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 it's diverse culture , comes diverse food items. There are many restaurants in New York City, each beloning 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

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

Indian resturants 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 the choropleth map.

0.0.3 Approach

- Collect the new york city data from https://cocl.us/new_york_dataset
- Using FourSquare API we will find all venues for each neighborhood.
- Filter out all venues that are Indian Resturants.
- Find rating , tips and like count for each Indian Resturants using FourSquare API.
- Using rating for each resturant , 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 the 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 you 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 = '1ZMVX2OKHBV4CKG12J5CCHE4WOENR3EUCSOYFXALLM3SJAHE'
    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 = '4IHGX34AAOMXD14JMF2Y1AWXISOVL4OW0QV2EBUNBLS2IAWF'
        CLIENT_SECRET = '1ZMVX2OKHBV4CKG12J5CCHE4WOENR3EUCSOYFXALLM3SJAHE'
        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=T

        return new_york_data
```

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

In [9]: new_york_data.head()
```

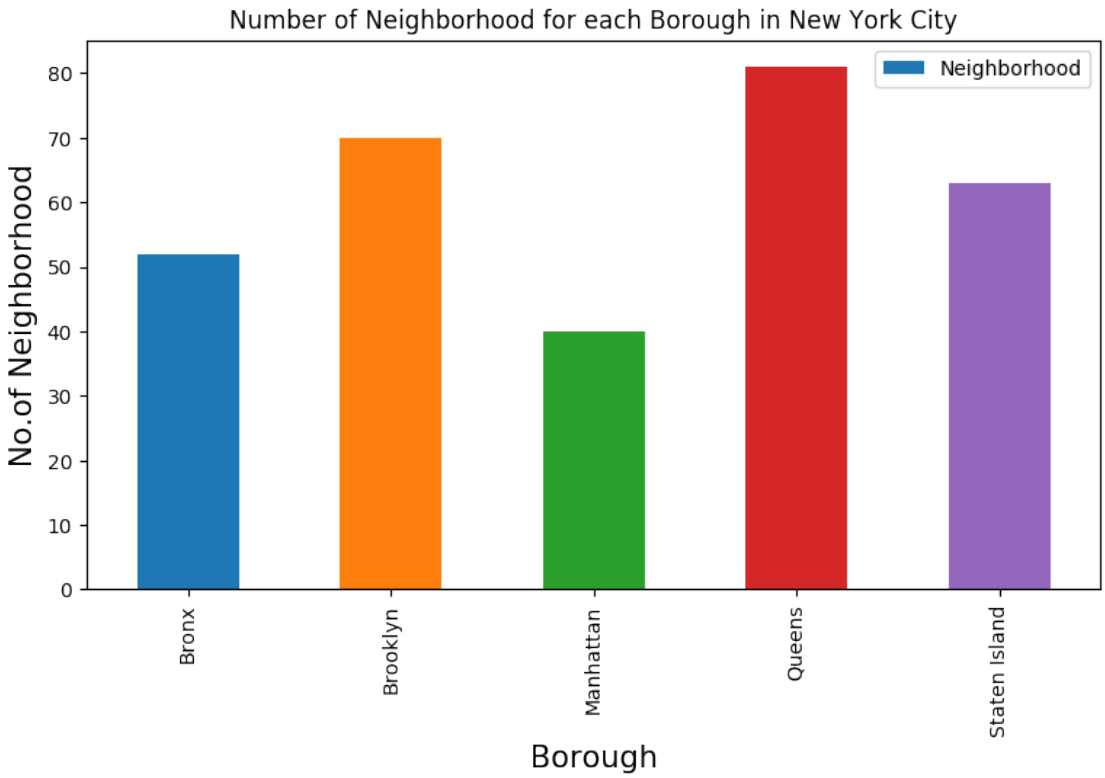
Out[9]:

	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	Name
0	Bronx	Riverdale	4c04544df423a593ac83d116	Cumin Indian Cuisine
1	Bronx	Kingsbridge	4c04544df423a593ac83d116	
2	Bronx	Woodlawn	4c0448d9310fc9b6bf1dc761	
3	Bronx	Williamsbridge	570c3a3fcd10eecd0d0434cd	
4	Bronx	Parkchester	4c194631838020a13e78e561	

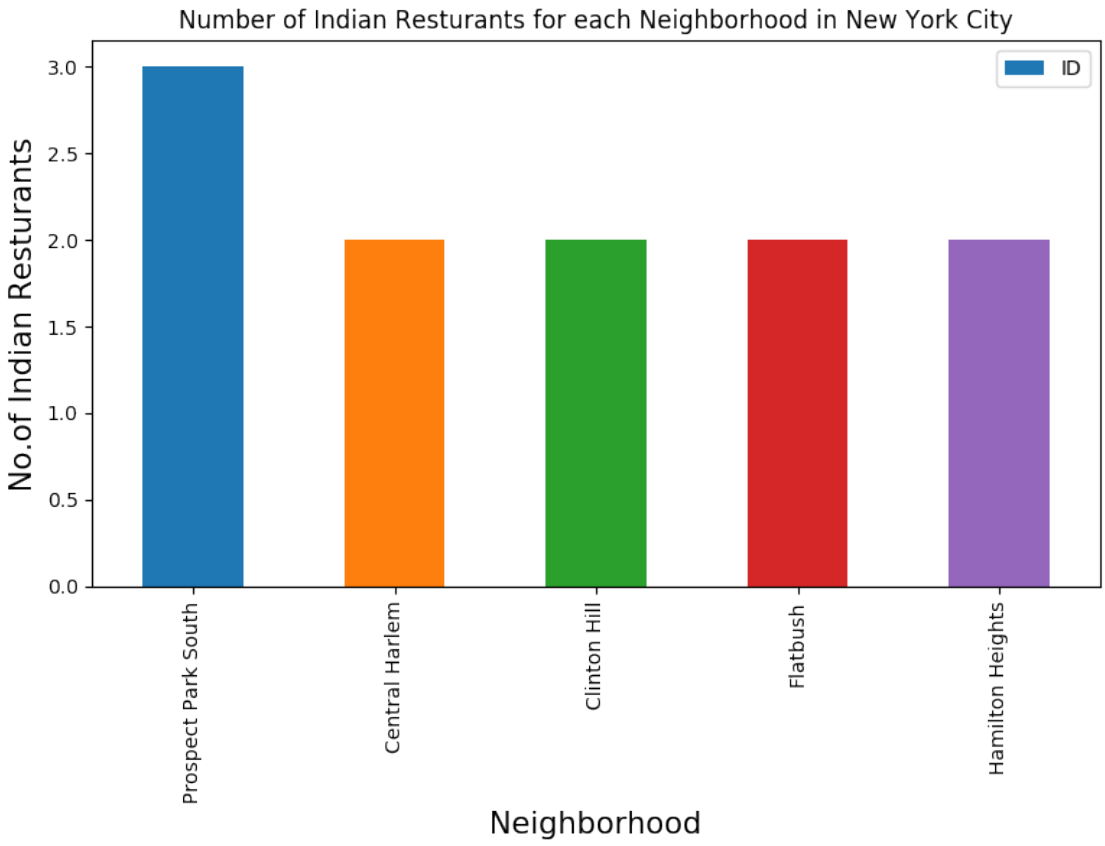
```
1          Cumin Indian Cuisine
2                   Curry Spot
3                   Agra Grill
4  Melanies Roti Bar And Grill
```

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 resturant for further analysis.
         # prepare neighborhood list that contains indian resturants
         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 resturants 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	Name	Likes	Rating	Tips
0	Bronx	Riverdale	4c04544df423a593ac83d116	Cumin Indian Cuisine	13	6.5	9
1	Bronx	Kingsbridge	4c04544df423a593ac83d116	Cumin Indian Cuisine	13	6.5	9
2	Bronx	Woodlawn	4c0448d9310fc9b6bf1dc761	Curry Spot	4	7.8	11
3	Bronx	Williamsbridge	0	0	0	0.0	0
4	Bronx	Parkchester	4c194631838020a13e78e561	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
```

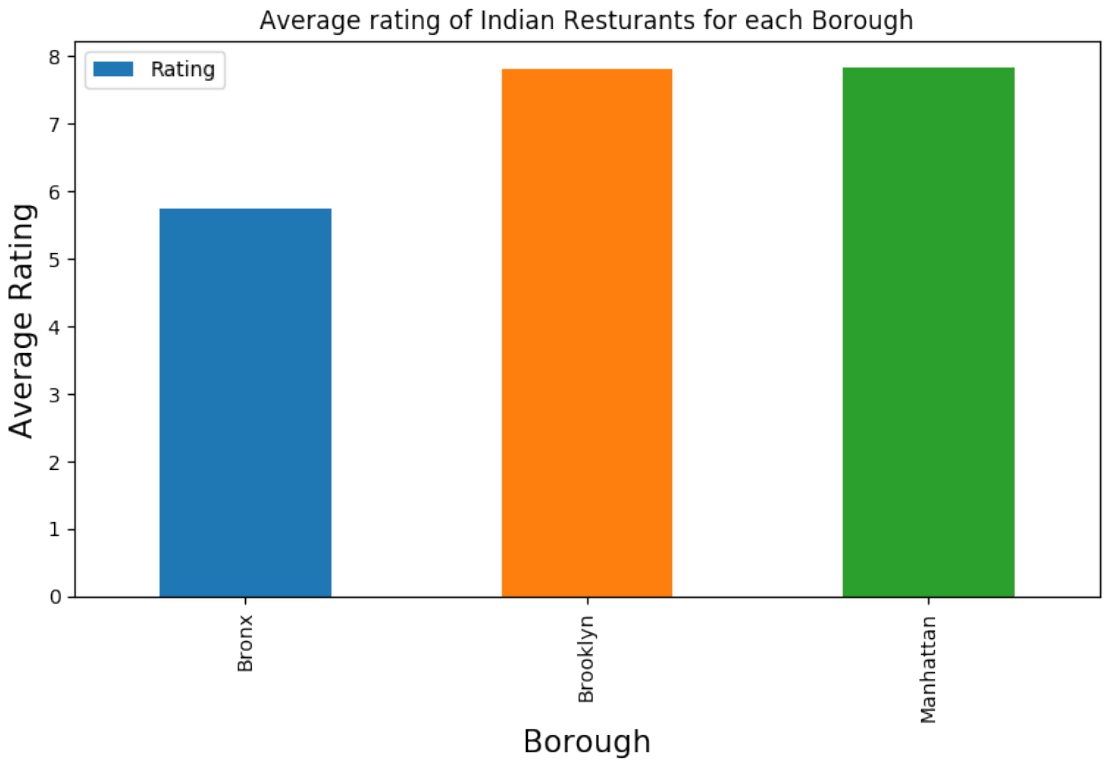
In [60]:
```
ny_borough_stats=indian_rest_stats_ny.groupby('Borough',as_index=False).mean()[['Boroug
ny_borough_stats.columns=['Borough','Average Rating']
```

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 Resturants 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 o
         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','Longi
```

```
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_neighborho
```

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 the 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 Manahttan is 7.83 and Brooklyn is 7.82.