# Capstone Project – The Battle of Neighborhoods

Selecting the most common neighbourhood in New York - Manhattan to open a new Luigi's Pizza Joint.

# Introduction

▶ **Background**

Luigi is the CEO of Luigi's Pizza Joint, which started as a family owned and operated business in the 60's. Luigi already has a number of pizza restaurants in other cities in America, but he would like to expand their gourmet pizza business in New York, specifically Manhattan.

▶ **Business Problem**

Luigi is concerned that there are already a number of pizza businesses in New York, specifically Manhattan, however none are to the same standard has Luigi's Pizza Joint. In this scenario, the aim is to identify a suitable location, on what basis is this choice suitable and identify the competition in that location.

# Data Selection

▶ **Data Sources**

I have chosen to use the New York data from the exercises (https://cocl.us/new_york_dataset). I will also be using my personal developer Foursquare to locate other Pizza restaurants.

▶ **How the data will be used**

The main components of our analysis and predication system, this will comprise of four stages:

1. Collect Data
2. 2. Explore and Understand Data
3. 3. Data preparation and preprocessing
4. 4. Modeling

# Methodology

- ▶ **Collect New York Neighborhood dataset with latitude and longitude**

- ▶ **Filter out Manhattan neighborhoods**

- ▶ **Use Foursquare API's to investigate venues in:**

  - ▶ **Manhattan**

  - ▶ **All neighborhoods in New York**

- ▶ **Cluster the types of venues based on:**

  - ▶ **Commercial areas**

  - ▶ **Tourist areas and hubs**

# Methodology - Manhattan

▶ **Identify the number of neighborhoods in Manhattan (40)**

```
In [9]:  # Creating new Dataframe manhattan_data
         manhattan_data = neighborhoods[neighborhoods['Borough'] == 'Manhattan'].reset_index(drop=True)
         manhattan_data.head()
```
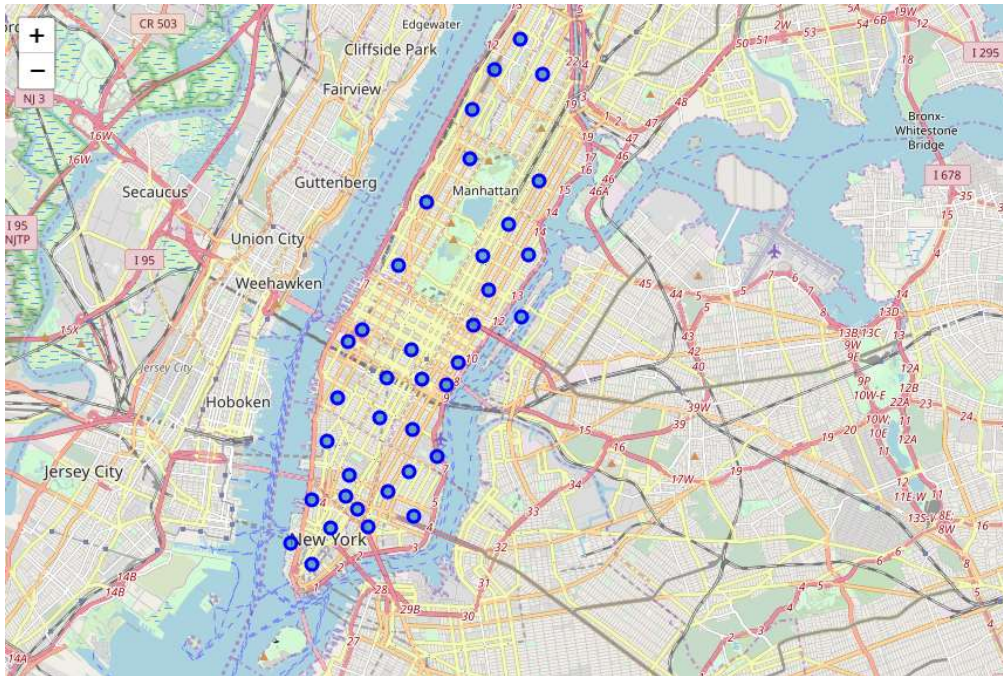
Out[9]:

|   | 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 |

```
In [10]:  manhattan_data.shape[0]
```

Out[10]: 40

# Methodology - Manhattan

▶ **Map the neighborhoods in Manhattan (40)**

# Methodology – All Neighborhoods

▶ **Analyse Foursquare venues across New York**

| | Neighborhood | 1st Most Common Venue | 2nd Most Common Venue | 3rd Most Common Venue | 4th Most Common Venue | 5th Most Common Venue | 6th Most Common Venue | 7th Most Common Venue | 8th Most Common Venue | 9th Most Common Venue | 10th Most Common Venue |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 0 | Allerton | Pizza Place | Pharmacy | Supermarket | Breakfast Spot | Fast Food Restaurant | Electronics Store | Chinese Restaurant | Gas Station | Bus Station | Donut S |
| 1 | Annadale | American Restaurant | Pub | Train Station | Pizza Place | Diner | Pharmacy | Restaurant | Park | Food | Ba |
| 2 | Arden Heights | Pharmacy | Deli / Bodega | Pizza Place | Coffee Shop | Women's Store | Event Service | Event Space | Eye Doctor | Factory | Fa Resta |
| 3 | Arlington | Intersection | Deli / Bodega | American Restaurant | Boat or Ferry | Coffee Shop | Bus Stop | Women's Store | Filipino Restaurant | Eye Doctor | Fa |
| 4 | Arrochar | Bus Stop | Deli / Bodega | Italian Restaurant | Athletics & Sports | Middle Eastern Restaurant | Supermarket | Mediterranean Restaurant | Sandwich Place | Food Truck | Bagel S |
| 5 | Arverne | Surf Spot | Sandwich Place | Metro Station | Beach | Wine Shop | Playground | Thai Restaurant | Pizza Place | Bed & Breakfast | Coffee S |
| 6 | Astoria | Seafood Restaurant | Gourmet Shop | Gym | Pub | Middle Eastern Restaurant | Greek Restaurant | Food Truck | Bakery | Bagel Shop | Fa Resta |
| 7 | Astoria Heights | Supermarket | Pizza Place | Bakery | Music Venue | Bus Station | Bowling Alley | Italian Restaurant | Burger Joint | Hostel | Playgr |
| 8 | Auburndale | Deli / Bodega | Noodle House | Fast Food Restaurant | Supermarket | Toy / Game Store | Gymnastics Gym | Furniture / Home Store | Athletics & Sports | Pet Store | Pharm |
| 9 | Bath Beach | Bubble Tea Shop | Italian Restaurant | Rental Car Location | Turkish Restaurant | Cantonese Restaurant | Sushi Restaurant | Surf Spot | Coffee Shop | Bakery | Resta |
| 10 | Battery Park City | Park | Food Court | Memorial Site | Plaza | BBQ Joint | Coffee Shop | Performing Arts Venue | Smoke Shop | Gym | Shopping |

# Results – Cluster Manhattan

▶ **Analyse Foursquare venues across Manhattan**

| | Borough | Neighborhood | Latitude | Longitude | Cluster Labels | 1st Most Common Venue | 2nd Most Common Venue | 3rd Most Common Venue | 4th Most Common Venue | 5th Most Common Venue | 6th Most Common Venue | 7th Most Common Venue | 8th Co |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 0 | Manhattan | Marble Hill | 40.876551 | -73.910660 | 2 | Discount Store | Coffee Shop | Yoga Studio | Bank | Gym | Donut Shop | Diner | Pha |
| 1 | Manhattan | Chinatown | 40.715618 | -73.994279 | 2 | Chinese Restaurant | Noodle House | Sandwich Place | Ice Cream Shop | Cocktail Bar | Museum | Bike Shop | C |
| 2 | Manhattan | Washington Heights | 40.851903 | -73.936900 | 1 | Park | Wine Shop | Café | Deli / Bodega | Breakfast Spot | Frozen Yogurt Shop | Market | Rest |
| 3 | Manhattan | Inwood | 40.867684 | -73.921210 | 1 | Café | Wine Bar | Park | Yoga Studio | Pet Store | Frozen Yogurt Shop | Mexican Restaurant | |
| 4 | Manhattan | Hamilton Heights | 40.823604 | -73.949688 | 1 | Yoga Studio | Caribbean Restaurant | Mexican Restaurant | Cocktail Bar | Bakery | Pub | Wine Bar | Rest |
| 5 | Manhattan | Manhattanville | 40.816934 | -73.957385 | 1 | Italian Restaurant | Other Nightlife | Japanese Curry Restaurant | Beer Garden | Bike Trail | Climbing Gym | Sushi Restaurant | Super |
| 6 | Manhattan | Central Harlem | 40.815976 | -73.943211 | 1 | African Restaurant | American Restaurant | Dessert Shop | Juice Bar | Spa | French Restaurant | Music Venue | |
| 7 | Manhattan | East Harlem | 40.792249 | -73.944182 | 1 | Mexican Restaurant | Park | Steakhouse | Sandwich Place | Thai Restaurant | Café | Latin American Restaurant | |
| 8 | Manhattan | Upper East Side | 40.775639 | -73.960508 | 1 | Hotel | Chocolate Shop | Bar | Bakery | Park | Bookstore | Burrito Place | Coffe |
| 9 | Manhattan | Yorkville | 40.775930 | -73.947118 | 1 | Wine Shop | Deli / Bodega | Coffee Shop | Gym | Hobby Shop | Sandwich Place | Sushi Restaurant | |
| 10 | Manhattan | Lenox Hill | 40.768113 | -73.958860 | 1 | Gym | Thai Restaurant | Women's Store | Pizza Place | Dessert Shop | College Academic Building | Salad Place | Smoke |

# Results – Manhattan Commercial

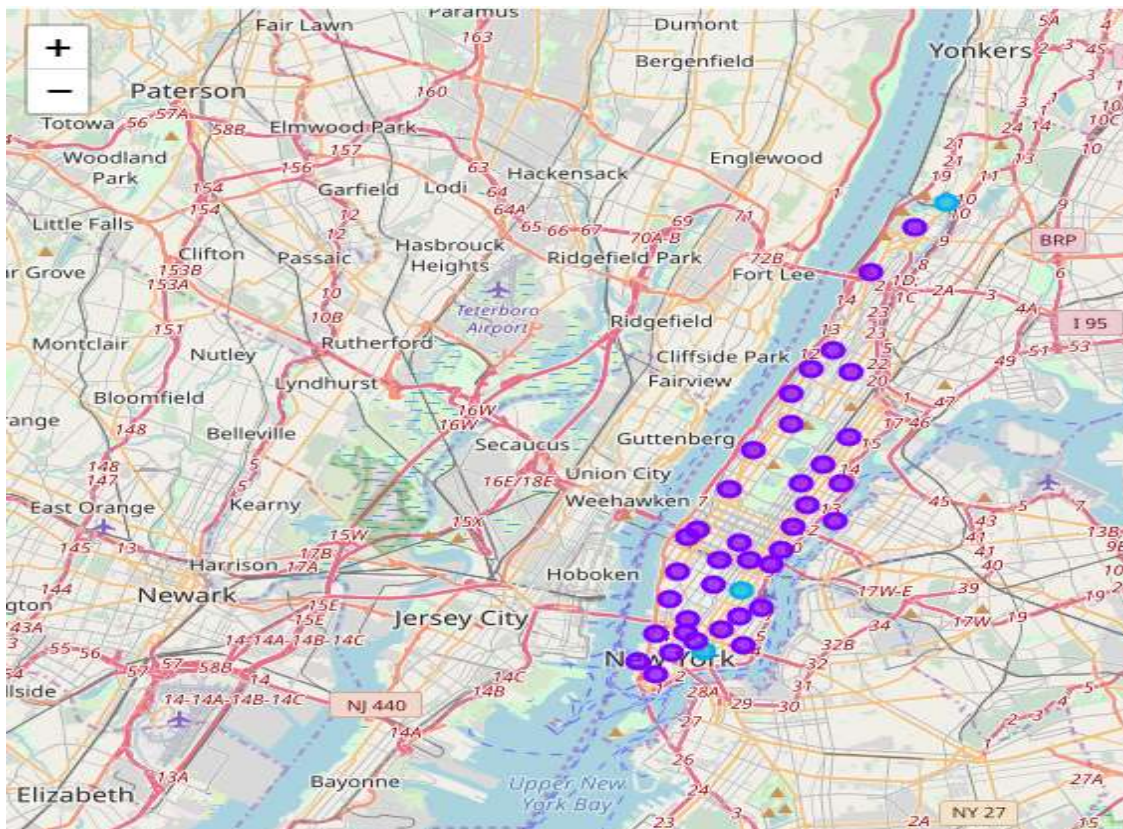▶ **Identify the number of commercial areas in Manhattan (37)**

| | Neighborhood | 1st Most Common Venue | 2nd Most Common Venue | 3rd Most Common Venue | 4th Most Common Venue | 5th Most Common Venue | 6th Most Common Venue | 7th Most Common Venue | 8th Most Common Venue | 9th Most Common Venue | 10th Most Common Venue |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 2 | Washington Heights | Park | Wine Shop | Café | Deli / Bodega | Breakfast Spot | Frozen Yogurt Shop | Market | Tapas Restaurant | Liquor Store | Coffee Shop |
| 3 | Inwood | Café | Wine Bar | Park | Yoga Studio | Pet Store | Frozen Yogurt Shop | Mexican Restaurant | Bistro | Farmers Market | Latin American Restaurant |
| 4 | Hamilton Heights | Yoga Studio | Caribbean Restaurant | Mexican Restaurant | Cocktail Bar | Bakery | Pub | Wine Bar | Italian Restaurant | Mediterranean Restaurant | Japanese Restaurant |
| 5 | Manhattanville | Italian Restaurant | Other Nightlife | Japanese Curry Restaurant | Beer Garden | Bike Trail | Climbing Gym | Sushi Restaurant | Supermarket | Seafood Restaurant | Park |
| 6 | Central Harlem | African Restaurant | American Restaurant | Dessert Shop | Juice Bar | Spa | French Restaurant | Music Venue | Café | Caribbean Restaurant | Beer Bar |
| 7 | East Harlem | Mexican Restaurant | Park | Steakhouse | Sandwich Place | Thai Restaurant | Café | Latin American Restaurant | Gym | Bakery | Clothing Store |
| 8 | Upper East Side | Hotel | Chocolate Shop | Bar | Bakery | Park | Bookstore | Burrito Place | Coffee Shop | Jazz Club | Art Gallery |
| 9 | Yorkville | Wine Shop | Deli / Bodega | Coffee Shop | Gym | Hobby Shop | Sandwich Place | Sushi Restaurant | Park | Bagel Shop | Asian Restaurant |
| 10 | Lenox Hill | Gym | Thai Restaurant | Women's Store | Pizza Place | Dessert Shop | College Academic Building | Salad Place | Smoke Shop | Burger Joint | French Restaurant |

# Results – Manhattan Tourist

▶ **Identify the number of tourist areas in Manhattan (3)**

| | Neighborhood | 1st Most Common Venue | 2nd Most Common Venue | 3rd Most Common Venue | 4th Most Common Venue | 5th Most Common Venue | 6th Most Common Venue | 7th Most Common Venue | 8th Most Common Venue | 9th Most Common Venue | 10th Most Common Venue |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 0 | Marble Hill | Discount Store | Coffee Shop | Yoga Studio | Bank | Gym | Donut Shop | Diner | Pharmacy | Department Store | Pizza Place |
| 1 | Chinatown | Chinese Restaurant | Noodle House | Sandwich Place | Ice Cream Shop | Cocktail Bar | Museum | Bike Shop | Garden Center | Tea Room | English Restaurant |
| 27 | Gramercy | Pizza Place | Coffee Shop | Yoga Studio | Thrift / Vintage Store | Irish Pub | Gourmet Shop | Liquor Store | Mexican Restaurant | Food Truck | Playground |

# Results – Cluster Map Manhattan



▶ Purple = Commercial

▶ Blue = Tourist area

# Results

- From analysing the data, we have uncovered that Gramercy has the most common venue for pizza places in a tourist neighborhoods.

- Lenox Hill and Clinton has the fourth most common venue for pizza places and Marble Hill is tenth in the commercial neighborhoods.

- If Luigi would like to open his newest restaurant in Manhattan, Gramercy has the most amount of pizza places / venues at 15% of all venues. It would be stiff competition, however Luigi's pizza's are proven winners in other cities.

# Discussion

▶ This analysis was performed on a limited neighborhood as Luigi wanted to set up his establishment in Manhattan.

▶ Looking at the other neighborhoods in New York, it is obvious that pizza venues are in general very popular, it would be worthwhile investigating those neighborhoods closely and investigating further.

# Conclusion

▶ When analysing the data from other neighborhoods in New York, pizza places are generally quite popular in general.

▶ 33 out of the 301 neighborhoods in New York had a 1st Most Common Venue, so pizza places are definitely popular, however it will be competitive.

▶ I would probably recommend that deeper analysis should be made whether Manhattan is actually the best area for Luigi's new pizza joint based on the high number of existing pizza venues.