

# Capstone Project - The Battle of neighborhoods

October 22, 2019

## 0.0.1 Introduction

New York City's demographics show that it is a large and ethnically diverse metropolis. It is the largest city in the United States with a long history of international immigration. New York City has been a major point of entry for immigrants; the term "melting pot" was coined to describe densely populated immigrant neighborhoods on the Lower East Side. As many as 800 languages are spoken in New York, making it the most linguistically diverse city in the world. English remains the most widely spoken language, although there are areas in the outer boroughs in which up to 25% of people speak English as an alternate language, and/or have limited or no English language fluency. English is least spoken in neighborhoods such as Flushing, Sunset Park, and Corona.

With its diverse culture, comes diverse food items. There are many restaurants in New York City, each belonging to different categories like Chinese, Indian, French etc.

So the objective of this project is to list and visualize all major parts of New York City that has great Indian restaurants.

## 0.0.2 Data

**New York City data that contains list Boroughs, Neighborhoods along with their latitude and longitude.**

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

Description : This data set contains the required information. And we will use this data set to explore various neighborhoods of New York City.

**Indian restaurants in each neighborhood of New York City.**

Data source : Foursquare API

Description : By using this API we will get all the venues in each neighborhood. We can filter these venues to get only Indian restaurants.

**GeoSpace data**

Data source : <https://data.cityofnewyork.us/City-Government/Borough-Boundaries/tqmj-j8zm>

Description : By using this GeoSpace data we will get the New York Borough boundaries that will help us visualize choropleth map.

### 0.0.3 Approach

- Collect the new york city data from [https://cocl.us/new\\_york\\_dataset](https://cocl.us/new_york_dataset)
- Using FourSquare API we will find all venues for each neighborhood.
- Filter out all venues that are Indian Restaurants.
- Find rating , tips and like count for each Indian Restaurants using FourSquare API.
- Using rating for each restaurant , we will sort that data.
- Visualize the Ranking of neighborhoods using folium library(python)

### 0.0.4 Results

The results are carried out to give the answer of following questions:

What is best location in New York City for Indian Cuisine ?

Which areas have potential Indian Restaurant Market ?

Which are some of the best neighborhoods for indian cuisine?

Which is the best place to stay if prefer Indian Cuisine ?

**Analysis is done with required python libraries**

- pandas and numpy for handling data.
- request module for using FourSquare API.
- geopy to get co-ordinates of City of New York.
- folium to visualize the results on a map

```
In [3]: import pandas as pd
import numpy as np
pd.set_option('display.max_columns', None)
pd.set_option('display.max_rows', None)
import requests
from bs4 import BeautifulSoup
import geocoder
import os
import folium # map rendering library
from geopy.geocoders import Nominatim # convert an address into latitude and longitude v
# Matplotlib and associated plotting modules
import matplotlib.pyplot as plt
import matplotlib.cm as cm
import matplotlib.colors as colors
%matplotlib inline

print('Libraries imported.')
```

Libraries imported.

```
In [4]: def geo_location(address):
# get geo location of address
geolocator = Nominatim(user_agent="ny_explorer")
```

```

location = geolocator.geocode(address)
latitude = location.latitude
longitude = location.longitude
return latitude,longitude

```

```
In [18]: def get_venues(lat,lng):
```

```

    #set variables
    radius=1000
    LIMIT=100
    # CLIENT_ID = os.environ['CLIENT_ID'] # your Foursquare ID
    #CLIENT_SECRET = os.environ['CLIENT_SECRET'] # your Foursquare Secret
    #VERSION = '20180605' # Foursquare API version
    CLIENT_ID = '4IHGX34AAOMXD14JMF2Y1AWXISOVL4OWOQV2EBUNBLS2IAWF'
    CLIENT_SECRET = '1ZMVX20KHBV4CKG12J5CCHE4WOENR3EUCSOYFXALLM3SJAHE'
    VERSION = '20180604'

    #url to fetch data from foursquare api
    url = 'https://api.foursquare.com/v2/venues/explore?&client_id={}&client_secret={}&
        CLIENT_ID,
        CLIENT_SECRET,
        VERSION,
        lat,
        lng,
        radius,
        LIMIT)

    # get all the data
    results = requests.get(url).json()
    venue_data=results["response"]['groups'][0]['items']
    venue_details=[]
    for row in venue_data:
        try:
            venue_id=row['venue']['id']
            venue_name=row['venue']['name']
            venue_category=row['venue']['categories'][0]['name']
            venue_details.append([venue_id,venue_name,venue_category])
        except KeyError:
            pass

    column_names=['ID', 'Name', 'Category']
    df = pd.DataFrame(venue_details,columns=column_names)
    return df

```

```
In [14]: def get_venue_details(venue_id):
```

```

    #CLIENT_ID = os.environ['CLIENT_ID'] # your Foursquare ID
    #CLIENT_SECRET = os.environ['CLIENT_SECRET'] # your Foursquare Secret

```

```

#VERSION = '20180605' # Foursquare API version
CLIENT_ID = '4IHGX34AOMXD14JMF2Y1AWXISOVL4OWQV2EBUNBLS2IAWF'
CLIENT_SECRET = '1ZMVX20KHBV4CKG12J5CCHE4WOENR3EUCSOYFXALLM3SJAHE'
VERSION = '20180604'
#LIMIT = 30

#url to fetch data from foursquare api
url = 'https://api.foursquare.com/v2/venues/{}?&client_id={}&client_secret={}&v={}'
        venue_id,
        CLIENT_ID,
        CLIENT_SECRET,
        VERSION)

# get all the data
results = requests.get(url).json()
venue_data=results['response']['venue']
venue_details=[]
try:
    venue_id=venue_data['id']
    venue_name=venue_data['name']
    venue_likes=venue_data['likes']['count']
    venue_rating=venue_data['rating']
    venue_tips=venue_data['tips']['count']
    venue_details.append([venue_id,venue_name,venue_likes,venue_rating,venue_tips])
except KeyError:
    pass

column_names=['ID', 'Name', 'Likes', 'Rating', 'Tips']
df = pd.DataFrame(venue_details,columns=column_names)
return df

```

```

In [7]: def get_new_york_data():
url='https://cocl.us/new_york_dataset'
resp=requests.get(url).json()
# all data is present in features label
features=resp['features']

# define the dataframe columns
column_names = ['Borough', 'Neighborhood', 'Latitude', 'Longitude']
# instantiate the dataframe
new_york_data = pd.DataFrame(columns=column_names)

for data in features:
    borough = data['properties']['borough']
    neighborhood_name = data['properties']['name']

    neighborhood_latlon = data['geometry']['coordinates']
    neighborhood_lat = neighborhood_latlon[1]

```

```

neighborhood_lon = neighborhood_latlon[0]

new_york_data = new_york_data.append({'Borough': borough,
                                      'Neighborhood': neighborhood_name,
                                      'Latitude': neighborhood_lat,
                                      'Longitude': neighborhood_lon}, ignore_index=True)

return new_york_data

In [8]: # get new york data
new_york_data=get_new_york_data()

In [9]: new_york_data.head()

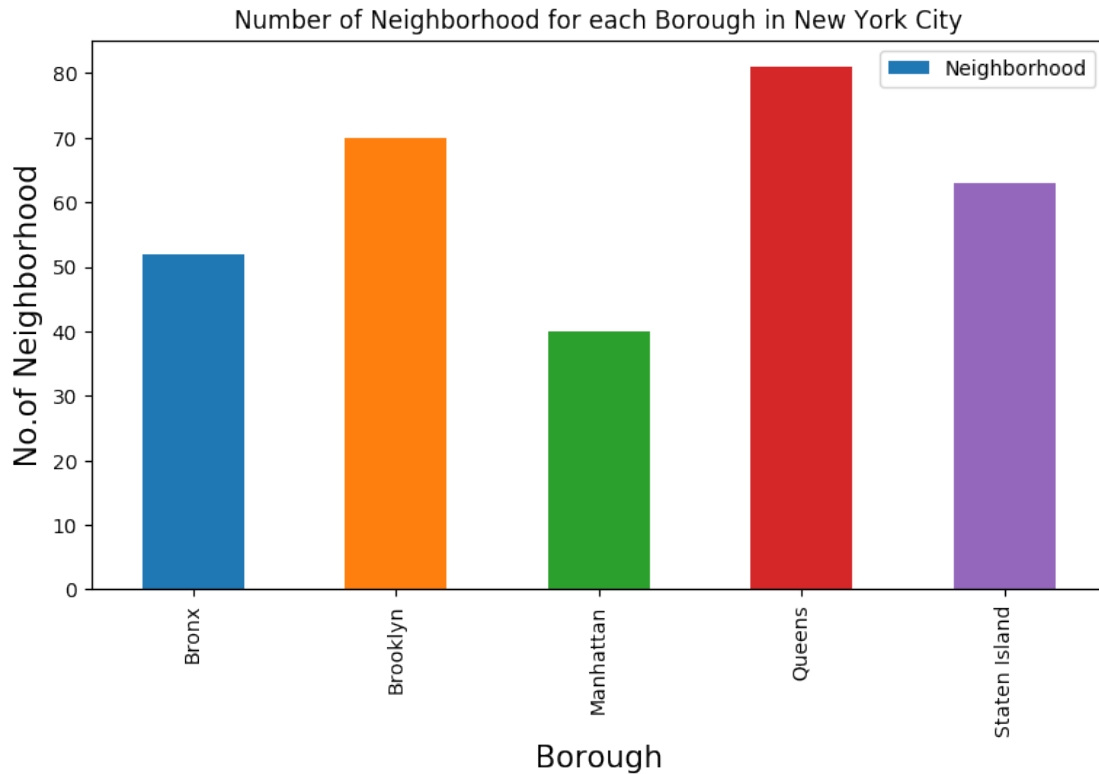
Out[9]:
   Borough Neighborhood  Latitude  Longitude
0   Bronx    Wakefield  40.894705  -73.847201
1   Bronx    Co-op City  40.874294  -73.829939
2   Bronx    Eastchester 40.887556  -73.827806
3   Bronx    Fieldston  40.895437  -73.905643
4   Bronx    Riverdale  40.890834  -73.912585

In [10]: new_york_data.shape

Out[10]: (306, 4)

In [11]: plt.figure(figsize=(9,5), dpi = 100)
         # title
         plt.title('Number of Neighborhood for each Borough in New York City')
         #On x-axis
         plt.xlabel('Borough', fontsize = 15)
         #On y-axis
         plt.ylabel('No.of Neighborhood', fontsize=15)
         #giving a bar plot
         new_york_data.groupby('Borough')['Neighborhood'].count().plot(kind='bar')
         #legend
         plt.legend()
         #displays the plot
         plt.show()

```



### collect Indian resturants for each Neighborhood

```
In [19]: # prepare neighborhood list that contains indian resturants
column_names=['Borough', 'Neighborhood', 'ID', 'Name']
indian_rest_ny=pd.DataFrame(columns=column_names)
count=1
for row in new_york_data.values.tolist():
    Borough, Neighborhood, Latitude, Longitude=row
    venues = get_venues(Latitude,Longitude)
    indian_resturants=venues[venues['Category']=='Indian Restaurant']
    print('(',count,'/',len(new_york_data),')','Indian Resturants in '+Neighborhood+',
    for resturant_detail in indian_resturants.values.tolist():
        id, name , category=resturant_detail
        indian_rest_ny = indian_rest_ny.append({'Borough': Borough,
                                                'Neighborhood': Neighborhood,
                                                'ID': id,
                                                'Name' : name
                                                }, ignore_index=True)

    count+=1

( 1 / 306 ) Indian Resturants in Wakefield, Bronx:0
( 2 / 306 ) Indian Resturants in Co-op City, Bronx:0
```

( 3 / 306 ) Indian Resturants in Eastchester, Bronx:0  
 ( 4 / 306 ) Indian Resturants in Fieldston, Bronx:0  
 ( 5 / 306 ) Indian Resturants in Riverdale, Bronx:1  
 ( 6 / 306 ) Indian Resturants in Kingsbridge, Bronx:1  
 ( 7 / 306 ) Indian Resturants in Marble Hill, Manhattan:0  
 ( 8 / 306 ) Indian Resturants in Woodlawn, Bronx:1  
 ( 9 / 306 ) Indian Resturants in Norwood, Bronx:0  
 ( 10 / 306 ) Indian Resturants in Williamsbridge, Bronx:1  
 ( 11 / 306 ) Indian Resturants in Baychester, Bronx:0  
 ( 12 / 306 ) Indian Resturants in Pelham Parkway, Bronx:0  
 ( 13 / 306 ) Indian Resturants in City Island, Bronx:0  
 ( 14 / 306 ) Indian Resturants in Bedford Park, Bronx:0  
 ( 15 / 306 ) Indian Resturants in University Heights, Bronx:0  
 ( 16 / 306 ) Indian Resturants in Morris Heights, Bronx:0  
 ( 17 / 306 ) Indian Resturants in Fordham, Bronx:0  
 ( 18 / 306 ) Indian Resturants in East Tremont, Bronx:0  
 ( 19 / 306 ) Indian Resturants in West Farms, Bronx:0  
 ( 20 / 306 ) Indian Resturants in High Bridge, Bronx:0  
 ( 21 / 306 ) Indian Resturants in Melrose, Bronx:0  
 ( 22 / 306 ) Indian Resturants in Mott Haven, Bronx:0  
 ( 23 / 306 ) Indian Resturants in Port Morris, Bronx:0  
 ( 24 / 306 ) Indian Resturants in Longwood, Bronx:0  
 ( 25 / 306 ) Indian Resturants in Hunts Point, Bronx:0  
 ( 26 / 306 ) Indian Resturants in Morrisania, Bronx:0  
 ( 27 / 306 ) Indian Resturants in Soundview, Bronx:0  
 ( 28 / 306 ) Indian Resturants in Clason Point, Bronx:0  
 ( 29 / 306 ) Indian Resturants in Throgs Neck, Bronx:0  
 ( 30 / 306 ) Indian Resturants in Country Club, Bronx:0  
 ( 31 / 306 ) Indian Resturants in Parkchester, Bronx:1  
 ( 32 / 306 ) Indian Resturants in Westchester Square, Bronx:0  
 ( 33 / 306 ) Indian Resturants in Van Nest, Bronx:0  
 ( 34 / 306 ) Indian Resturants in Morris Park, Bronx:0  
 ( 35 / 306 ) Indian Resturants in Belmont, Bronx:0  
 ( 36 / 306 ) Indian Resturants in Spuyten Duyvil, Bronx:1  
 ( 37 / 306 ) Indian Resturants in North Riverdale, Bronx:0  
 ( 38 / 306 ) Indian Resturants in Pelham Bay, Bronx:0  
 ( 39 / 306 ) Indian Resturants in Schuylerville, Bronx:0  
 ( 40 / 306 ) Indian Resturants in Edgewater Park, Bronx:0  
 ( 41 / 306 ) Indian Resturants in Castle Hill, Bronx:0  
 ( 42 / 306 ) Indian Resturants in Olinville, Bronx:0  
 ( 43 / 306 ) Indian Resturants in Pelham Gardens, Bronx:0  
 ( 44 / 306 ) Indian Resturants in Concourse, Bronx:1  
 ( 45 / 306 ) Indian Resturants in Unionport, Bronx:1  
 ( 46 / 306 ) Indian Resturants in Edenwald, Bronx:0  
 ( 47 / 306 ) Indian Resturants in Bay Ridge, Brooklyn:1  
 ( 48 / 306 ) Indian Resturants in Bensonhurst, Brooklyn:0  
 ( 49 / 306 ) Indian Resturants in Sunset Park, Brooklyn:0  
 ( 50 / 306 ) Indian Resturants in Greenpoint, Brooklyn:0

( 51 / 306 ) Indian Resturants in Gravesend, Brooklyn:0  
 ( 52 / 306 ) Indian Resturants in Brighton Beach, Brooklyn:1  
 ( 53 / 306 ) Indian Resturants in Sheepshead Bay, Brooklyn:0  
 ( 54 / 306 ) Indian Resturants in Manhattan Terrace, Brooklyn:0  
 ( 55 / 306 ) Indian Resturants in Flatbush, Brooklyn:2  
 ( 56 / 306 ) Indian Resturants in Crown Heights, Brooklyn:0  
 ( 57 / 306 ) Indian Resturants in East Flatbush, Brooklyn:1  
 ( 58 / 306 ) Indian Resturants in Kensington, Brooklyn:2  
 ( 59 / 306 ) Indian Resturants in Windsor Terrace, Brooklyn:0  
 ( 60 / 306 ) Indian Resturants in Prospect Heights, Brooklyn:0  
 ( 61 / 306 ) Indian Resturants in Brownsville, Brooklyn:0  
 ( 62 / 306 ) Indian Resturants in Williamsburg, Brooklyn:0  
 ( 63 / 306 ) Indian Resturants in Bushwick, Brooklyn:0  
 ( 64 / 306 ) Indian Resturants in Bedford Stuyvesant, Brooklyn:0  
 ( 65 / 306 ) Indian Resturants in Brooklyn Heights, Brooklyn:0  
 ( 66 / 306 ) Indian Resturants in Cobble Hill, Brooklyn:0  
 ( 67 / 306 ) Indian Resturants in Carroll Gardens, Brooklyn:0  
 ( 68 / 306 ) Indian Resturants in Red Hook, Brooklyn:0  
 ( 69 / 306 ) Indian Resturants in Gowanus, Brooklyn:0  
 ( 70 / 306 ) Indian Resturants in Fort Greene, Brooklyn:1  
 ( 71 / 306 ) Indian Resturants in Park Slope, Brooklyn:0  
 ( 72 / 306 ) Indian Resturants in Cypress Hills, Brooklyn:0  
 ( 73 / 306 ) Indian Resturants in East New York, Brooklyn:0  
 ( 74 / 306 ) Indian Resturants in Starrett City, Brooklyn:0  
 ( 75 / 306 ) Indian Resturants in Canarsie, Brooklyn:0  
 ( 76 / 306 ) Indian Resturants in Flatlands, Brooklyn:0  
 ( 77 / 306 ) Indian Resturants in Mill Island, Brooklyn:0  
 ( 78 / 306 ) Indian Resturants in Manhattan Beach, Brooklyn:0  
 ( 79 / 306 ) Indian Resturants in Coney Island, Brooklyn:0  
 ( 80 / 306 ) Indian Resturants in Bath Beach, Brooklyn:0  
 ( 81 / 306 ) Indian Resturants in Borough Park, Brooklyn:0  
 ( 82 / 306 ) Indian Resturants in Dyker Heights, Brooklyn:0  
 ( 83 / 306 ) Indian Resturants in Gerritsen Beach, Brooklyn:0  
 ( 84 / 306 ) Indian Resturants in Marine Park, Brooklyn:0  
 ( 85 / 306 ) Indian Resturants in Clinton Hill, Brooklyn:2  
 ( 86 / 306 ) Indian Resturants in Sea Gate, Brooklyn:0  
 ( 87 / 306 ) Indian Resturants in Downtown, Brooklyn:0  
 ( 88 / 306 ) Indian Resturants in Boerum Hill, Brooklyn:0  
 ( 89 / 306 ) Indian Resturants in Prospect Lefferts Gardens, Brooklyn:2  
 ( 90 / 306 ) Indian Resturants in Ocean Hill, Brooklyn:2  
 ( 91 / 306 ) Indian Resturants in City Line, Brooklyn:0  
 ( 92 / 306 ) Indian Resturants in Bergen Beach, Brooklyn:0  
 ( 93 / 306 ) Indian Resturants in Midwood, Brooklyn:0  
 ( 94 / 306 ) Indian Resturants in Prospect Park South, Brooklyn:3  
 ( 95 / 306 ) Indian Resturants in Georgetown, Brooklyn:0  
 ( 96 / 306 ) Indian Resturants in East Williamsburg, Brooklyn:0  
 ( 97 / 306 ) Indian Resturants in North Side, Brooklyn:1  
 ( 98 / 306 ) Indian Resturants in South Side, Brooklyn:1



```
( 99 / 306 ) Indian Resturants in Ocean Parkway, Brooklyn:0
( 100 / 306 ) Indian Resturants in Fort Hamilton, Brooklyn:0
( 101 / 306 ) Indian Resturants in Chinatown, Manhattan:0
( 102 / 306 ) Indian Resturants in Washington Heights, Manhattan:1
( 103 / 306 ) Indian Resturants in Inwood, Manhattan:0
( 104 / 306 ) Indian Resturants in Hamilton Heights, Manhattan:2
( 105 / 306 ) Indian Resturants in Manhattanville, Manhattan:2
( 106 / 306 ) Indian Resturants in Central Harlem, Manhattan:2
( 107 / 306 ) Indian Resturants in East Harlem, Manhattan:1
( 108 / 306 ) Indian Resturants in Upper East Side, Manhattan:0
( 109 / 306 ) Indian Resturants in Yorkville, Manhattan:1
```

```
-----
KeyError                                Traceback (most recent call last)
```

```
<ipython-input-19-7a917332b722> in <module>()
      5 for row in new_york_data.values.tolist():
      6     Borough, Neighborhood, Latitude, Longitude=row
----> 7     venues = get_venues(Latitude,Longitude)
      8     indian_resturants=venues[venues['Category']=='Indian Restaurant']
      9     print('(',count, '/',len(new_york_data),')','Indian Resturants in '+Neighborhood+
```

```
<ipython-input-18-eeb204a5e0f5> in get_venues(lat, lng)
     23     # get all the data
     24     results = requests.get(url).json()
--> 25     venue_data=results["response"]["groups"][0]["items"]
     26     venue_details=[]
     27     for row in venue_data:
```

```
KeyError: 'groups'
```

```
In [20]: indian_rest_ny.head()
```

```
Out[20]:
```

	Borough	Neighborhood	ID \
0	Bronx	Riverdale	4c04544df423a593ac83d116
1	Bronx	Kingsbridge	4c04544df423a593ac83d116
2	Bronx	Woodlawn	4c0448d9310fc9b6bf1dc761
3	Bronx	Williamsbridge	570c3a3fcd10eecd0d0434cd
4	Bronx	Parkchester	4c194631838020a13e78e561

	Name
0	Cumin Indian Cuisine

```

1      Cumin Indian Cuisine
2          Curry Spot
3          Agra Grill
4  Melanies Roti Bar And Grill

```

```
In [21]: indian_rest_ny.shape
```

```
Out[21]: (36, 4)
```

```

In [27]: plt.figure(figsize=(9,5), dpi = 100)
         # title
         plt.title('Number of Indian Resturants for each Borough in New York City')
         #On x-axis
         plt.xlabel('Borough', fontsize = 15)
         #On y-axis
         plt.ylabel('No.of Indian Resturants', fontsize=15)
         #giving a bar plot
         indian_rest_ny.groupby('Borough')['ID'].count().plot(kind='bar')
         #legend
         plt.legend()
         #displays the plot
         plt.show()

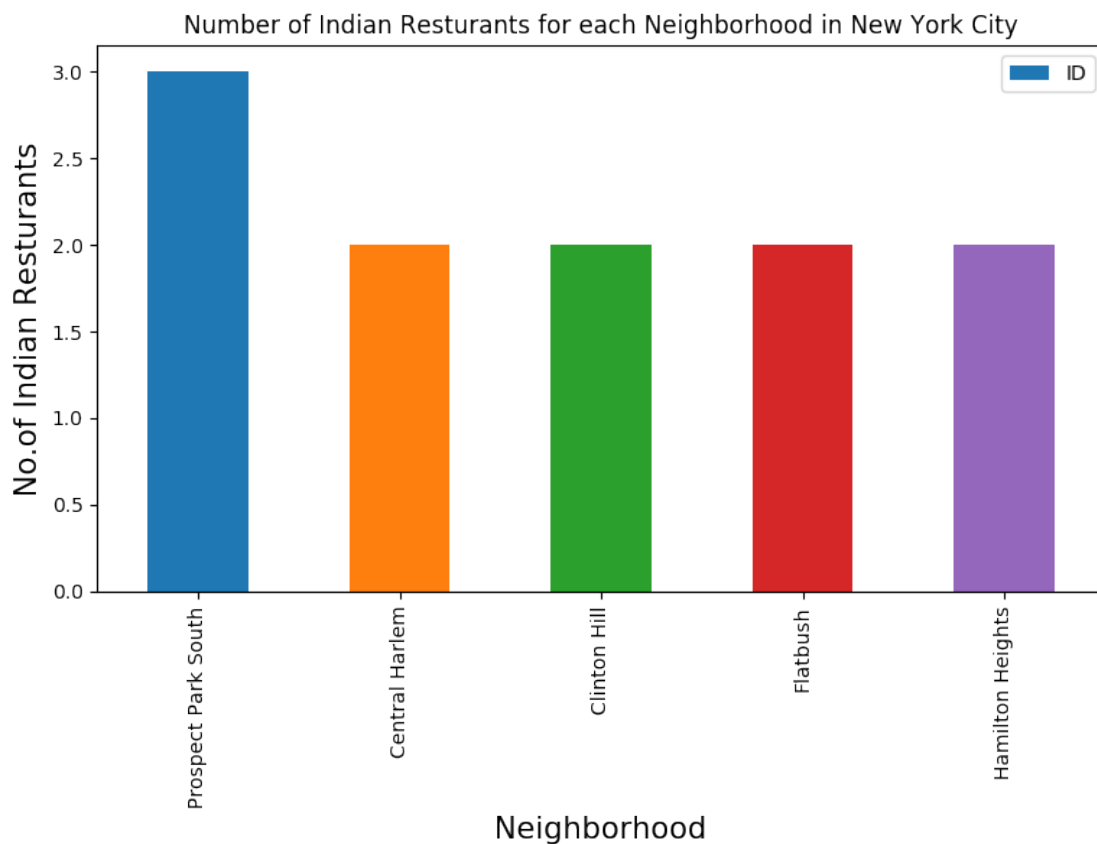
```



```

In [23]: plt.figure(figsize=(9,5), dpi = 100)
         # title
         plt.title('Number of Indian Resturants for each Neighborhood in New York City')
         #On x-axis
         plt.xlabel('Neighborhood', fontsize = 15)
         #On y-axis
         plt.ylabel('No.of Indian Resturants', fontsize=15)
         #giving a bar plot
         indian_rest_ny.groupby('Neighborhood')['ID'].count().nlargest(5).plot(kind='bar')
         #legend
         plt.legend()
         #displays the plot
         plt.show()

```



```

In [33]: indian_rest_ny[indian_rest_ny['Neighborhood']=='Prospect Park South']

```

```

Out[33]:   Borough      Neighborhood      ID \
22  Brooklyn  Prospect Park South  519ff6c8498e1300ddcbd45c
23  Brooklyn  Prospect Park South  4db0f4371e729fcc56497f20
24  Brooklyn  Prospect Park South  4b718914f964a520c04b2de3

```

	Name
22	Anarkali Indian Cuisine
23	Mashallah
24	Madina Restaurant and Sweets

Thus Prospect Park South in Brooklyn has highest number of restaurants i.e 3

```
In [34]: # get the ranking of each restaurant for further analysis.
# prepare neighborhood list that contains indian restaurants
column_names=['Borough', 'Neighborhood', 'ID', 'Name', 'Likes', 'Rating', 'Tips']
indian_rest_stats_ny=pd.DataFrame(columns=column_names)
count=1

for row in indian_rest_ny.values.tolist():
    Borough,Neighborhood,ID,Name=row
    try:
        venue_details=get_venue_details(ID)
        print(venue_details)
        id,name,likes,rating,tips=venue_details.values.tolist()[0]
    except IndexError:
        print('No data available for id=',ID)
        # we will assign 0 value for these restaurants as they may have been
        #recently opened or details does not exist in FourSquare Database
        id,name,likes,rating,tips=[0]*5
    print('(',count,'/',len(indian_rest_ny),')', 'processed')
    indian_rest_stats_ny = indian_rest_stats_ny.append({'Borough': Borough,
                                                         'Neighborhood': Neighborhood,
                                                         'ID': id,
                                                         'Name' : name,
                                                         'Likes' : likes,
                                                         'Rating' : rating,
                                                         'Tips' : tips
                                                         }, ignore_index=True)

    count+=1
```

	ID	Name	Likes	Rating	Tips
0	4c04544df423a593ac83d116	Cumin Indian Cuisine	13	6.5	9
( 1 / 36 ) processed					
	ID	Name	Likes	Rating	Tips
0	4c04544df423a593ac83d116	Cumin Indian Cuisine	13	6.5	9
( 2 / 36 ) processed					
	ID	Name	Likes	Rating	Tips
0	4c0448d9310fc9b6bf1dc761	Curry Spot	4	7.8	11
( 3 / 36 ) processed					

Empty DataFrame  
Columns: [ID, Name, Likes, Rating, Tips]  
Index: []

No data available for id= 570c3a3fcd10eecd0d0434cd

( 4 / 36 ) processed

	ID	Name	Likes	Rating	Tips
0	4c194631838020a13e78e561	Melanies Roti Bar And Grill	3	6.0	2

( 5 / 36 ) processed

	ID	Name	Likes	Rating	Tips
0	4c04544df423a593ac83d116	Cumin Indian Cuisine	13	6.5	9

( 6 / 36 ) processed

	ID	Name	Likes	Rating	Tips
0	551b7f75498e86c00a0ed2e1	Hungry Bird	8	6.6	3

( 7 / 36 ) processed

	ID	Name	Likes	Rating	Tips
0	4c194631838020a13e78e561	Melanies Roti Bar And Grill	3	6.0	2

( 8 / 36 ) processed

	ID	Name	Likes	Rating	Tips
0	4b5a4dc8f964a520a2bb28e3	Taj Mahal	38	8.3	26

( 9 / 36 ) processed

	ID	Name	Likes	Rating	Tips
0	4af0d31bf964a5207ddf21e3	Pak Nasheman	9	7.4	4

( 10 / 36 ) processed

	ID	Name	Likes	Rating	Tips
0	52213c4211d295d4c57a607c	Ashoka Grill	8	7.4	14

( 11 / 36 ) processed

	ID	Name	Likes	Rating	Tips
0	564d283d498e6e851df79d87	Great Indian Curry	3	6.4	2

( 12 / 36 ) processed

	ID	Name	Likes	Rating	Tips
0	512a9ea9e4b004fb8eeb84e5	Silver Krust	12	8.2	3

( 13 / 36 ) processed

	ID	Name	Likes	Rating	Tips
0	4db0f4371e729fcc56497f20	Mashallah	19	7.6	7

( 14 / 36 ) processed

	ID	Name	Likes	Rating	Tips
0	4b718914f964a520c04b2de3	Madina Restaurant and Sweets	17	7.0	12

( 15 / 36 ) processed

	ID	Name	Likes	Rating	Tips
0	57596dad498e732300496b23	Dosa Royale	73	8.7	22

( 16 / 36 ) processed

	ID	Name	Likes	Rating	Tips
0	57596dad498e732300496b23	Dosa Royale	73	8.7	22

( 17 / 36 ) processed

	ID	Name	Likes	Rating	Tips
0	568d3902498e619efcbc3f58	Spice & Grill	19	7.8	6

( 18 / 36 ) processed

	ID	Name	Likes	Rating	Tips
0	4bb93b70cf2fc9b6fe64a002	Gandhi Fine Indian Cuisine	81	8.7	47

( 19 / 36 ) processed

	ID	Name	Likes	Rating	Tips
--	----	------	-------	--------	------

```

0 4ec80587d3e3e131f2e72835 Bayleaf      7      7.2      7
( 20 / 36 ) processed
                                ID          Name  Likes  Rating  Tips
0 5539753f498edbace4746b67 Tandoori Masala      12      7.9      2
( 21 / 36 ) processed
                                ID          Name  Likes  Rating  Tips
0 4f6cae2ee4b0d4a5afcef5c0 Delhi Heights      22      8.2      8
( 22 / 36 ) processed
                                ID          Name  Likes  Rating  Tips
0 519ff6c8498e1300ddcbd45c Anarkali Indian Cuisine      14      7.5      8
( 23 / 36 ) processed
                                ID          Name  Likes  Rating  Tips
0 4db0f4371e729fcc56497f20 Mashallah      19      7.6      7
( 24 / 36 ) processed
                                ID          Name  Likes  Rating  Tips
0 4b718914f964a520c04b2de3 Madina Restaurant and Sweets      17      7.0      12
( 25 / 36 ) processed
                                ID          Name  Likes  Rating  Tips
0 5631511b498e3d6d7e0a4df0 Tikka Indian Grill      94      8.5      27
( 26 / 36 ) processed
                                ID          Name  Likes  Rating  Tips
0 5631511b498e3d6d7e0a4df0 Tikka Indian Grill      94      8.5      27
( 27 / 36 ) processed
                                ID          Name  Likes  Rating  Tips
0 4ae7876ef964a5201eac21e3 Kismat Indian Restaurant      45      7.8      24
( 28 / 36 ) processed
                                ID          Name  Likes  Rating  \
0 54c2bd96498eaf5142e3fe92 Clove Indian Restaurant & Bar      29      7.6

Tips
0 15
( 29 / 36 ) processed
                                ID          Name  Likes  Rating  Tips
0 5914ff32b23dfa207eca38de Mumbai Masala      13      7.2      6
( 30 / 36 ) processed
                                ID          Name  Likes  Rating  Tips
0 529d382a11d2dd5ef107e641 Chapati House - NYC      73      7.8      18
( 31 / 36 ) processed
                                ID          Name  Likes  Rating  \
0 54c2bd96498eaf5142e3fe92 Clove Indian Restaurant & Bar      29      7.6

Tips
0 15
( 32 / 36 ) processed
                                ID          Name  Likes  Rating  Tips
0 56d87f3d498ee215abee5724 Delhi Masala      13      8.6      3
( 33 / 36 ) processed
                                ID          Name  Likes  Rating  \

```

```
0 54c2bd96498eaf5142e3fe92 Clove Indian Restaurant & Bar      29      7.6
```

Tips

```
0      15
```

```
( 34 / 36 ) processed
```

	ID	Name	Likes	Rating	Tips
0	519fe6f5498e30595d370c44	Bawarchi	9	7.8	4

```
( 35 / 36 ) processed
```

	ID	Name	Likes	Rating	Tips
0	5272ca4511d22488f6895caf	Drunken Munkey	207	8.5	61

```
( 36 / 36 ) processed
```

```
In [35]: indian_rest_stats_ny.head()
```

```
Out[35]:
```

	Borough	Neighborhood	ID \
0	Bronx	Riverdale	4c04544df423a593ac83d116
1	Bronx	Kingsbridge	4c04544df423a593ac83d116
2	Bronx	Woodlawn	4c0448d9310fc9b6bf1dc761
3	Bronx	Williamsbridge	0
4	Bronx	Parkchester	4c194631838020a13e78e561

	Name	Likes	Rating	Tips
0	Cumin Indian Cuisine	13	6.5	9
1	Cumin Indian Cuisine	13	6.5	9
2	Curry Spot	4	7.8	11
3		0	0.0	0
4	Melanies Roti Bar And Grill	3	6.0	2

```
In [36]: indian_rest_stats_ny.shape
```

```
Out[36]: (36, 7)
```

```
In [37]: indian_rest_ny.shape
```

```
Out[37]: (36, 4)
```

```
In [38]: # save data to csv
```

```
indian_rest_stats_ny.to_csv('indian_rest_stats_ny.csv', index=False)
```

```
In [39]: # Verify csv data
```

```
indian_rest_stats_ny_csv=pd.read_csv('indian_rest_stats_ny.csv')
indian_rest_stats_ny_csv.shape
```

```
Out[39]: (36, 7)
```

```
In [40]: indian_rest_stats_ny_csv.head()
```

```
Out[40]:
```

	Borough	Neighborhood	ID \
0	Bronx	Riverdale	4c04544df423a593ac83d116
1	Bronx	Kingsbridge	4c04544df423a593ac83d116
2	Bronx	Woodlawn	4c0448d9310fc9b6bf1dc761
3	Bronx	Williamsbridge	0
4	Bronx	Parkchester	4c194631838020a13e78e561

	Name	Likes	Rating	Tips
0	Cumin Indian Cuisine	13	6.5	9
1	Cumin Indian Cuisine	13	6.5	9
2	Curry Spot	4	7.8	11
3	0	0	0.0	0
4	Melanies Roti Bar And Grill	3	6.0	2

```
In [41]: indian_rest_stats_ny.info()
```

```
<class 'pandas.core.frame.DataFrame'>
RangeIndex: 36 entries, 0 to 35
Data columns (total 7 columns):
Borough      36 non-null object
Neighborhood  36 non-null object
ID           36 non-null object
Name         36 non-null object
Likes        36 non-null object
Rating       36 non-null float64
Tips         36 non-null object
dtypes: float64(1), object(6)
memory usage: 2.0+ KB
```

```
In [42]: # Need certain Preprocessing
```

```
indian_rest_stats_ny['Likes']=indian_rest_stats_ny['Likes'].astype('float64')
indian_rest_stats_ny['Tips']=indian_rest_stats_ny['Tips'].astype('float64')
```

```
In [43]: indian_rest_stats_ny.info()
```

```
<class 'pandas.core.frame.DataFrame'>
RangeIndex: 36 entries, 0 to 35
Data columns (total 7 columns):
Borough      36 non-null object
Neighborhood  36 non-null object
ID           36 non-null object
Name         36 non-null object
Likes        36 non-null float64
Rating       36 non-null float64
Tips         36 non-null float64
dtypes: float64(3), object(4)
memory usage: 2.0+ KB
```



```
In [44]: # Resturant with maximum Likes
```

```
indian_rest_stats_ny.iloc[indian_rest_stats_ny['Likes'].idxmax()]
```

```
Out[44]: Borough                Manhattan
Neighborhood                Yorkville
ID                5272ca4511d22488f6895caf
Name                Drunken Munkey
Likes                207
Rating                8.5
Tips                61
Name: 35, dtype: object
```

```
In [45]: # Resturant with maximum Rating
```

```
indian_rest_stats_ny.iloc[indian_rest_stats_ny['Rating'].idxmax()]
```

```
Out[45]: Borough                Brooklyn
Neighborhood                Fort Greene
ID                57596dad498e732300496b23
Name                Dosa Royale
Likes                73
Rating                8.7
Tips                22
Name: 15, dtype: object
```

```
In [46]: # Resturant with maximum Tips
```

```
indian_rest_stats_ny.iloc[indian_rest_stats_ny['Tips'].idxmax()]
```

```
Out[46]: Borough                Manhattan
Neighborhood                Yorkville
ID                5272ca4511d22488f6895caf
Name                Drunken Munkey
Likes                207
Rating                8.5
Tips                61
Name: 35, dtype: object
```

```
In [47]: ny_neighborhood_stats=indian_rest_stats_ny.groupby('Neighborhood',as_index=False).mean(
ny_neighborhood_stats.columns=['Neighborhood','Average Rating']
```

```
In [48]: # The top neighborhoods with top average rating of Indian resturants
```

```
ny_neighborhood_stats.sort_values(['Average Rating'],ascending=False).head(10)
```

```
Out[48]:
```

	Neighborhood	Average Rating
8	Fort Greene	8.70
13	North Side	8.50
19	South Side	8.50
25	Yorkville	8.50
0	Bay Ridge	8.30

3	Clinton Hill	8.25
5	East Flatbush	8.20
2	Central Harlem	8.10
14	Ocean Hill	8.05
16	Prospect Lefferts Gardens	7.95

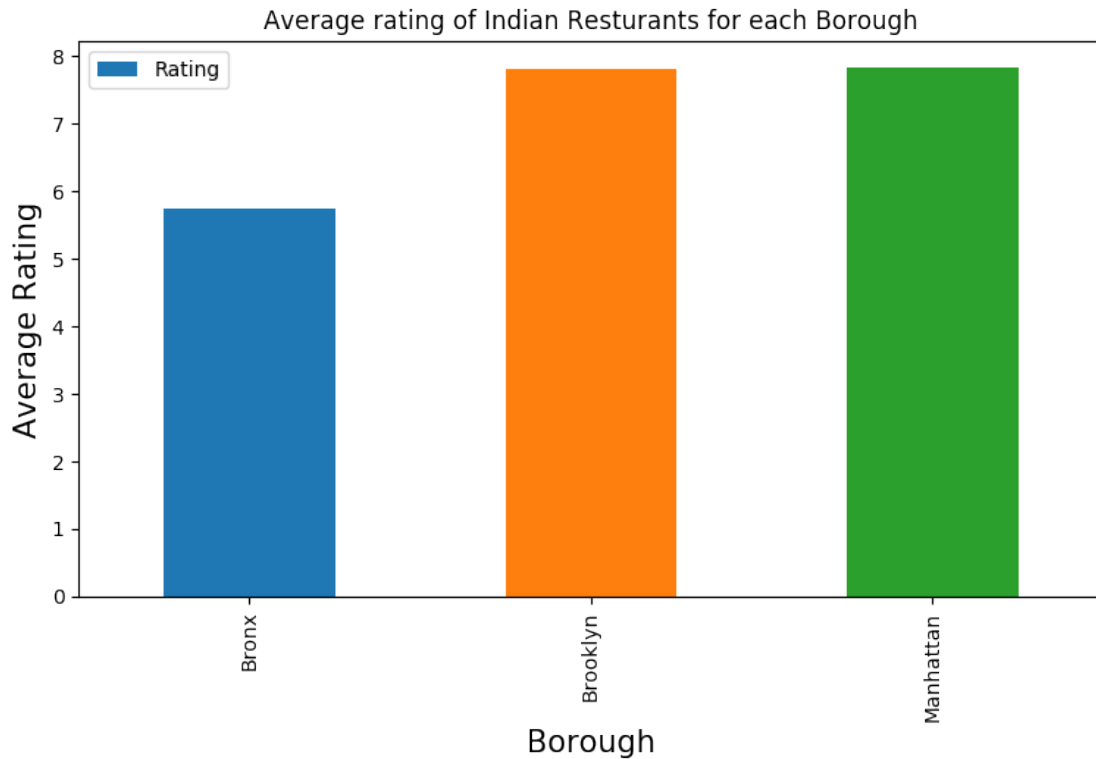
```
In [60]: ny_borough_stats=indian_rest_stats_ny.groupby('Borough',as_index=False).mean()[['Borough',
ny_borough_stats.columns=['Borough','Average Rating']
```

```
In [61]: ny_borough_stats.sort_values(['Average Rating'],ascending=False).head()
```

```
Out[61]:
```

	Borough	Average Rating
2	Manhattan	7.833333
1	Brooklyn	7.821053
0	Bronx	5.737500

```
In [49]: # Visualization
plt.figure(figsize=(9,5), dpi = 100)
# title
plt.title('Average rating of Indian Restaurants for each Borough')
#On x-axis
plt.xlabel('Borough', fontsize = 15)
#On y-axis
plt.ylabel('Average Rating', fontsize=15)
#giving a bar plot
indian_rest_stats_ny.groupby('Borough').mean()['Rating'].plot(kind='bar')
#legend
plt.legend()
#displays the plot
plt.show()
```



```
In [50]: #consider all the neighborhoods with average rating greater or equal 8.0 to visualize a
ny_neighborhood_stats=ny_neighborhood_stats[ny_neighborhood_stats['Average Rating']>=8.]
```

```
In [51]: ny_neighborhood_stats
```

```
Out[51]:
```

	Neighborhood	Average Rating
0	Bay Ridge	8.30
2	Central Harlem	8.10
3	Clinton Hill	8.25
5	East Flatbush	8.20
8	Fort Greene	8.70
13	North Side	8.50
14	Ocean Hill	8.05
19	South Side	8.50
25	Yorkville	8.50

```
In [52]: #join this dataset to original new york data to get lonitude and latitude
ny_neighborhood_stats=pd.merge(ny_neighborhood_stats,new_york_data, on='Neighborhood')
ny_neighborhood_stats=ny_neighborhood_stats[['Borough','Neighborhood','Latitude','Longitude']]
```

```
In [53]: ny_neighborhood_stats
```

```
Out[53]:
```

	Borough	Neighborhood	Latitude	Longitude	Average Rating
0	Brooklyn	Bay Ridge	40.625801	-74.030621	8.30

1	Manhattan	Central Harlem	40.815976	-73.943211	8.10
2	Brooklyn	Clinton Hill	40.693229	-73.967843	8.25
3	Brooklyn	East Flatbush	40.641718	-73.936103	8.20
4	Brooklyn	Fort Greene	40.688527	-73.972906	8.70
5	Brooklyn	North Side	40.714823	-73.958809	8.50
6	Brooklyn	Ocean Hill	40.678403	-73.913068	8.05
7	Brooklyn	South Side	40.710861	-73.958001	8.50
8	Manhattan	Yorkville	40.775930	-73.947118	8.50

```
In [54]: # Display data on map
ny_map = folium.Map(location=geo_location('New York'), zoom_start=12)
```

```
In [55]: # instantiate a feature group for the incidents in the dataframe
incidents = folium.map.FeatureGroup()

# loop through the 100 crimes and add each to the incidents feature group
for lat, lng, in ny_neighborhood_stats[['Latitude', 'Longitude']].values:
    incidents.add_child(
        folium.CircleMarker(
            [lat, lng],
            radius=10, # define how big you want the circle markers to be
            color='yellow',
            fill=True,
            fill_color='blue',
            fill_opacity=0.6
        )
    )
```

```
In [56]: ny_neighborhood_stats['Label']=ny_neighborhood_stats['Neighborhood']+', '+ny_neighborhood_stats['Rating']
```

```
In [57]: # add pop-up text to each marker on the map
for lat, lng, label in ny_neighborhood_stats[['Latitude', 'Longitude', 'Label']].values:
    folium.Marker([lat, lng], popup=label).add_to(ny_map)
# add incidents to map
ny_map.add_child(incidents)
```

```
Out[57]: <folium.folium.Map at 0x7fe9e1c5c7b8>
```

## 0.0.5 Discussion

The analysis has been carried out to list and visualize all major parts of New York City that has great indian resturants. The restaurant with varous attribues like maximum likes, rating and tips is also provided. The accuracy of data is completely depends on the data provided by FourSquare.

#### **0.0.6 Conclusion**

1. Brooklyn has the largest number of Indian Restaurants.
2. The Prospect Park South in Brooklyn has highest number of restaurants i.e 3.
3. Bay Ridge (Brooklyn), Central Harlem (Manhattan), Clinton Hill (Brooklyn) are some of the best neighborhoods for indian cuisine.
4. Manhattan and Brooklyn are the best places to stay if you prefer Indian Cuisine. Though Manhattan ranks first and Brooklyn ranks second in ranking ; the difference in their average rating is minimal i.e Manhattan is with 7.83 and Brooklyn is with 7.82.