

# Capstone Project: Battle of the Neighborhoods

IBM Data Science

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## 1 Introduction

### 1.1 Background

This analysis will study *Italian restaurants* within **New York City (NYC)**. **NYC** is one of the world's top culinary destinations. Therefore, the competition between individual restaurants is extremely difficult. Nationwide, the failure rate of restaurants within the first year is 60% and the failure rate within the first five years is even worse at 80%. Due to **NYC**'s reputation as a culinary destination, there is a multitude of data to study.

### 1.2 Problem

This analysis has two goals:

- determine which neighborhood is best to *open a new* Italian restaurant
- determine which neighborhood is best to *invest in an existing* Italian restaurant.

Given the high failure rate, it is important for stakeholders to invest in restaurants that have a high probability of being successful.

## 2 Data

### 2.1 Data Sources

The rating, likes, tips, venue name, and venue type data for individual restaurants were taken from **Foursquare**. This was combined with location data for NYC [1] containing latitude and longitude values for each venue.

### 2.2 Data Cleaning

The **NYC** location data was compiled into a data frame containing the borough, neighborhood, latitude, and longitude. This data was combined with borough, neighborhood, rating, and restaurant name data from **Foursquare**.

### 3 Methodology

In order to determine which neighborhoods to select for both cases two variables were needed: location and rating. Desirable neighborhoods are those with a large concentration of restaurants with adequate ratings.

From the **Foursquare** data, an average rating of restaurants per neighborhood will be determined. To determine if there is a strong market in an area, surrounding neighborhoods will be compared to examine the number of restaurants in the neighborhood and their average rating. Areas with the strongest performance in these areas will be selected.

### 4 Results

This analysis found that within NYC's five boroughs there are 306 neighborhoods. Queens (81) is the borough with the most neighborhoods, followed by Brooklyn (70), Staten Island (63), the Bronx (52), and Manhattan (40).

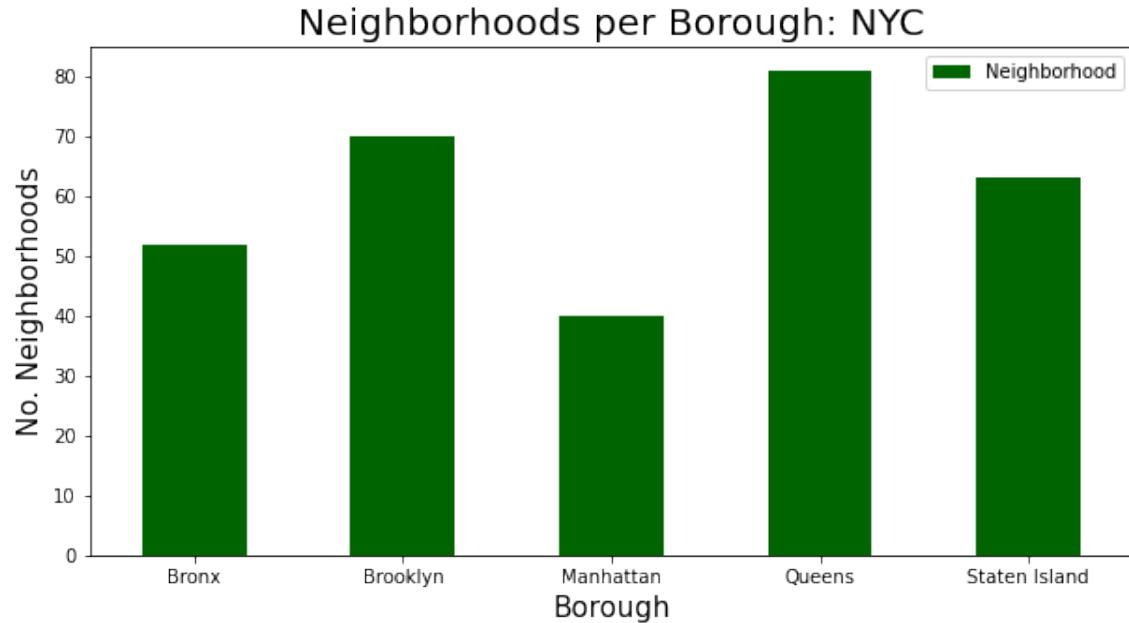


Figure 1: Number of neighborhoods per borough in New York City.

Within those neighborhoods there are 236 Italian restaurants. Manhattan (110) contains the most, followed by Brooklyn (46), the Bronx(30), Staten Island (29), and Queens (21). Due to their low restaurant counts, the Bronx, Staten Island, and Queens will not be considered in this analysis.

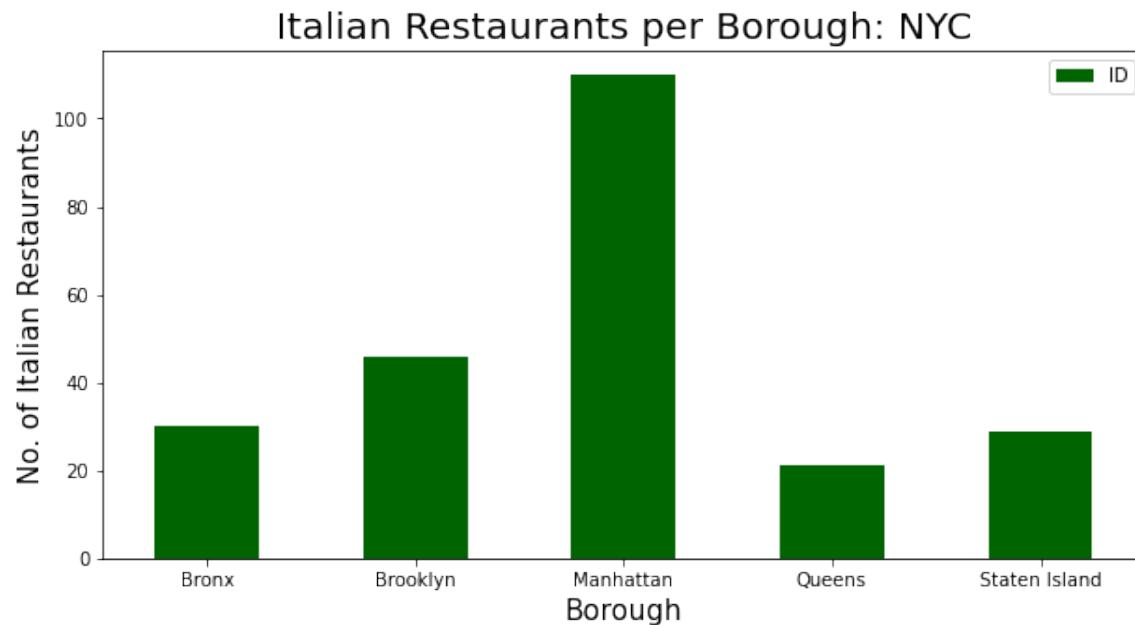


Figure 2: Number of Italian restaurants per borough in New York City.

The neighborhoods that contain the most Italian restaurants are Belmont (17), Greenwich Village (13), West Village (10), Carroll Gardens (9), Lenox Hill (9), and Yorkville (7). Several of these neighborhoods (Greenwich Village & West Village; Lenox Hill & Yorkville) are located next to each other as can be seen in appendix A.1.

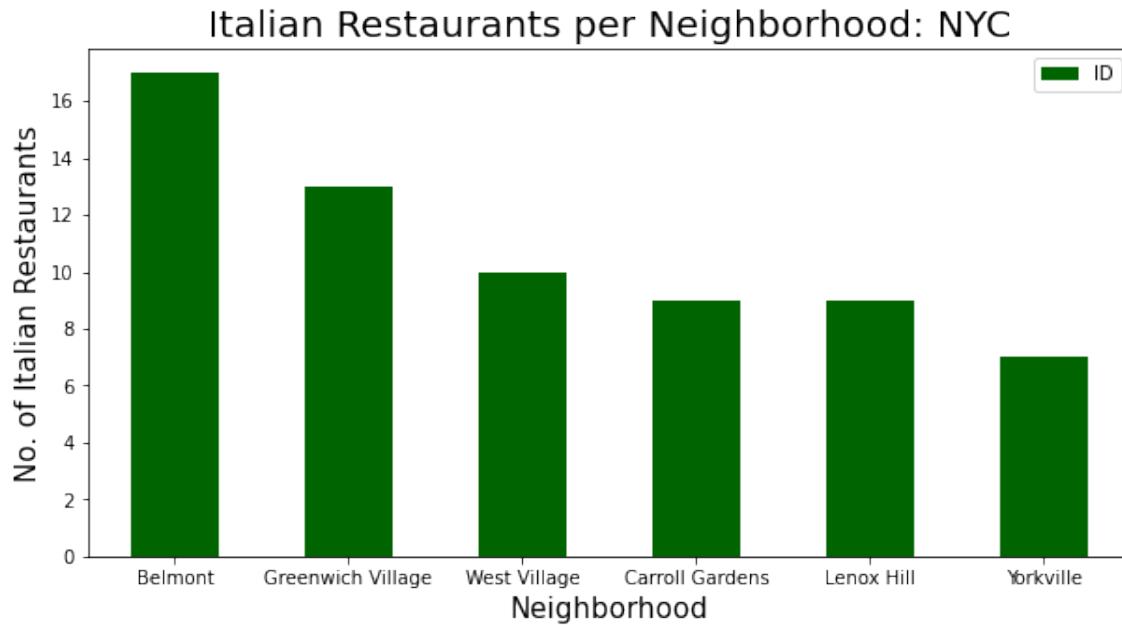


Figure 3: Number of Italian restaurants for the top 6 neighborhoods in New York City.

Of all the boroughs, Manhattan has the highest average rating of Italian restaurants, followed by the Bronx, Queens, Brooklyn, and Staten Island. Since Manhattan has the highest average rating, we will choose this area to invest in a restaurant.

The areas to open a new Italian restaurant were chosen based on their proximity to other restaurants and lower than average ratings of current restaurants. The neighborhoods that best meet these conditions are Carroll Gardens, Fort Hamilton, Bay Ridge, and Chelsea. Carroll Gardens is located near the popular areas of Cobble & Clinton Hills seen in table 2

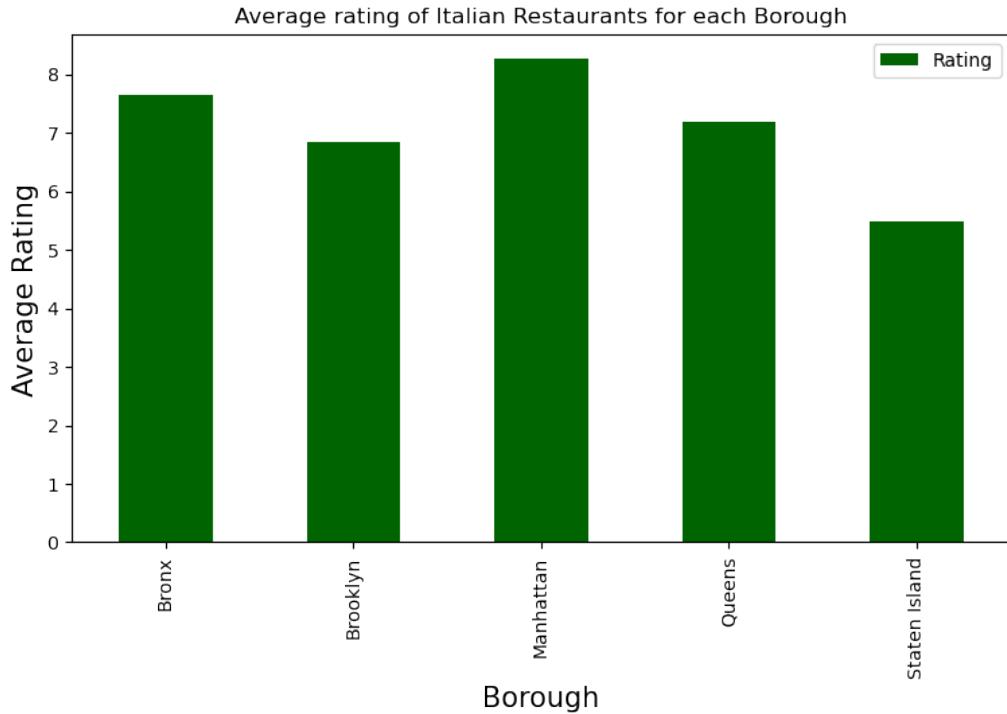


Figure 4: Average rating of Italian restaurants per borough in New York City.

#### 4.1 Neighborhoods to Open a New Italian Restaurant

Neighborhoods were selected based on three criteria:

- at least 3 restaurants
- proximity to other neighborhoods with Italian restaurants
- rating of 6.5 or below

Neighborhood, Borough (Rating)	Count
Bay Ridge, Brooklyn(4.65)	6
Belmont, Bronx(8.04)	17
Carroll Gardens, Brooklyn(6.48)	9
Chelsea, Manhattan(5.73)	3
Chelsea, Staten Island(5.73)	3
Civic Center, Manhattan(7.87)	3
Clinton, Manhattan(8.05)	4
Eltingville, Staten Island(2.63)	3
Financial District, Manhattan(8.05)	4

Fort Hamilton, Brooklyn(5.5)	3
Gramercy, Manhattan(8.17)	3
Howard Beach, Queens(7.53)	3
Lenox Hill, Manhattan(7.69)	9
New Dorp, Staten Island(7.63)	3
Old Town, Staten Island(7.63)	3
Sutton Place, Manhattan(8.25)	4
Turtle Bay, Manhattan(7.7)	3
Upper East Side, Manhattan(8.0)	6
Yorkville, Manhattan(7.74)	7

Table 1: Number of Italian restaurants (with ratings of 8.25 and below) per neighborhood and their ratings.

The neighborhoods that best meet these criteria are Carroll Gardens, Chelsea, Bay Ridge, and Fort Hamilton.

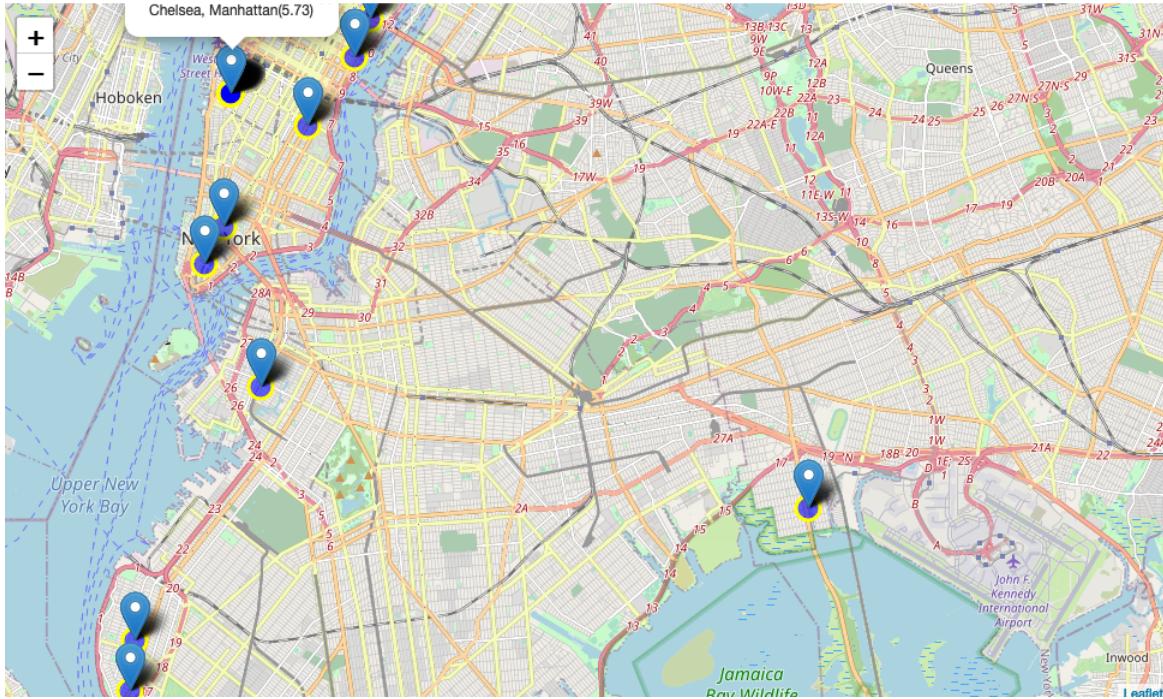


Figure 5: Restaurants with ratings of 8.25 and below.

## 4.2 Neighborhoods to Invest in an Italian Restaurant

To select which neighborhood to invest in an Italian restaurant the selection criteria are:

- rating above 8.25
- at least 3 restaurants
- near other highly rated restaurants

After cleaning the data, the following restaurants were found.

Label	Count
Clinton Hill, Brooklyn(8.33)	3
Cobble Hill, Brooklyn(8.53)	3
East Village, Manhattan(8.37)	3
Flatiron, Manhattan(8.48)	5
Fort Greene, Brooklyn(8.68)	4
Greenwich Village, Manhattan(8.72)	13
Little Italy, Manhattan(8.37)	3
Noho, Manhattan(8.43)	6
Soho, Manhattan(8.65)	6
Upper West Side, Manhattan(8.3)	3
West Village, Manhattan(8.75)	10

Table 2: Number of Italian restaurants (with ratings above 8.25) per neighborhood (containing at least 3 restaurants) and their ratings.

The neighborhoods that best meet these criteria are Greenwich Village, SoHo, and West Village. Other neighborhoods were excluded because they were not located as closely to the densely clustered, highly rated restaurants in the Greenwich Village area of Lower Manhattan. A map of Manhattan can be seen in appendix A.1

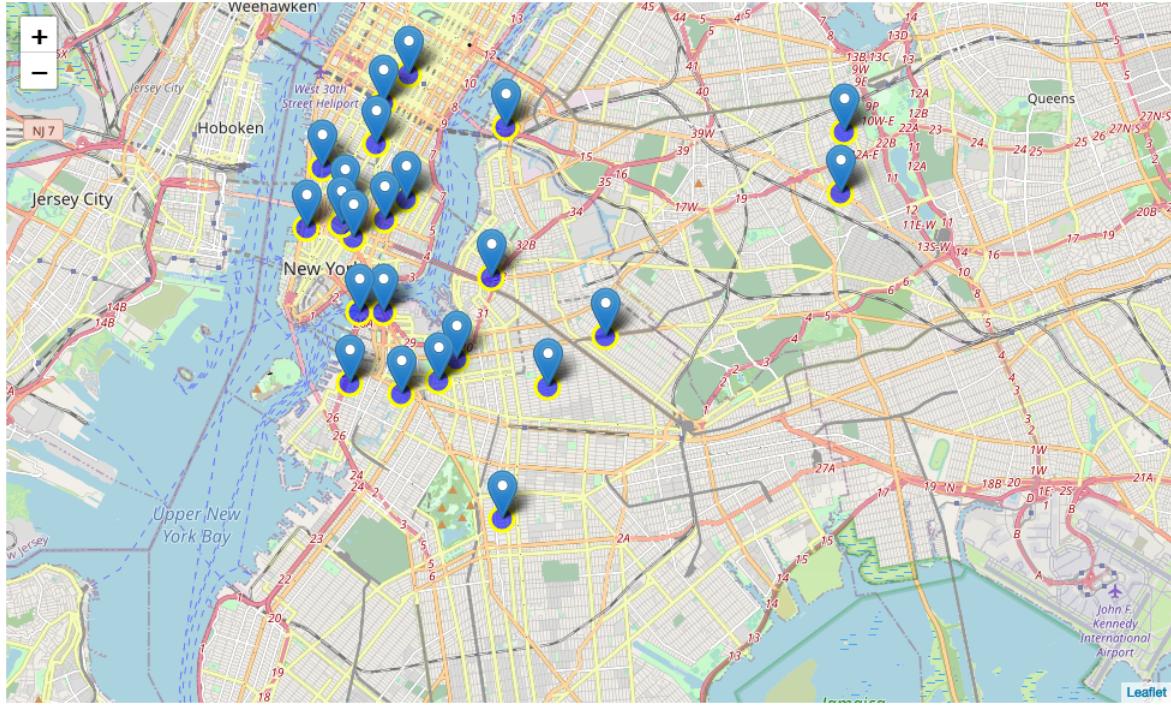


Figure 6: Restaurants with a rating above 8.25.

## 5 Discussion

There are several other areas that may be good options to invest in Italian restaurants (e.g. Little Italy, Upper West Side, Flatiron, etc.), but this analysis only focused on the strongest options that met all selection criteria.

However, Belmont and Yorkville are outlier areas that are not surrounded by neighborhoods with high concentrations of Italian restaurants, so we will disregard them in this analysis.

Similar logic was applied to Brooklyn: only the area near the Manhattan Bridge was considered for analysis. This left out strongly performing neighborhoods in Brooklyn (Bushwick, South Side, Bedford Stuyvesant, and Prospect Lefferts Gardens) from the analysis.

## 6 Conclusion

New York City has a large number of Italian restaurants (236) spread throughout its five boroughs. However, there are a few key areas—Lower Manhattan and DUMBO area of Brooklyn—where many of the most popular restaurants are located. Due to those conditions, the scope of this study was limited to those areas.

This analysis found that the best neighborhoods to open a new Italian restaurant are

Carroll Gardens, Chelsea, Bay Ridge, and Fort Hamilton. Additionally, the best neighborhoods to invest in an existing Italian restaurant are SoHo, Greenwich Village, and the West Village.

## A Neighborhood Maps

### A.1 Manhattan Map

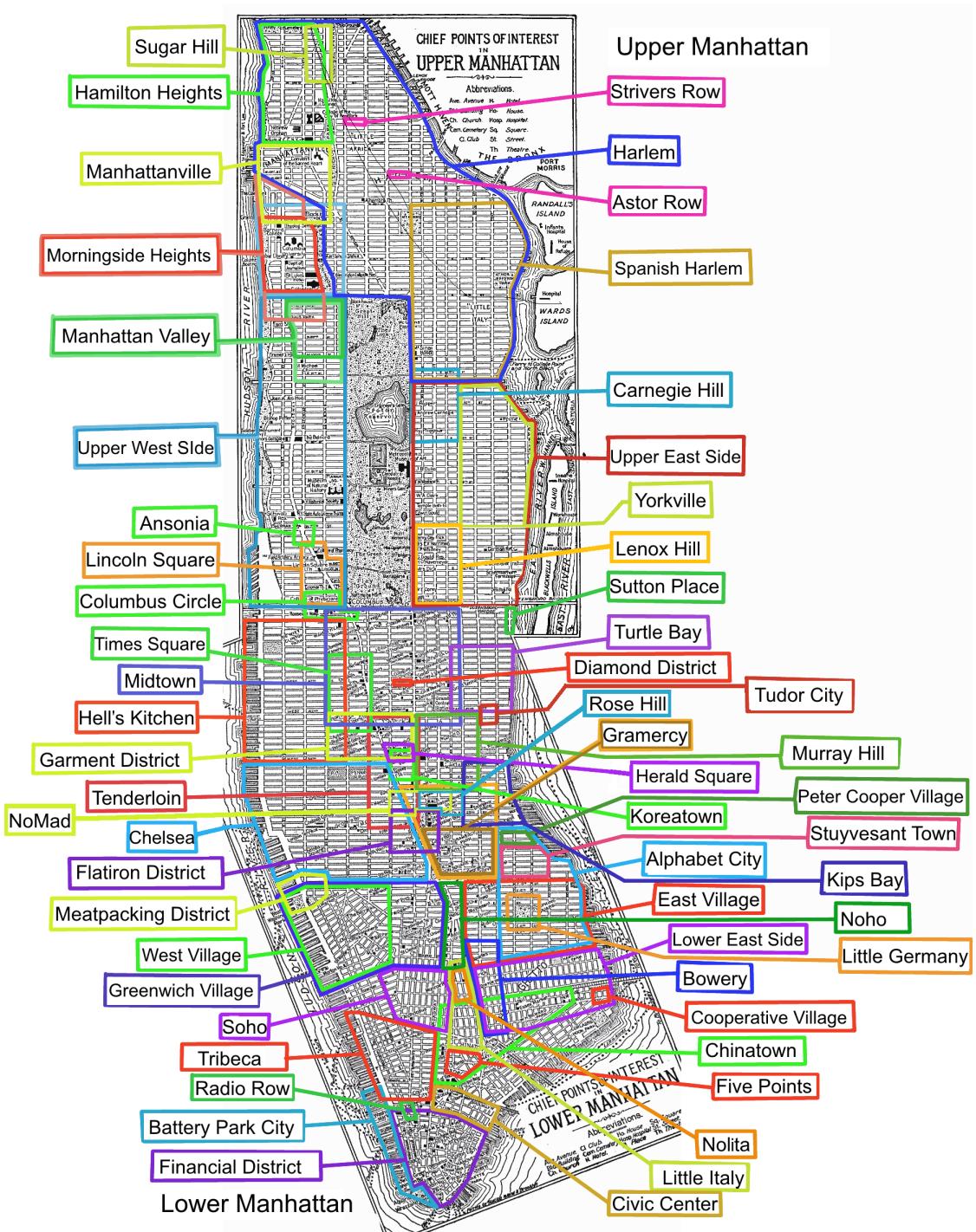


Figure 7: Map of Manhattan neighborhoods.<sup>10</sup>

## A.2 Brooklyn Map



Figure 8: Map of Brooklyn neighborhoods.

## References

[1] [https://cocl.us/new\\_york\\_dataset](https://cocl.us/new_york_dataset)