against cuisines such as Italian, American, and Mexican would not be convenient.
- Although there are few venues/shops in Lower East Side, **parks** and **art galleries** prevail, which are indicators of the lifestyle in the neighborhood and may be associated with the type of recommended restaurant.

Thank You