

Capstone Project - The Battle of Neighborhoods- New York City

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 was home to nearly 8.5 million people in 2014, accounting for over 40% of the population of New York State and a slightly lower percentage of the New York metropolitan area, home to approximately 23.6 million. Over the last decade the city has been growing faster than the region. The New York region continues to be by far the leading metropolitan gateway for legal immigrants admitted into the United States.

Throughout its history, 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 as part of this project, we will list and visualize all major parts of New York City that have great Indian restaurants.

Before we get the data and start exploring it, let's download all the dependencies that we will need.

In [19]:

```
import numpy as np # library to handle data in a vectorized manner

import pandas as pd # library for data analysis
pd.set_option('display.max_columns', None)
pd.set_option('display.max_rows', None)

import json # library to handle JSON files

#!conda install -c conda-forge geopy --yes # uncomment this line if you haven't
    completed the Foursquare API lab
from geopy.geocoders import Nominatim # convert an address into latitude and lon
    gitude values

import requests # library to handle requests
from pandas.io.json import json_normalize # tranform JSON file into a pandas dat
    aframe

# Matplotlib and associated plotting modules
import matplotlib.cm as cm
import matplotlib.colors as colors
import matplotlib.pyplot as plt
%matplotlib inline

# import k-means from clustering stage
from sklearn.cluster import KMeans

#!conda install -c conda-forge folium=0.5.0 --yes # uncomment this line if you h
    aven't completed the Foursquare API lab
import folium # map rendering library

print('Libraries imported.')
```

Libraries imported.

In [20]:

```
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 [21]:

```
def get_venues(lat,lng):

    #set variables
    radius=1000
    LIMIT=100
    CLIENT_ID = 'KUZXHLSCQK0W0CY344VU3WKI4RSKPYLIBEFN21HBKND3OTJO' # your Foursq
    uare ID
    CLIENT_SECRET = 'GCX0OHJKEPVMSFS0BORTH1AWD54S1OZY0L5GX3EGBIT5JHA' # your Fo
    ursquare Secret
    VERSION = '20180605' # Foursquare API version

    #url to fetch data from foursquare api
    url = 'https://api.foursquare.com/v2/venues/explore?&client_id={}&client_sec
    ret={}&v={}&ll={},{}&radius={}&limit={}'.format(
        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 [22]:

```
def get_venue_details(venue_id):

    CLIENT_ID = 'KUZXLSCQK0W0CY344VU3WKI4RSKPYLIBEFN21HBKND3OTJO' # your Foursq
uare ID
    CLIENT_SECRET = 'GCX0OHJKEPVMSFS0BORTH1AWD54S1OZY0L5GX3EGBIT5JHA' # your Fo
ursquare Secret
    VERSION = '20180605' # Foursquare API version

    #url to fetch data from foursquare api
    url = 'https://api.foursquare.com/v2/venues/{}?&client_id={}&client_secret=
{}&v={} '.format(
        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
```

1. Download and Explore Dataset

In [23]:

```
!wget -q -O 'newyork_data.json' https://ibm.box.com/shared/static/fbpwbovar7lf8p
5sgddm06cgipa2rxpe.json
print('Data downloaded!')
```

Data downloaded!

In [24]:

```
with open('newyork_data.json') as json_data:
    newyork_data = json.load(json_data)
```

Let's take a quick look at the data.

Notice how all the relevant data is in the *features* key, which is basically a list of the neighborhoods. So, let's define a new variable that includes this data.

In [26]:

```
neighborhoods_data = newyork_data['features']
```

Let's take a look at the first item in this list.

In [27]:

```
neighborhoods_data[0]
```

Out[27]:

```
{'geometry': {'coordinates': [-73.84720052054902, 40.89470517661],  
  'type': 'Point'},  
  'geometry_name': 'geom',  
  'id': 'nyu_2451_34572.1',  
  'properties': {'annoangle': 0.0,  
    'annoline1': 'Wakefield',  
    'annoline2': None,  
    'annoline3': None,  
    'bbox': [-73.84720052054902,  
      40.89470517661,  
      -73.84720052054902,  
      40.89470517661],  
    'borough': 'Bronx',  
    'name': 'Wakefield',  
    'stacked': 1},  
  'type': 'Feature'}
```

Transform the data into a *pandas* dataframe

The next task is essentially transforming this data of nested Python dictionaries into a *pandas* dataframe. So let's start by creating an empty dataframe.

In [28]:

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

Take a look at the empty dataframe to confirm that the columns are as intended.

In [29]:

```
neighborhoods
```

Out[29]:

Borough	Neighborhood	Latitude	Longitude
---------	--------------	----------	-----------

Then let's loop through the data and fill the dataframe one row at a time.

In [30]:

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

    neighborhood_latlon = data['geometry']['coordinates']
    neighborhood_lat = neighborhood_latlon[1]
    neighborhood_lon = neighborhood_latlon[0]

    neighborhoods = neighborhoods.append({'Borough': borough,
                                          'Neighborhood': neighborhood_name,
                                          'Latitude': neighborhood_lat,
                                          'Longitude': neighborhood_lon}, ignore
                                          _index=True)
```

Quickly examine the resulting dataframe.

In [31]:

```
neighborhoods.head()
```

Out[31]:

	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

And make sure that the dataset has all 5 boroughs and 306 neighborhoods.

In [32]:

```
print('The dataframe has {} boroughs and {} neighborhoods.'.format(
    len(neighborhoods['Borough'].unique()),
    neighborhoods.shape[0]
))
```

The dataframe has 5 boroughs and 306 neighborhoods.

So there are total of 306 different Neighborhoods in New York

In [33]:

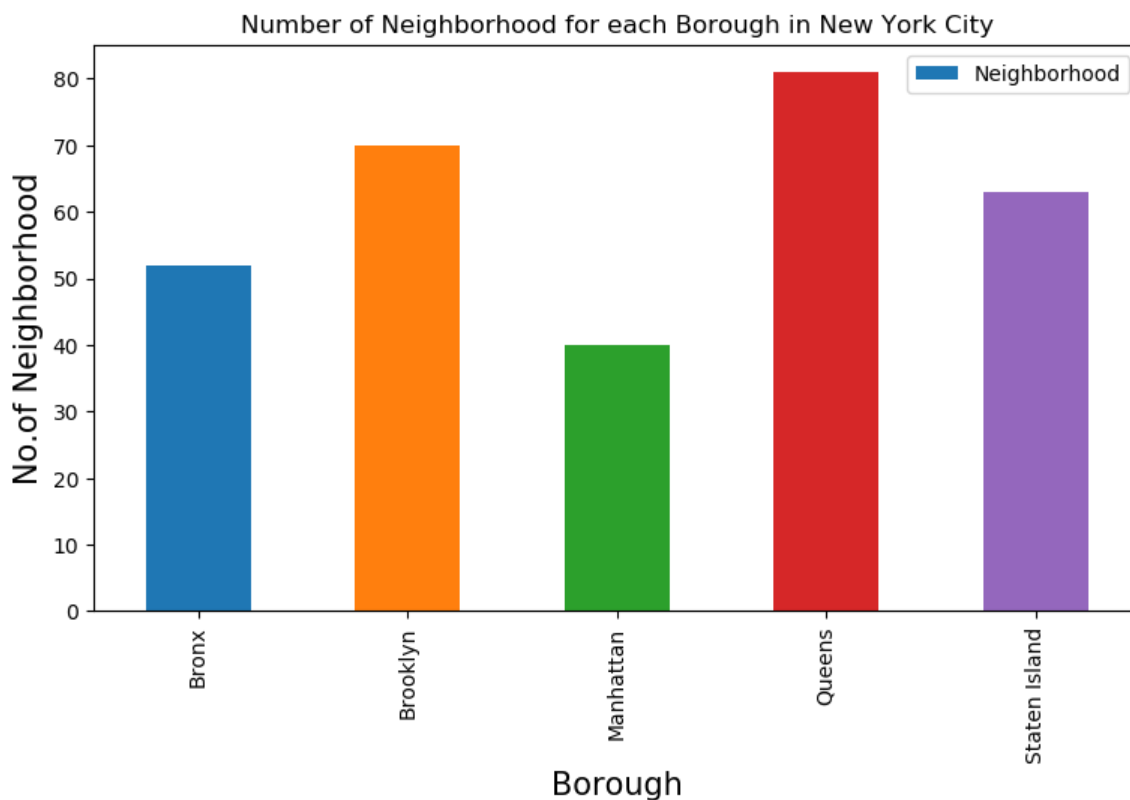
```
address = 'New York City, NY'

geolocator = Nominatim(user_agent="ny_explorer")
location = geolocator.geocode(address)
latitude = location.latitude
longitude = location.longitude
print('The geograpical coordinate of New York City are {}, {}'.format(latitude, longitude))
```

The geograpical coordinate of New York City are 40.7127281, -74.0060152.

In [34]:

```
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
neighborhoods.groupby('Borough')['Neighborhood'].count().plot(kind='bar')
#legend
plt.legend()
#displays the plot
plt.show()
```



Use geopy library to get the latitude and longitude values of New York City.

In order to define an instance of the geocoder, we need to define a `user_agent`. We will name our agent *ny_explorer*, as shown below.

In [35]:

[illegible]

(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:0
(6 / 306) Indian Resturants in Kingsbridge, Bronx:0
(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:2
(46 / 306) Indian Resturants in Edenwald, Bronx:0
(47 / 306) Indian Resturants in Bay Ridge, Brooklyn:2
(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:1
 (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:1
 (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, Brookly
 n:1
 (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:2
 (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:1
 (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
 (110 / 306) Indian Resturants in Lenox Hill, Manhattan:0
 (111 / 306) Indian Resturants in Roosevelt Island, Manhattan:1
 (112 / 306) Indian Resturants in Upper West Side, Manhattan:3
 (113 / 306) Indian Resturants in Lincoln Square, Manhattan:0
 (114 / 306) Indian Resturants in Clinton, Manhattan:0
 (115 / 306) Indian Resturants in Midtown, Manhattan:1
 (116 / 306) Indian Resturants in Murray Hill, Manhattan:1
 (117 / 306) Indian Resturants in Chelsea, Manhattan:1
 (118 / 306) Indian Resturants in Greenwich Village, Manhattan:0
 (119 / 306) Indian Resturants in East Village, Manhattan:0
 (120 / 306) Indian Resturants in Lower East Side, Manhattan:0
 (121 / 306) Indian Resturants in Tribeca, Manhattan:1

(122 / 306) Indian Resturants in Little Italy, Manhattan:0
(123 / 306) Indian Resturants in Soho, Manhattan:0
(124 / 306) Indian Resturants in West Village, Manhattan:1
(125 / 306) Indian Resturants in Manhattan Valley, Manhattan:5
(126 / 306) Indian Resturants in Morningside Heights, Manhattan:2
(127 / 306) Indian Resturants in Gramercy, Manhattan:3
(128 / 306) Indian Resturants in Battery Park City, Manhattan:0
(129 / 306) Indian Resturants in Financial District, Manhattan:1
(130 / 306) Indian Resturants in Astoria, Queens:1
(131 / 306) Indian Resturants in Woodside, Queens:6
(132 / 306) Indian Resturants in Jackson Heights, Queens:5
(133 / 306) Indian Resturants in Elmhurst, Queens:1
(134 / 306) Indian Resturants in Howard Beach, Queens:0
(135 / 306) Indian Resturants in Corona, Queens:0
(136 / 306) Indian Resturants in Forest Hills, Queens:0
(137 / 306) Indian Resturants in Kew Gardens, Queens:2
(138 / 306) Indian Resturants in Richmond Hill, Queens:7
(139 / 306) Indian Resturants in Flushing, Queens:0
(140 / 306) Indian Resturants in Long Island City, Queens:2
(141 / 306) Indian Resturants in Sunnyside, Queens:1
(142 / 306) Indian Resturants in East Elmhurst, Queens:0
(143 / 306) Indian Resturants in Maspeth, Queens:0
(144 / 306) Indian Resturants in Ridgewood, Queens:1
(145 / 306) Indian Resturants in Glendale, Queens:0
(146 / 306) Indian Resturants in Rego Park, Queens:1
(147 / 306) Indian Resturants in Woodhaven, Queens:0
(148 / 306) Indian Resturants in Ozone Park, Queens:0
(149 / 306) Indian Resturants in South Ozone Park, Queens:1
(150 / 306) Indian Resturants in College Point, Queens:0
(151 / 306) Indian Resturants in Whitestone, Queens:0
(152 / 306) Indian Resturants in Bayside, Queens:3
(153 / 306) Indian Resturants in Auburndale, Queens:0
(154 / 306) Indian Resturants in Little Neck, Queens:0
(155 / 306) Indian Resturants in Douglaston, Queens:0
(156 / 306) Indian Resturants in Glen Oaks, Queens:4
(157 / 306) Indian Resturants in Bellerose, Queens:0
(158 / 306) Indian Resturants in Kew Gardens Hills, Queens:1
(159 / 306) Indian Resturants in Fresh Meadows, Queens:1
(160 / 306) Indian Resturants in Briarwood, Queens:3
(161 / 306) Indian Resturants in Jamaica Center, Queens:6
(162 / 306) Indian Resturants in Oakland Gardens, Queens:0
(163 / 306) Indian Resturants in Queens Village, Queens:0
(164 / 306) Indian Resturants in Hollis, Queens:0
(165 / 306) Indian Resturants in South Jamaica, Queens:0
(166 / 306) Indian Resturants in St. Albans, Queens:0
(167 / 306) Indian Resturants in Rochdale, Queens:0
(168 / 306) Indian Resturants in Springfield Gardens, Queens:0
(169 / 306) Indian Resturants in Cambria Heights, Queens:0
(170 / 306) Indian Resturants in Rosedale, Queens:0
(171 / 306) Indian Resturants in Far Rockaway, Queens:0
(172 / 306) Indian Resturants in Broad Channel, Queens:0
(173 / 306) Indian Resturants in Breezy Point, Queens:0
(174 / 306) Indian Resturants in Steinway, Queens:1
(175 / 306) Indian Resturants in Beechhurst, Queens:0
(176 / 306) Indian Resturants in Bay Terrace, Queens:0
(177 / 306) Indian Resturants in Edgemere, Queens:0
(178 / 306) Indian Resturants in Arverne, Queens:0
(179 / 306) Indian Resturants in Rockaway Beach, Queens:0
(180 / 306) Indian Resturants in Neponsit, Queens:0
(181 / 306) Indian Resturants in Murray Hill, Queens:0
(182 / 306) Indian Resturants in Floral Park, Queens:8

(183 / 306) Indian Resturants in Holliswood, Queens:1
 (184 / 306) Indian Resturants in Jamaica Estates, Queens:3
 (185 / 306) Indian Resturants in Queensboro Hill, Queens:1
 (186 / 306) Indian Resturants in Hillcrest, Queens:0
 (187 / 306) Indian Resturants in Ravenswood, Queens:1
 (188 / 306) Indian Resturants in Lindenwood, Queens:0
 (189 / 306) Indian Resturants in Laurelton, Queens:0
 (190 / 306) Indian Resturants in Lefrak City, Queens:0
 (191 / 306) Indian Resturants in Belle Harbor, Queens:0
 (192 / 306) Indian Resturants in Rockaway Park, Queens:0
 (193 / 306) Indian Resturants in Somerville, Queens:0
 (194 / 306) Indian Resturants in Brookville, Queens:0
 (195 / 306) Indian Resturants in Bellaire, Queens:0
 (196 / 306) Indian Resturants in North Corona, Queens:0
 (197 / 306) Indian Resturants in Forest Hills Gardens, Queens:1
 (198 / 306) Indian Resturants in St. George, Staten Island:0
 (199 / 306) Indian Resturants in New Brighton, Staten Island:1
 (200 / 306) Indian Resturants in Stapleton, Staten Island:0
 (201 / 306) Indian Resturants in Rosebank, Staten Island:0
 (202 / 306) Indian Resturants in West Brighton, Staten Island:0
 (203 / 306) Indian Resturants in Grymes Hill, Staten Island:0
 (204 / 306) Indian Resturants in Todt Hill, Staten Island:0
 (205 / 306) Indian Resturants in South Beach, Staten Island:0
 (206 / 306) Indian Resturants in Port Richmond, Staten Island:0
 (207 / 306) Indian Resturants in Mariner's Harbor, Staten Island:0
 (208 / 306) Indian Resturants in Port Ivory, Staten Island:0
 (209 / 306) Indian Resturants in Castleton Corners, Staten Island:0
 0
 (210 / 306) Indian Resturants in New Springville, Staten Island:0
 (211 / 306) Indian Resturants in Travis, Staten Island:0
 (212 / 306) Indian Resturants in New Dorp, Staten Island:1
 (213 / 306) Indian Resturants in Oakwood, Staten Island:0
 (214 / 306) Indian Resturants in Great Kills, Staten Island:0
 (215 / 306) Indian Resturants in Eltingville, Staten Island:0
 (216 / 306) Indian Resturants in Annadale, Staten Island:0
 (217 / 306) Indian Resturants in Woodrow, Staten Island:0
 (218 / 306) Indian Resturants in Tottenville, Staten Island:0
 (219 / 306) Indian Resturants in Tompkinsville, Staten Island:1
 (220 / 306) Indian Resturants in Silver Lake, Staten Island:0
 (221 / 306) Indian Resturants in Sunnyside, Staten Island:0
 (222 / 306) Indian Resturants in Ditmas Park, Brooklyn:3
 (223 / 306) Indian Resturants in Wingate, Brooklyn:0
 (224 / 306) Indian Resturants in Rugby, Brooklyn:0
 (225 / 306) Indian Resturants in Park Hill, Staten Island:0
 (226 / 306) Indian Resturants in Westerleigh, Staten Island:0
 (227 / 306) Indian Resturants in Graniteville, Staten Island:0
 (228 / 306) Indian Resturants in Arlington, Staten Island:0
 (229 / 306) Indian Resturants in Arrochar, Staten Island:0
 (230 / 306) Indian Resturants in Grasmere, Staten Island:0
 (231 / 306) Indian Resturants in Old Town, Staten Island:0
 (232 / 306) Indian Resturants in Dongan Hills, Staten Island:0
 (233 / 306) Indian Resturants in Midland Beach, Staten Island:0
 (234 / 306) Indian Resturants in Grant City, Staten Island:1
 (235 / 306) Indian Resturants in New Dorp Beach, Staten Island:0
 (236 / 306) Indian Resturants in Bay Terrace, Staten Island:0
 (237 / 306) Indian Resturants in Huguenot, Staten Island:0
 (238 / 306) Indian Resturants in Pleasant Plains, Staten Island:0
 (239 / 306) Indian Resturants in Butler Manor, Staten Island:0
 (240 / 306) Indian Resturants in Charleston, Staten Island:0
 (241 / 306) Indian Resturants in Rossville, Staten Island:0
 (242 / 306) Indian Resturants in Arden Heights, Staten Island:0

(243 / 306) Indian Resturants in Greenridge, Staten Island:0
(244 / 306) Indian Resturants in Heartland Village, Staten Island:
0
(245 / 306) Indian Resturants in Chelsea, Staten Island:0
(246 / 306) Indian Resturants in Bloomfield, Staten Island:0
(247 / 306) Indian Resturants in Bulls Head, Staten Island:0
(248 / 306) Indian Resturants in Carnegie Hill, Manhattan:1
(249 / 306) Indian Resturants in Noho, Manhattan:0
(250 / 306) Indian Resturants in Civic Center, Manhattan:1
(251 / 306) Indian Resturants in Midtown South, Manhattan:1
(252 / 306) Indian Resturants in Richmond Town, Staten Island:0
(253 / 306) Indian Resturants in Shore Acres, Staten Island:0
(254 / 306) Indian Resturants in Clifton, Staten Island:0
(255 / 306) Indian Resturants in Concord, Staten Island:0
(256 / 306) Indian Resturants in Emerson Hill, Staten Island:0
(257 / 306) Indian Resturants in Randall Manor, Staten Island:0
(258 / 306) Indian Resturants in Howland Hook, Staten Island:0
(259 / 306) Indian Resturants in Elm Park, Staten Island:0
(260 / 306) Indian Resturants in Remsen Village, Brooklyn:0
(261 / 306) Indian Resturants in New Lots, Brooklyn:0
(262 / 306) Indian Resturants in Paerdegat Basin, Brooklyn:0
(263 / 306) Indian Resturants in Mill Basin, Brooklyn:0
(264 / 306) Indian Resturants in Jamaica Hills, Queens:6
(265 / 306) Indian Resturants in Utopia, Queens:0
(266 / 306) Indian Resturants in Pomonok, Queens:0
(267 / 306) Indian Resturants in Astoria Heights, Queens:0
(268 / 306) Indian Resturants in Claremont Village, Bronx:0
(269 / 306) Indian Resturants in Concourse Village, Bronx:1
(270 / 306) Indian Resturants in Mount Eden, Bronx:0
(271 / 306) Indian Resturants in Mount Hope, Bronx:0
(272 / 306) Indian Resturants in Sutton Place, Manhattan:3
(273 / 306) Indian Resturants in Hunters Point, Queens:1
(274 / 306) Indian Resturants in Turtle Bay, Manhattan:4
(275 / 306) Indian Resturants in Tudor City, Manhattan:2
(276 / 306) Indian Resturants in Stuyvesant Town, Manhattan:0
(277 / 306) Indian Resturants in Flatiron, Manhattan:0
(278 / 306) Indian Resturants in Sunnyside Gardens, Queens:1
(279 / 306) Indian Resturants in Blissville, Queens:1
(280 / 306) Indian Resturants in Fulton Ferry, Brooklyn:0
(281 / 306) Indian Resturants in Vinegar Hill, Brooklyn:0
(282 / 306) Indian Resturants in Weeksville, Brooklyn:0
(283 / 306) Indian Resturants in Broadway Junction, Brooklyn:0
(284 / 306) Indian Resturants in Dumbo, Brooklyn:0
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(298 / 306) Indian Resturants in Bronxdale, Bronx:0
(299 / 306) Indian Resturants in Allerton, Bronx:0
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(302 / 306) Indian Resturants in Hudson Yards, Manhattan:0

```
( 303 / 306 ) Indian Resturants in Hammels, Queens:0
( 304 / 306 ) Indian Resturants in Bayswater, Queens:0
( 305 / 306 ) Indian Resturants in Queensbridge, Queens:2
( 306 / 306 ) Indian Resturants in Fox Hills, Staten Island:0
```

In [36]:

```
indian_rest_ny.head()
```

Out[36]:

	Borough	Neighborhood	ID	Name
0	Bronx	Woodlawn	4c0448d9310fc9b6bf1dc761	Curry Spot
1	Bronx	Williamsbridge	570c3a3fcd10eecd0d0434cd	Agra Grill
2	Bronx	Parkchester	4c194631838020a13e78e561	Melanies Roti Bar And Grill
3	Bronx	Spuyten Duyvil	4c04544df423a593ac83d116	Cumin Indian Cuisine
4	Bronx	Concourse	551b7f75498e86c00a0ed2e1	Hungry Bird

In [37]:

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

In [38]:

```
indian_rest_ny.shape
```

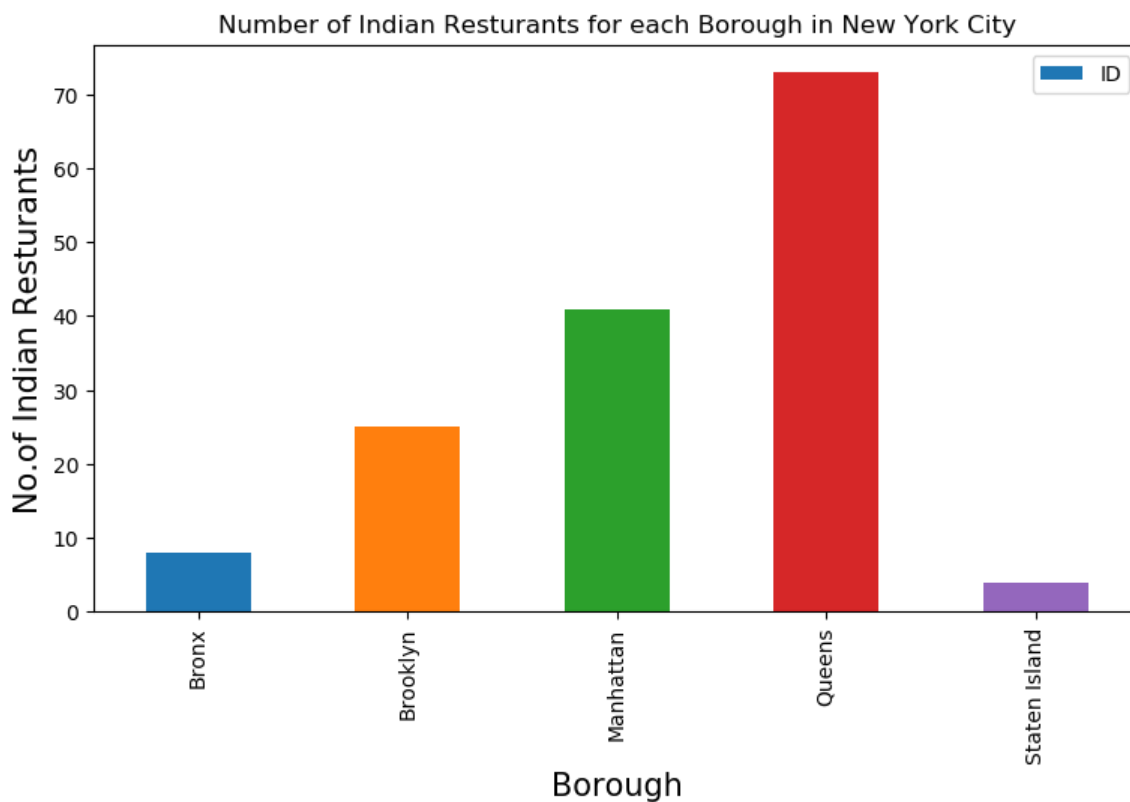
Out[38]:

```
(151, 4)
```

We got 151 Indian Resturants across New York City

In [39]:

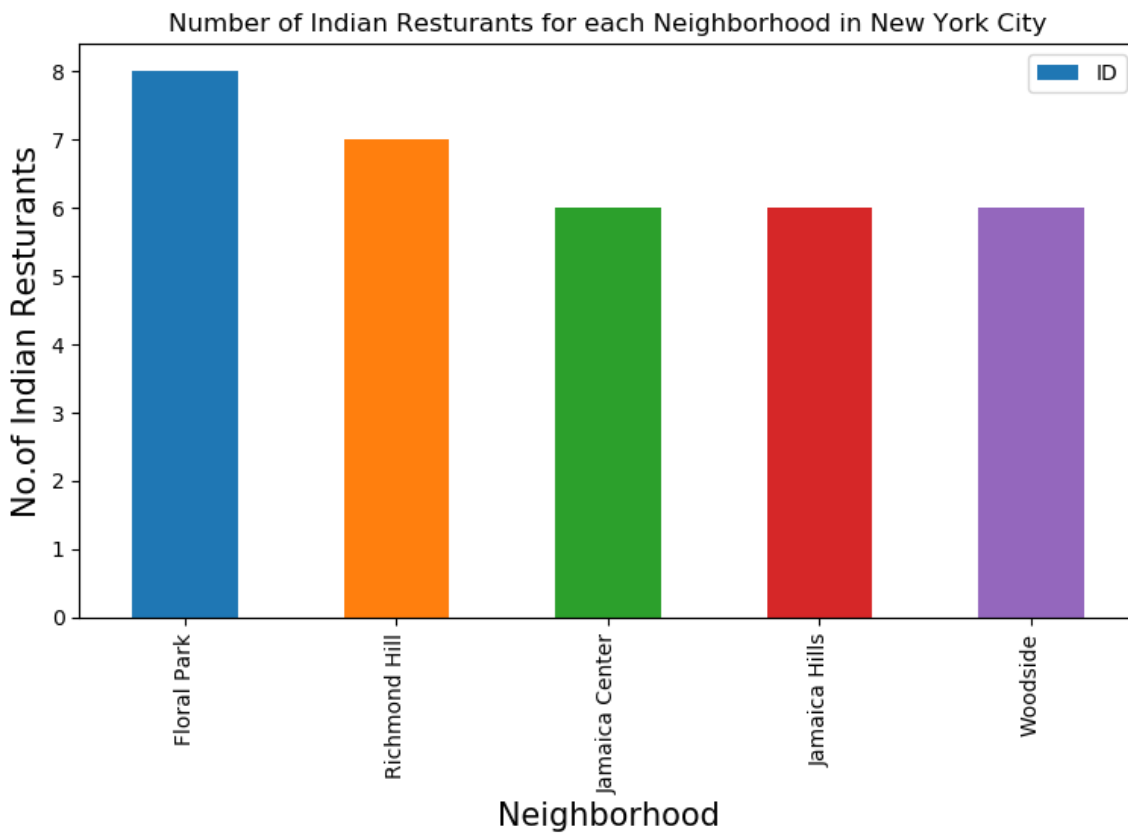
```
plt.figure(figsize=(9,5), dpi = 100)
# title
plt.title('Number of Indian Resturants for each Borough in New York City')
#On x-axis
plt.xlabel('Borough', fontsize = 15)
#On y-axis
plt.ylabel('No.of Indian Resturants', fontsize=15)
#giving a bar plot
indian_rest_ny.groupby('Borough')['ID'].count().plot(kind='bar')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



We see that Queens has the largest number of indian resturants

In [40]:

```
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 [41]:

```
indian_rest_ny[indian_rest_ny['Neighborhood']=='Floral Park']
```

Out[41]:

	Borough	Neighborhood	ID	Name
104	Queens	Floral Park	527ffc0811d2d329d5e49abd	Jackson Diner
105	Queens	Floral Park	4e4e3e22bd4101d0d7a5c2d1	Kerala Kitchen
106	Queens	Floral Park	4b647b56f964a520c4b62ae3	Usha Foods & Usha Sweets
107	Queens	Floral Park	4b787c49f964a5209cd12ee3	Santoor Indian Restaurant
108	Queens	Floral Park	4c0c01e0bbc676b00d6b4cd5	Mumbai Xpress
109	Queens	Floral Park	4c76ff35a5676dcb72671721	Flavor Of India
110	Queens	Floral Park	4df0f39dd4c04d0392c853ea	Sagar Chinese
111	Queens	Floral Park	4e6bfe1c7d8b2c711b17bbe5	Surya sweets and snacks

So Floral Park in Queens has the highest number of Indian Resturants with a total count of 8.

Now we will get the ranking of each resturant for further analysis.

[illegible]

```

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6.2      2
( 3 / 151 ) processed

ID      Name  Likes  Rating  Tips
0  4c04544df423a593ac83d116  Cumin Indian Cuisine      13      6.2
9
( 4 / 151 ) processed

ID      Name  Likes  Rating  Tips
0  551b7f75498e86c00a0ed2e1  Hungry Bird      8      7.6      3
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0  564d283d498e6e851df79d87  Great Indian Curry      3      6.7      2
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ID      Name  Likes  Rating  Tips
0  512a9ea9e4b004fb8eeb84e5  Silver Krust      12      8.4      3
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0  4db0f4371e729fcc56497f20  Mashallah      19      7.4      7
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ID      Name  Likes  Rating  Tips
0  4b718914f964a520c04b2de3  Madina Restaurant and Sweets      16
6.9      12
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ID      Name  Likes  Rating  Tips
0  5631511b498e3d6d7e0a4df0  Tikka Indian Grill      93      8.8     25
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ID      Name  Likes  Rating  Tips

```

```

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0 52f18573498ec2c34e830ffd Kanan's Indian Restaurant 22 7.
7 7
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0 4bb93b70cf2fc9b6fe64a002 Gandhi Fine Indian Cuisine 79
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0 4f6cae2ee4b0d4a5afcef5c0 Delhi Heights 22 8.2 8
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7.6

Tips
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ating \				
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7.6				

Tips

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ating \				
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7.6				

Tips

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256					

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ips					
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0 539e27b0498e2eba582085ee masalabox 7 6.4 2
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0 4b787c49f964a5209cd12ee3 Santoor Indian Restaurant 36 7.
8 17
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3 7.6
Tips
0 5
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(98 / 151) processed

	ID	Name	Likes	Rating	Tips
0	4c434b2bd691c9b6ef8f8f0a	Sagar Restaurant	10	7.3	6

(99 / 151) processed

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Tips				

0	4b647b56f964a520c4b62ae3	Usha Foods & Usha Sweets	31	7.9
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(117 / 151) processed

	ID	Name	Likes	Rating	Tips
0	5623f6f9498e5a44a08bfae8	Boishakhi Restaurant	17	8.3	7

(118 / 151) processed

	ID	Name	Likes	Rating	Tips
0	4f188adfe4b0cae4b525a694	Haveli	14	7.4	9

(119 / 151) processed

	ID	Name	Likes	Rating	Tips
0	4b9be038f964a520393036e3	Dosa Garden	18	7.7	17

(120 / 151) processed

	ID	Name	Likes	Rating	Tips
0	4be74a502468c928505a0243	Taste Of India II	29	8.1	14

(121 / 151) processed

	ID	Name	Likes	Rating	Tips
0	4b9be038f964a520393036e3	Dosa Garden	18	7.7	17

(122 / 151) processed

	ID	Name	Likes	Rating	Tips
0	519ff6c8498e1300ddcbd45c	Anarkali Indian Cuisine	14	7.8	8

(123 / 151) processed

	ID	Name	Likes	Rating	Tips
0	4db0f4371e729fcc56497f20	Mashallah	19	7.4	7

(124 / 151) processed

	ID	Name	Likes	Rating	Tips
0	564d283d498e6e851df79d87	Great Indian Curry	3	6.7	2

(125 / 151) processed

	ID	Name	Likes	Rating	Tips
0	4be74a502468c928505a0243	Taste Of India II	29	8.1	14

(126 / 151) processed

	ID	Name	Likes	Rating	Tips
0	5272ca4511d22488f6895caf	Drunken Munkey	203	8.4	61

(127 / 151) processed

	ID	Name	Likes	Rating	Tips
0	4bbb9dbded7776b0elad3e51	Tamarind TriBeCa	571	9.0	142

(128 / 151) processed

```

                                ID              Name  Likes  Rating  T
ips
0  49d91c12f964a520015e1fe3  The Kati Roll Company      824      8.8
256
( 129 / 151 ) processed
                                ID              Name  Likes  Rating  Tips
0  4bad49a0f964a52041423be3  Annam Brahma          15      8.3      3
( 130 / 151 ) processed
                                ID              Name  Likes  Rating  Tips
0  4c434b2bd691c9b6ef8f8f0a  Sagar Restaurant      10      7.3      6
( 131 / 151 ) processed
                                ID              Name  Likes  Rating  Tips
0  4cc08b0900d83704ed474b5c  Sybil's Bakery         7      6.7      3
( 132 / 151 ) processed
Empty DataFrame
Columns: [ID, Name, Likes, Rating, Tips]
Index: []
No data available for id= 59fcbd4edb1d813e71197d23
( 133 / 151 ) processed
Empty DataFrame
Columns: [ID, Name, Likes, Rating, Tips]
Index: []
No data available for id= 4cb4a712db32f04dcb5adf4d
( 134 / 151 ) processed
Empty DataFrame
Columns: [ID, Name, Likes, Rating, Tips]
Index: []
No data available for id= 5b00c131b399f7002c0d0d6b
( 135 / 151 ) processed
                                ID              Name  Likes  Rating  Tips
0  551b7f75498e86c00a0ed2e1  Hungry Bird            8      7.6      3
( 136 / 151 ) processed
                                ID              Name  Likes  R
ating \
0  4a63bfb4f964a520b3c51fe3  Chola Eclectic Indian Cuisine      149
8.3

Tips
0  56
( 137 / 151 ) processed
                                ID              Name  Likes  Rating  Tips
0  4fe4fb50c2eee335e4fea69d  Moti Mahal Delux      178      8.5      79
( 138 / 151 ) processed
                                ID              Name  Likes  Rating  T
ips
0  4f57f98fe4b0bd50f6bb8b31  The Kati Roll Company      180      8.4
55
( 139 / 151 ) processed
                                ID              Name  Likes  Rating  Tips
0  5a862df5356b493fcd8a10e5  DesiBowl                6      7.5      1
( 140 / 151 ) processed
                                ID              Name  Likes  Rating  T
ips
0  59fcd48c464d6567ed2f5e37  The Kati Roll Company      15      8.8
2
( 141 / 151 ) processed
                                ID  Name  Likes  Rating  Tips
0  4a5b660df964a52015bb1fe3  Amma          98      8.1      65
( 142 / 151 ) processed
                                ID  Name  Likes  Rating  Tips
0  5ac3984ae57ca64be4dc6168  INDAY         29      8.1      8

```

```
( 143 / 151 ) processed
                                ID                Name  Likes  Rating  T
ips
0  4f57f98fe4b0bd50f6bb8b31  The Kati Roll Company    180    8.4
55
( 144 / 151 ) processed
                                ID                Name  Likes  Rating  T
ips
0  59fcd48c464d6567ed2f5e37  The Kati Roll Company    15    8.8
2
( 145 / 151 ) processed
                                ID  Name  Likes  Rating  Tips
0  5ac3984ae57ca64be4dc6168  INDAY    29    8.1    8
( 146 / 151 ) processed
                                ID                Name  Likes  Rating  Tips
0  4c48da9f3013a59356c5f0e1  Saffron Garden    17    7.8    16
( 147 / 151 ) processed
                                ID  Name  Likes  Rating  Tips
0  5b931ea69d7468002c3b1382  Adda    82    9.1    23
( 148 / 151 ) processed
                                ID                Name  Likes  Rating  Tips
0  564d283d498e6e851df79d87  Great Indian Curry    3    6.7    2
( 149 / 151 ) processed
                                ID                Name  Likes  Rating  Ti
ps
0  50a287a7e4b0033f830f06db  Raj's Indian Kitchen    21    7.4
9
( 150 / 151 ) processed
                                ID                Name  Likes  Rating  Tips
0  4b1b341bf964a5208af923e3  Five Star Banquet    29    6.8    31
( 151 / 151 ) processed
```

In [43]:

```
indian_rest_stats_ny.head()
```

Out[43]:

	Borough	Neighborhood	ID	Name	Likes	Rating	Tips
0	Bronx	Woodlawn	4c0448d9310fc9b6bf1dc761	Curry Spot	4	7.8	10
1	Bronx	Williamsbridge	0	0	0	0.0	0
2	Bronx	Parkchester	4c194631838020a13e78e561	Melanies Roti Bar And Grill	3	6.2	2
3	Bronx	Spuyten Duyvil	4c04544df423a593ac83d116	Cumin Indian Cuisine	13	6.2	9
4	Bronx	Concourse	551b7f75498e86c00a0ed2e1	Hungry Bird	8	7.6	3

In [44]:

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

In [45]:

```
indian_rest_stats_ny.shape
```

Out[45]:

```
(151, 7)
```

In [46]:

```
indian_rest_ny.shape
```

Out[46]:

```
(151, 4)
```

In [47]:

```
indian_rest_stats_ny.info()
```

```
<class 'pandas.core.frame.DataFrame'>
RangeIndex: 151 entries, 0 to 150
Data columns (total 7 columns):
Borough      151 non-null object
Neighborhood  151 non-null object
ID            151 non-null object
Name          151 non-null object
Likes         151 non-null object
Rating        151 non-null float64
Tips          151 non-null object
dtypes: float64(1), object(6)
memory usage: 8.3+ KB
```

We see that values like Likes, Tips are strig values. We would need to convert them into float for further analysis

In [48]:

```
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 [49]:

```
# Resturant with maximum Likes
indian_rest_stats_ny.iloc[indian_rest_stats_ny['Likes'].idxmax()]
```

Out[49]:

```
Borough      Manhattan
Neighborhood  Midtown
ID            49d91c12f964a520015elfe3
Name          The Kati Roll Company
Likes         824
Rating        8.8
Tips          256
Name: 41, dtype: object
```

In [50]:

```
# Resturant with maximum Rating
indian_rest_stats_ny.iloc[indian_rest_stats_ny['Rating'].idxmax()]
```

Out[50]:

Borough	Queens
Neighborhood	Long Island City
ID	5b931ea69d7468002c3b1382
Name	Adda
Likes	82
Rating	9.1
Tips	23

Name: 80, dtype: object

In [51]:

```
# Resturant with maximum Tips
indian_rest_stats_ny.iloc[indian_rest_stats_ny['Tips'].idxmax()]
```

Out[51]:

Borough	Manhattan
Neighborhood	Midtown
ID	49d91c12f964a520015e1fe3
Name	The Kati Roll Company
Likes	824
Rating	8.8
Tips	256

Name: 41, dtype: object

Now lets visualize neighborhood with maximum average rating of resturants

In [52]:

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

In [53]:

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

Out[53]:

	Neighborhood	Average Rating
64	Sunnyside	9.1
3	Blissville	9.1
68	Tribeca	9.0
9	Civic Center	9.0
0	Astoria	8.9
74	West Village	8.9
76	Williamsburg	8.8
61	South Side	8.8
48	North Side	8.8
45	Murray Hill	8.8

Above are the top neighborhoods with top average rating of Indian restaurants

In [54]:

```
ny_borough_stats=indian_rest_stats_ny.groupby('Borough',as_index=False).mean()[['Borough','Rating']]
ny_borough_stats.columns=['Borough','Average Rating']
ny_borough_stats.sort_values(['Average Rating'],ascending=False).head()
```

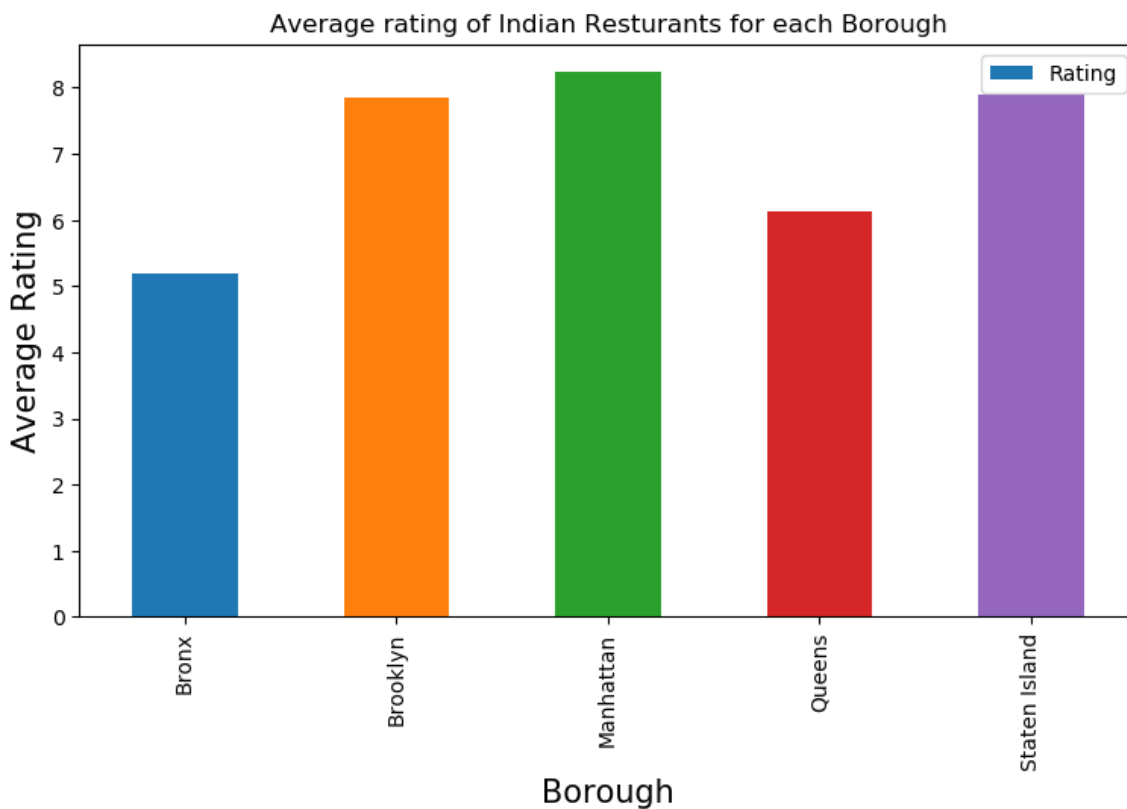
Out[54]:

	Borough	Average Rating
2	Manhattan	8.241463
4	Staten Island	7.900000
1	Brooklyn	7.844000
3	Queens	6.141096
0	Bronx	5.200000

Similarly these are the average rating of Indian Restaurants for each Borough

In [55]:

```
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()
```



We will consider all the neighborhoods with average rating greater or equal 9.0 to visualize on map

In [56]:

```
ny_neighborhood_stats=ny_neighborhood_stats[ny_neighborhood_stats['Average Rating']>=9.0]
```

In [57]:

```
ny_neighborhood_stats
```

Out[57]:

	Neighborhood	Average Rating
3	Blissville	9.1
9	Civic Center	9.0
64	Sunnyside	9.1
68	Tribeca	9.0

In [59]:

```
ny_neighborhood_stats=pd.merge(ny_neighborhood_stats,neighborhoods, on='Neighborhood')
```

In [60]:

```
ny_neighborhood_stats=ny_neighborhood_stats[['Borough','Neighborhood','Latitude','Longitude','Average Rating']]
```

In [61]:

```
ny_neighborhood_stats
```

Out[61]:

	Borough	Neighborhood	Latitude	Longitude	Average Rating
0	Queens	Blissville	40.737251	-73.932442	9.1
1	Manhattan	Civic Center	40.715229	-74.005415	9.0
2	Queens	Sunnyside	40.740176	-73.926916	9.1
3	Staten Island	Sunnyside	40.612760	-74.097126	9.1
4	Manhattan	Tribeca	40.721522	-74.010683	9.0

In [62]:

```
# create map and display it  
ny_map = folium.Map(location=geo_location('New York'), zoom_start=12)
```

In [63]:

```
# 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 [64]:

```
ny_neighborhood_stats['Label']=ny_neighborhood_stats['Neighborhood']+', '+ny_nei
ghborhood_stats['Borough']+' ('+ny_neighborhood_stats['Average Rating'].map(str)+
')
```

In [65]:

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

Out[65]:



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