CAPSTONE PROJECT

The Battle of Neighborhoods

Peizhao HUANG

2020/2/24

Table of Content

Instruction

For this project, you will be required to submit the following:

- A description of the problem and a discussion of the background.
- A description of the data and how it will be used to solve the problem.
- A link to your Notebook on your Github repository, showing your code.
- A full report consisting of all of the following components:
  - Introduction where you discuss the business problem and who would be interested in this project.
  - Data where you describe the data that will be used to solve the problem and the source of the data.
  - Methodology section which represents the main component of the report where you discuss and describe any exploratory data analysis that you did, any inferential statistical testing that you performed, if any, and what machine learnings were used and why.
  - Results section where you discuss the results.
  - Discussion section where you discuss any observations you noted and any recommendations you can make based on the results.
  - Conclusion section where you conclude the report.
- A presentation or blogpost.

Description

Background

There are large number of people especially for widespread consumers, travelers and local small business investors are desire to find the most appropriate restaurants for themselves in big city. However, the miscellaneous info on the web contain different noise and interfere the people's choice. These kinds of info not only based on the gourmet's review and the numbers of order, but also contain the malicious comments from other competitors. Consequently, in this project, we will identify the several different Chinese restaurants in New York based on location.

Problems

1. What is the top ranked Chinese restaurants in terms of neighborhoods and boroughs?
2. How can we identify the location for small business investors to start and maintain their restaurant business in the city?

Data

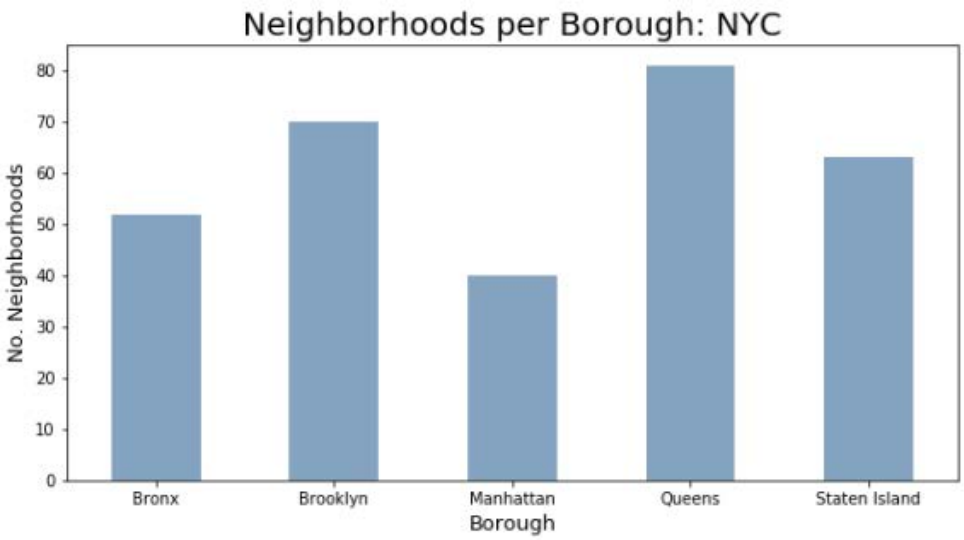
In this project, we will use the Foursquare data including ID, name and ranking etc. to data frames as the additional one in the later workflow, also we will address the geographic data to the data frames. These efficient elements will be taken into account when we count and analyze the Chinese restaurants, also play a significant role for the later process such as recognize the top ranked restaurants and location info.

Moreover, data visualization in the later process will bring a comprehensive and understandable way to observe the information. The geographic data comes from the official website of cityofnewyork.us and cocl.us. Other ratable sources come from the Foursquare.

The following picture demonstrate the initial data frame related with geographic information:

	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

The following bar chart illustrated the preliminary information involved with how many neighborhoods per borough. Apparently, there are great number of neighborhoods in Queen and the least number of neighborhoods in Manhattan.



The next step is to generate the data frame which contains Names, ID and other information. This information are both comes from Foursquare. Through this graph, we can easily compare the total count of Chinese restaurants in different borough.

	Borough	Neighborhood	ID	Name
257	Staten Island	Prince's Bay	4bb7d282b35776b0b83dc801	Island Taste
258	Brooklyn	Madison	4be32bd7b02ec9b61fc34ec0	win hing
259	Bronx	Bronxdale	4c3f7f2eda3dc928b8f6c5b9	Peking Kitchen
260	Bronx	Allerton	4bc11181abf495219f7dc093	Li's Kitchen
261	Queens	Hammels	4c72ad2bad69b60cb31b84b9	301 Chinese Resturant

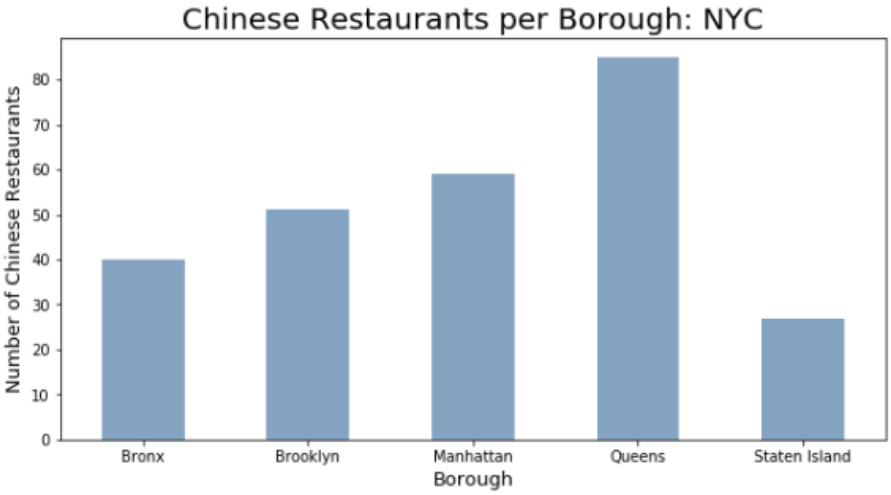
Calculation Result

From the table below we can get the information that it has 269 Chinese restaurants in total throughout the 5 different area in New York, and most of them are distributed in Queens borough.

:

Borough	ID	Name
Bronx	46	46
Brooklyn	56	56
Manhattan	60	60
Queens	83	83
Staten Island	24	24

As you can see from the below bar chart, Chinatown has the largest number of Chinese restaurants per neighborhood (around 10 restaurants).



The following picture shows the another Foursquare, it reveals the overall rating of the restaurants and the tendency of people's choice. In the data cleaning process, we clean the unnecessary data and NAN data (162 remain) in terms of the deep analysis.

	Borough	Neighborhood	ID	Name	Likes	Rating
0	Bronx	Eastchester	0	0	0	0.0
1	Bronx	Kingsbridge	0	0	0	0.0
2	Bronx	Woodlawn	0	0	0	0.0
3	Bronx	Norwood	0	0	0	0.0
4	Bronx	Pelham Parkway	4b9d6b45f964a52078ab36e3	Mr. Q's Chinese Restaurant	9	7.4

```
#drop rows with zero ratings
indexratingzero=chi_rest_stats_nyc[chi_rest_stats_nyc['Rating']==0].index
chi_rest_stats_nyc.drop(indexratingzero, inplace=True)
chi_rest_stats_nyc.tail()
```

	Borough	Neighborhood	ID	Name	Likes	Rating
263	Brooklyn	Homecrest	4b46743ff964a520892126e3	Golden "Z" Restaurant	9	7.6
264	Brooklyn	Homecrest	4d28b924ebacb1f72efbf34f	Wing Hing Seafood Restaurant	25	6.7
266	Bronx	Bronxdale	4c3f7f2eda3dc928b8f6c5b9	Peking Kitchen	9	7.4
267	Bronx	Allerton	4bc11181abf495219f7dc093	Li's Kitchen	2	7.1
268	Queens	Hammels	4c72ad2bad69b60cb31b84b9	301 Chinese Resturant	9	6.3

```
chi_rest_stats_nyc.info()
```

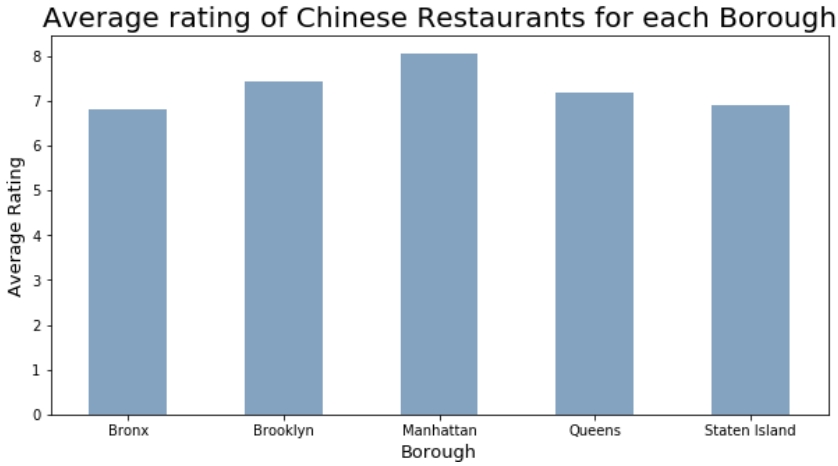
```
<class 'pandas.core.frame.DataFrame'>
Int64Index: 162 entries, 4 to 268
Data columns (total 6 columns):
Borough         162 non-null object
Neighborhood    162 non-null object
ID              162 non-null object
Name            162 non-null object
Likes           162 non-null int64
Rating          162 non-null float64
dtypes: float64(1), int64(1), object(4)
```

The top popular restaurant which contains the most people's choice and top rating in the Chelsea neighborhood is Buddakan, as you can see from the following picture.

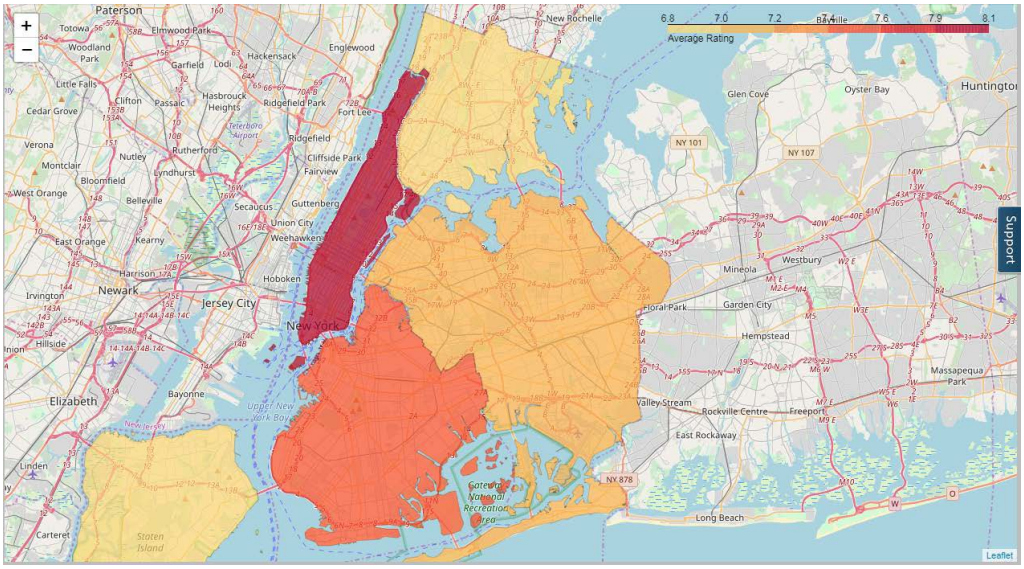
```
#check restaurant with max likes and rating
chi_rest_stats_nyc.loc[chi_rest_stats_nyc['Rating'].idxmax()]
```

```
Borough                      Manhattan
Neighborhood                   Chelsea
ID              44e9b421f964a520a5371fe3
Name                           Buddakan
Likes                              1473
Rating                              9.2
Name: 117, dtype: object
```

Furthermore, there is another information displays the average rating in terms of different area. From the bar chart, we can easily get the conclusion that Manhattan has the largest points which means the restaurants in there are the most popular for the people. On the opposite side, the Bronix has the least popular Chinese restaurants compare with other brough.



For the last step, the data visualization will bring the data. tables and charts out together as the untreatable map. The following maps (cluster and choropleth) show the aberage rating of Chinese restaurants.



Conclusion

Overall, the boughs which contain the largest number of Chinese restaurants are Queens and Manhattan, while the Bronx has the least number of restaurants. For the average rating, the top-ranked area is Brooklyn. However, the best rated restaurants are more likely distributed in Neck. The recommendation and most appropriate suggestion for the small restaurant business investor is that starting a new restaurant in and Brooklyn will be a good choice. For the fresh off the boat and travelers. It is better to consider about Neck. Queen when they want to have a delicious experience and explore the Chinese cuisine culture.