

The Battle of Neighborhoods: Capstone Project

Introduction

New York City (NYC), the capital city of USA, is the most populous city of USA. NYC is growing as the famous international center of business, finance, arts and culture with population of 8,336,817 in 2019. And great NYC area continues to be the leading gateway for immigrants into USA. NYC has established many ethnic neighborhoods such as Chinatowns, Koreatowns, Little India, Greektown etc.

This project will explore the best location for opening a new Indian restaurant across NYC area. As one of the most multicultural and diverse cities in the world, NYC has a great inclusiveness for diverse exotic food and different ethnical restaurants. Indian cuisine is an important part of the whole world cuisine, originating from distinct regions of India with a long history. The variety of Indian food is quite large with special favors. The diversified color, aromatic flavor, as well as excellent taste makes the potential success of opening a new Indian restaurant especially in modern city like NYC.

However, careful considerations of multiple relevant factors need to be required at the beginning. In particular, the location of the restaurant is one of the most important factors that will affect whether it will have success or a failure. Therefore, this project will answer two main questions: 1). Where should the investor open a new Indian restaurant? 2). Where to find a great Indian restaurant?

Data

Based on the purpose of our project and solve the questions above, several datasets are needed:

1. Datasets on NYC location data including neighborhoods, boroughs, longitudes will be obtained from the data sources: https://cocl.us/new_york_dataset
2. Indian restaurants in NYC neighborhoods: Data will be obtained from Foursquare API and venues of Chinese restaurants in Toronto neighborhoods will be collected including restaurants' ratings, tips, users likes.
3. GeoSpace data Data source to get the New york Borough boundaries that will help us visualize choropleth map: <https://data.cityofnewyork.us/City-Government/Borough-Boundaries/tgmi-j8zm>.

Methods

1. Collect the NYC data containing all of the neighborhood, postal code and boroughs from above datasets.
2. Collect all venues of each neighborhood using Foursquare API and filter out all of venues for Indian restaurants.
3. Prepare data for machine learning: select data, preprocess data and transform data.
4. Data visualization, statistical analysis.
5. Compare the neighborhoods to find the best place for opening a new Indian restaurant.
6. Conclusions.

Data Analysis

In order to obtain necessary data for our project, we installed several libraries as tools for further analysis including pandas, numpy, FourSquare API, geopy, folium. A "geo_location (address)"

function was defined to get the geocodes (latitude and longitude of a certain location). We also defined a function to interact with FourSquare API and get top 100 venues within a radius of 1000 metres for a given latitude and longitude from url:

https://api.foursquare.com/v2/venues/explore?&client_id={}&client_secret={}&v={}&ll={},{}&radius={}&limit={}. The venue details including count, rating, tip counts for a given venue id were

extracted from <https://api.foursquare.com/>. The new york city data such as Boroughs,

Neighborhoods along with their latitude and longitude were from https://cocl.us/new_york_dataset.

The Figure 2 demonstrates that Queens has the highest number of neighborhoods.

	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

Figure 1. Sample of 5 neighborhoods of NYC.

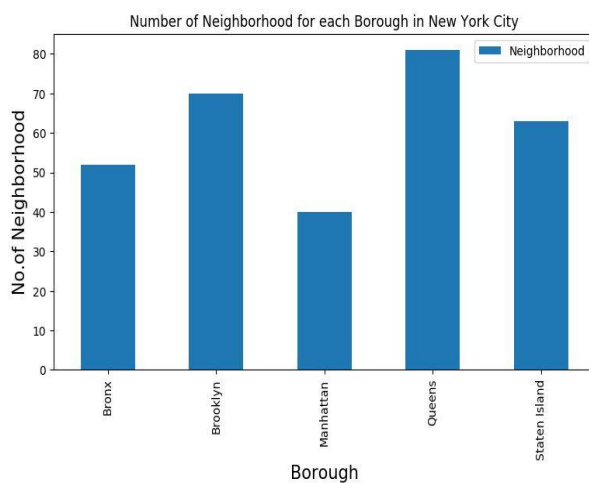


Figure 2. Number of neighborhoods in each borough.

FourSquare API was applied to collect Indian restaurants for each Neighborhood. Total 153 Indian Restaurants across New York City was obtained including detailed information like ID, and Name. Number of Indian Restaurants for each borough across NYC was also visualized.

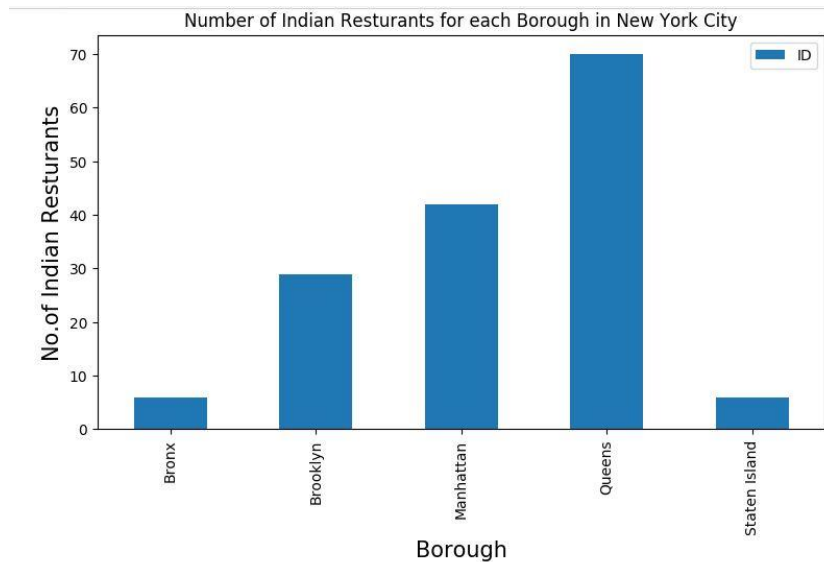


Figure 3. Number of Indian Restaurants for each borough across NYC.

Since Queen has the maximum number of restaurants, let's have a look at the 10 neighborhoods with maximum.

	Borough	Neighborhood	ID	Name
103	Queens	Floral Park	4e4e3e22bd4101d0d7a5c2d1	Kerala Kitchen
104	Queens	Floral Park	4b647b56f964a520c4b62ae3	Usha Foods & Usha Sweets
105	Queens	Floral Park	527ffc0811d2d329d5e49abd	Jackson Diner
106	Queens	Floral Park	4b787c49f964a5209cd12ee3	Santoor Indian Restaurant
107	Queens	Floral Park	4c0c01e0bbc676b00d6b4cd5	Mumbai Xpress
108	Queens	Floral Park	4c76ff35a5676dcb72671721	Flavor Of India
109	Queens	Floral Park	4df0f39dd4c04d0392c853ea	Sagar Chinese
110	Queens	Floral Park	571af96a498e9e392d8d3786	Namaste Authenic Indian Cuisine
111	Queens	Floral Park	55d68c1b498ecf05fa196fe1	Namaste Restaurant and Cafe
112	Queens	Floral Park	4c3e17f2ca012d7f82022fbe	Mushin's Halal Food [Gyro Cart]
113	Queens	Floral Park	4e6bfe1c7d8b2c711b17bbe5	Surya sweets and snacks

Figure 4. Top 10 Neighborhoods in Queens with maximum number of Indian Restaurants.

Furthermore, the ranking of each restaurant was obtained using FourSquare API and put into a dataframe.

	Borough	Neighborhood	ID	Name	Likes	Rating	Tips
0	Bronx	Woodlawn	4c0448d9310fc9b6bf1dc761	Curry Spot	4	8.1	11
1	Bronx	Parkchester	4c194631838020a13e78e561	Melanies Roti Bar And Grill	3	6.0	2
2	Bronx	Spuyten Duyvil	4c04544df423a593ac83d116	Cumin Indian Cuisine	13	6.1	9
3	Bronx	Concourse	551b7f75498e86c00a0ed2e1	Hungry Bird	8	6.9	3
4	Bronx	Unionport	4c194631838020a13e78e561	Melanies Roti Bar And Grill	3	6.0	2

Figure 5. Sample of 5 Indian Restaurants with ratings.

Restaurant with Maximum Likes, Rating, Tips as well as the top neighborhoods with top average rating of Indian restaurant were computed respectively.

```

Borough           Manhattan
Neighborhood      Midtown
ID                49d91c12f964a520015e1fe3
Name              The Kati Roll Company
Likes             836
Rating            8.8
Tips              259
Name: 41, dtype: object

```

Figure 6. Indian Restaurants with Maximum likes.

```

Borough           Manhattan
Neighborhood      Tribeca
ID                4bbb9dbded7776b0e1ad3e51
Name              Tamarind TriBeCa
Likes             586
Rating            9
Tips              145
Name: 45, dtype: object

```

Figure 7. Indian Restaurants with Maximum Rating.

```

Borough           Manhattan
Neighborhood      Midtown
ID                49d91c12f964a520015e1fe3
Name              The Kati Roll Company
Likes             836
Rating            8.8
Tips              259
Name: 41, dtype: object

```

Figure 8. Indian Restaurants with Maximum Tips.

	Neighborhood	Average Rating
28	Tribeca	9.00
13	Greenwich Village	8.90
32	West Village	8.85
18	Midtown	8.80
3	Chelsea	8.80
19	Murray Hill	8.70
10	Fort Greene	8.60
20	North Side	8.60
26	South Side	8.60
25	Roosevelt Island	8.40

Figure 9. Above are the top neighborhoods with top average rating of Indian restaurant. Similarly, the average rating of Indian Restaurants for each Borough was also obtained.

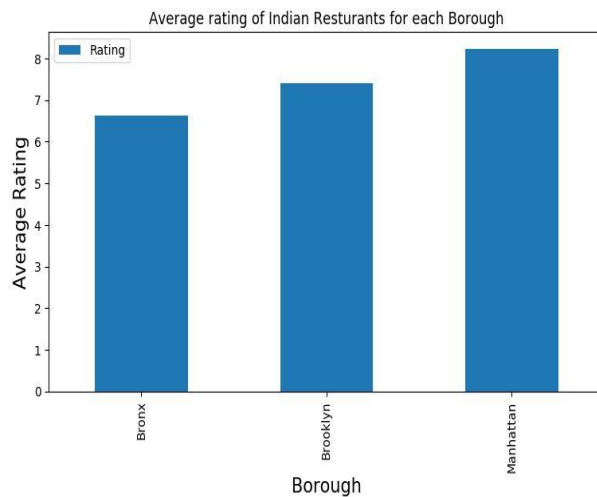


Figure 10. Average rating of Indian Restaurants of each borough across NYC.

Conclusion

Astoria (Queens), Blissville (Queens), Civic Center (Manhattan) are some of the best neighborhoods for indian cuisine.

Manhattan have potential Indian Resturant Market

Staten Island ranks last in average rating of Indian Resturants.

Manhattan is the best place to stay if you prefer Indian Cuisine.

Limitations

The ranking is purely on basis of rating of restaurants

The accuracy of data depends purely depends on the data provided by FourSquare