The Best Location to Open A New Ramen Shop In New York City

Introduction

New York City has is the place where is high competition for restaurant businesses. Every year, new restaurants open, and many restaurants cannot survive the competition and close down for good. One factor of the successful restaurant business is the location. Even though the restaurant has an excellent chef and serves excellent food, if the accessibility was good enough, it cannot build enough positive reviews to attract more people to come. Hence, the location of the restaurant business is a critical issue to be a successful restaurant. This project defines the best location to open a new restaurant in New York City by using FourSquare geographical data. I start by defining what factors would make the best location for the ramen shop. In general, less competition has more opportunities to be successful. In terms of accessibility, a safe neighborhood is more comfortable for customers to visit the restaurant. I identify the number of crimes in each borough of New York City and then visualize what kind of crimes are reported. Then, plot the crime that occurs in the NYC map to show the populated area for the crimes. Then, the study finds the number of restaurants and ramen shops in each neighborhood. Finally, the research decides which borough is suitable for a new ramen shop.

Dataset

This research uses two datasets. FourSquare API data is used to identify the low number of restaurant/ramen shops in the neighborhood. NYPD Complaint Data Historical is to find the small number of crimes in the area. This dataset includes all valid felony, misdemeanor, and violation crimes reported to the New York City Police Department (NYPD) from 2006 to the end

of last year (2017). For additional details, please see the attached data dictionary in the 'About' section. (NYC Open Data, 2018)

Table 1. Columns of NYPD Historical Complaint Dataset

Column Name	Description	Type
CMPLNT_NUM	Randomly generated persistent ID for each complaint	Number
CMPLNT_FR_DT	Exact date of occurrence for the reported event (or starting date of occurrence, if CMPLNT_TO_DT exists)	Date & Time
CMPLNT_FR_TM	Exact time of occurrence for the reported event (or starting time of occurrence, if CMPLNT_TO_TM exists)	Plain Text
CMPLNT_TO_DT	Ending date of occurrence for the reported event, if exact time of occurrence is unknown	Date & Time
CMPLNT_TO_TM	Ending time of occurrence for the reported event, if exact time of occurrence is unknown	Plain Text
ADDR_PCT_CD	The precinct in which the incident occurred	Number
RPT_DT	Date event was reported to police	Date & Time
KY_CD	Three digit offense classification code	Number
OFNS_DESC	Description of offense corresponding with key code	Plain Text
PD_CD	Three digit internal classification code (more granular than Key Code)	Number
PD_DESC	Description of internal classification corresponding with PD code (more granular than Offense Description)	Plain Text
CRM_ATPT_CPTD_CD	Indicator of whether crime was successfully completed or attempted, but failed or was interrupted prematurely	Plain Text
LAW_CAT_CD	Level of offense: felony, misdemeanor, violation	Plain Text
BORO_NM	The name of the borough in which the incident occurred	Plain Text
LOC_OF_OCCUR_DESC	Specific location of occurrence in or around the premises; inside, opposite of, front of, rear of	Plain Text
PREM_TYP_DESC	Specific description of premises; grocery store, residence, street, etc.	Plain Text
JURIS_DESC	Description of the jurisdiction code	Plain Text
JURISDICTION_CODE	Jurisdiction responsible for incident. Either internal, like Police(0), Transit(1), and Housing(2); or external(3), like Correction, Port Authority, etc.	Number
PARKS_NM	Name of NYC park, playground or greenspace of occurrence, if applicable (state parks are not included)	Plain Text

HADEVELOPT	Name of NYCHA housing development of occurrence, if applicable	Plain Text
HOUSING_PSA	Development Level Code	Plain Text
X_COORD_CD	X-coordinate for New York State Plane Coordinate System, Long Island Zone, NAD 83, units feet (FIPS 3104)	Number
Y_COORD_CD	Y-coordinate for New York State Plane Coordinate System, Long Island Zone, NAD 83, units feet (FIPS 3104)	Number
SUSP_AGE_GROUP	Suspect's Age Group	Plain Text
SUSP_RACE	Suspect's Race Description	Plain Text
SUSP_SEX	Suspect's Sex Description	Plain Text
TRANSIT_DISTRICT	Transit district in which the offense occurred.	Number
Latitude	Midblock Latitude coordinate for Global Coordinate System, WGS 1984, decimal degrees (EPSG 4326)	Number
Longitude	Midblock Longitude coordinate for Global Coordinate System, WGS 1984, decimal degrees (EPSG 4326)	Number
Lat_Lon	Geospatial Location Point (latitude and Longitude combined)	Location
PATROL_BORO	The name of the patrol borough in which the incident occurred	Plain Text
STATION_NAME	Transit station name	Plain Text
VIC_AGE_GROUP	Victim's Age Group	Plain Text
VIC_RACE	Victim's Race Description	Plain Text
VIC_SEX	Victim's Sex Description	Plain Text

Methodology

It starts with visualizing the low crime rate in each neighborhood in New York City by using NYPD Complaint Data. In a data cleansing process, missing variables are removed from the dataset. The number of restaurants and ramen shops in the area is visualized on a map as well. Then, merge the datasets based on longitude and latitude, apply cluster analysis for the new dataset to identify the best location for the ramen shop in New York City.

Exploration Analysis

According to NYPD Complaint Data, the histogram for the number of crimes in each borough shows that Brooklyn has the highest number of crimes. On the other hand, Staten Island has the smallest number of crimes among the five boroughs of New York City (Figure 1). The number of crimes by categories shows that Petit Larceny is the most common crime in New York City (Figure 2). Then, I plotted all the crime data on the geographical map. Figure 3 shows the high density of crimes in Manhattan, Brooklyn, and the Bronx area. Crimes in Staten Island seems more scattered.

Figure 1. Crime by borough

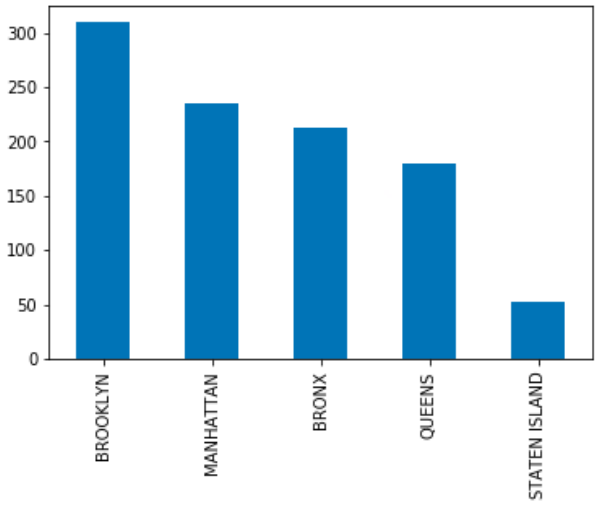


Figure 2. Crime by category

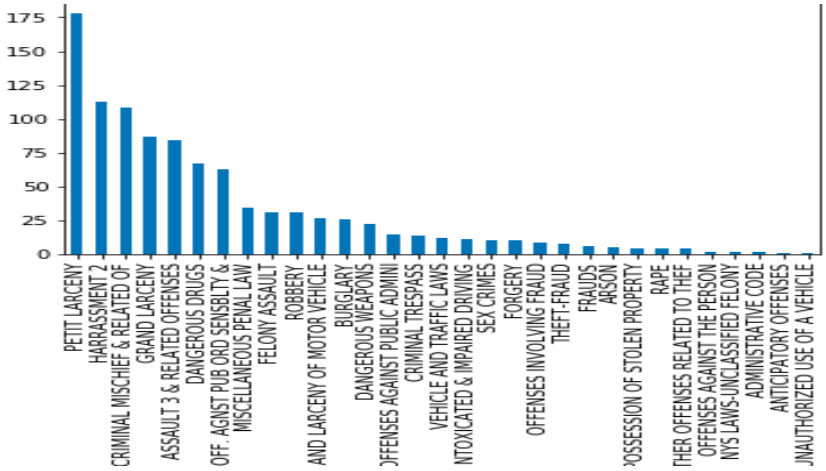
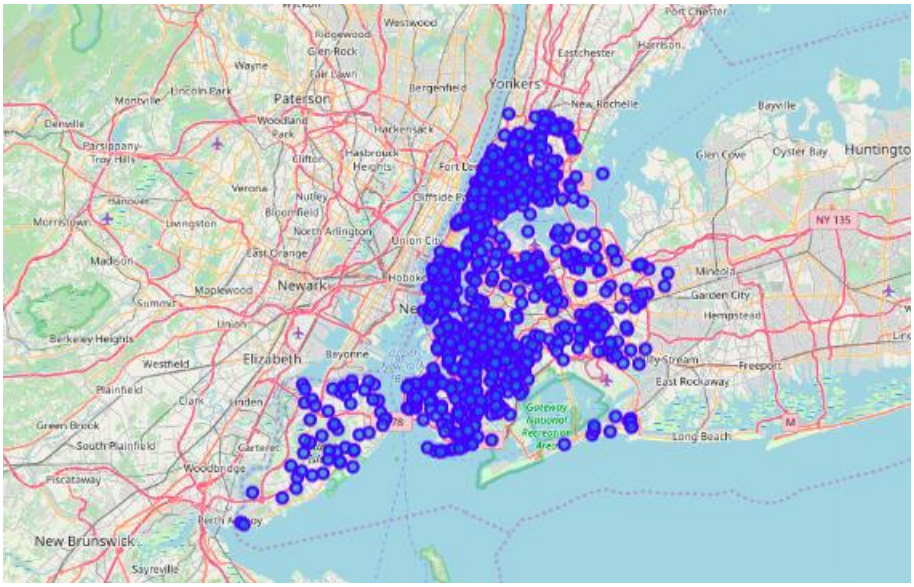


Figure 3. Crime data on New York City map



Based on the NYPD complaint data, I created a merged dataset with FourSquare trending venue data in New York City. The frequency of 'Restaurant,' 'Japanese Restaurant,' and 'Ramen Restaurant' in each borough are identified. Staten Island has the least frequency for all the categories. Then, I identify the top ten venues in each neighborhood. As a result, the most populated venue for the Bronx, Brooklyn, and Queens is Pizza Place. The coffee shop is the most popular venue in Manhattan. Then Bus Stop is the first most common venue in Staten Island.

Figure 4. The frequency of Restaurant in each borough

```
In [18]: nyc_grouped['Restaurant']

Out[18]: 0    0.007669
         1    0.012023
         2    0.009631
         3    0.009303
         4    0.010695
         Name: Restaurant, dtype: float64
```

```
In [19]: nyc_grouped['Ramen Restaurant']

Out[19]: 0    0.000000
         1    0.002186
         2    0.004240
         3    0.001584
         4    0.000000
         Name: Ramen Restaurant, dtype: float64
```

```
In [20]: nyc_grouped['Japanese Restaurant']

Out[20]: 0    0.000935
         1    0.008996
         2    0.012876
         3    0.010293
         4    0.005348
         Name: Japanese Restaurant, dtype: float64
```

Figure 5. Top 10 venue in each borough

	Neighbourhood	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	BRONX	Pizza Place	Donut Shop	Grocery Store	Fast Food Restaurant	Deli / Bodega	Pharmacy	Chinese Restaurant	Fried Chicken Joint	Sandwich Place	Spanish Restaurant
1	BROOKLYN	Pizza Place	Coffee Shop	Bar	Deli / Bodega	Bakery	Chinese Restaurant	Grocery Store	Caribbean Restaurant	Café	Mexican Restaurant
2	MANHATTAN	Coffee Shop	Italian Restaurant	Pizza Place	Hotel	American Restaurant	Theater	Bakery	Bar	Café	Mexican Restaurant
3	QUEENS	Pizza Place	Chinese Restaurant	Bakery	Deli / Bodega	Grocery Store	Korean Restaurant	Pharmacy	Donut Shop	Mexican Restaurant	Sandwich Place
4	STATEN ISLAND	Bus Stop	Pizza Place	Deli / Bodega	Italian Restaurant	Cosmetics Shop	Clothing Store	Bagel Shop	Sandwich Place	Chinese Restaurant	Liquor Store

Cluster Analysis

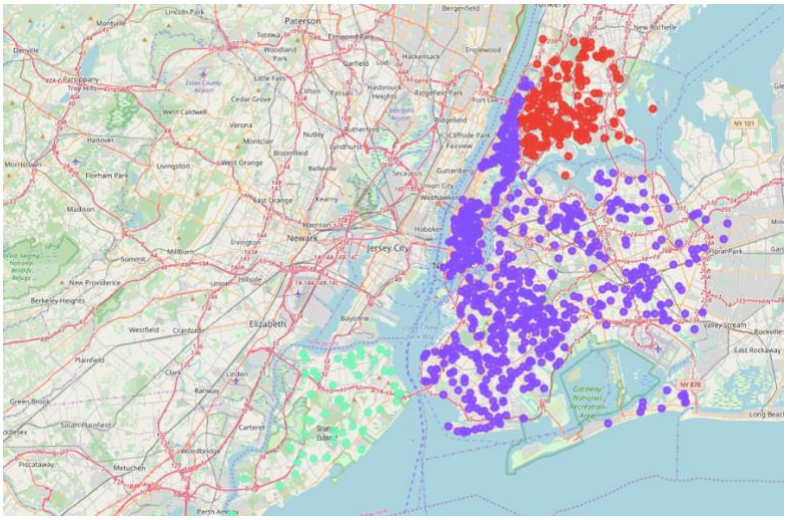
In order to conduct cluster analysis, I chose the number of the cluster, which is three. Each cluster is shown on a map (Figure 6). Details of each cluster revealed the most popular venue, and the most popular venue for cluster 1 is the pizza place, doughnut shop, and grocery store after that. The cluster 2 shows that Manhattan, Queens, and Brooklyn areas have many restaurants (Pizza place, coffee shop, bar...etc) In the cluster 3, non- restaurants venues are more populated in Staten Island. However, pizza places and Italian restaurants are popular in the area.

Result

Based on NYPD complaint data, the bar chart and map show Staten Island is the safest borough in New York City since the smallest number of crimes were recorded among three other boroughs, The Bronx, Manhattan, and Queens. Moreover, the foursquare data shows that the highest number of the restaurant exists in Manhattan, and Staten Island has the least number of restaurants. There are more Japanese restaurants in Manhattan and Brooklyn than two other boroughs, The Bronx and Queens. Ramen restaurants are more prevalent in Manhattan and

Brooklyn than other boroughs. In terms of competition, Staten Island is less likely to be competitive and the safest borough among five boroughs for a new ramen shop. Cluster analysis revealed that Manhattan, Queens, and Brooklyn areas have many restaurants (Pizza place, coffee shop, bar...etc), and The Bronx area's most populated venue is the pizza place, doughnut shop, and grocery store. Non-restaurants venues are more prevalent in Staten Island than other boroughs, although pizza places and Italian restaurants are popular in the area. For a ramen shop, there are less competitive and more opportunities for the restaurant location. Therefore, the best place to locate a new ramen shop would be in Staten Island.

Figure 6. Clusters on New York City map



Discussion

There are some limitations to this analysis. This study did not include the population of the area. High populated areas are more likely to have a higher number of crimes. So, the safest neighborhood cannot be defined by the only number of crimes, and other factors make the area safe or dangerous. Although the smallest number of restaurants/Japanese restaurants/Ramen

Restaurants in the area defines the less competition, the less competition is not the only aspect for the successful restaurant. For example, ramen is still a newcomer to the restaurant industry, and it is not familiar for some people. In general, ramen is more common for people who have an Asian background. This analysis does not include culture and demography.

Conclusion

Staten Island is the best place for a new ramen shop to open in New York City. Staten Island shows the least number of crimes occurred, and the least number of restaurants and ramen shop among the borough. For future analysis, the study should include other factors that can lead to the success of establishing a business such as population in the area.

Reference

NYPD Complaint Data Historical, retrieved from:

https://data.cityofnewyork.us/Public-Safety/NYPD-Complaint-Data-Historic/qgea-i56i