

# Capstone Final Project

## Problem Description

Where is the best location to establish a new halal restaurant in NY City?

## Background

There are approximately 700,000 Muslims in NY City. Practicing Muslims adhere to 'halal' dietary restrictions. The word 'halal' in arabic translates casually as 'acceptable'. A more formal extensior is meat that has been hand-slaughtered with delicate precision in an ethical manner meant to minimize suffering for the animal and according to the religious teachings of Muslim beliefs. In other b Since a majority of delis, restaurants, and franchises do not observe these requirements by default, this severely limits the options available for the 'halal' consumer. In this project, we'll analyze halal restaurant catering to the 'halal' demographic based on existing demand and popularity found in our data set.

## Data

Our primary dataset sources used to analyze this problem include:

- [https://cod.us/new\\_york\\_dataset/https://cod.us/new\\_york\\_dataset/](https://cod.us/new_york_dataset/https://cod.us/new_york_dataset/)
  - Used to capture and filter NYC district neighborhoods and borough information
- Foursquare API
  - Used to query, sort, and rank relevant venue data in the area.

The two sets of data will be analyzed, integrated, overlayed, and visualized to determine potential solutions to our problem.

## Methodology

```
In [1]: #Install Libraries

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
from geopy.geocoders import Nominatim # convert an address into latitude and longitude values

!conda install -c conda-forge folium
import os
import folium # map rendering library

# Matplotlib and associated plotting modules

import matplotlib.pyplot as plt
import matplotlib.cm as cm
import matplotlib.colors as colors
import matplotlib as mp
import re
import csv
%matplotlib inline

print('Libraries imported.')
```

Solving environment: done

## Package Plan ##

environment location: /opt/conda/envs/Python36

added / updated specs:

- folium

The following packages will be downloaded:

package	build		
folium-0.11.0	py_0	61 KB	conda-forge
ca-certificates-2020.6.20	hecd8079_0	145 KB	conda-forge
openssl-1.1.1g	h516909a_1	2.1 MB	conda-forge
certifi-2020.6.20	py36h9f8ad1d_0	151 KB	conda-forge
branca-0.4.1	py_0	26 KB	conda-forge
python_abi-3.6	1_cp36m	4 KB	conda-forge
Total:		2.5 MB	

The following NEW packages will be INSTALLED:

branca:	0.4.1-py_0	conda-forge
folium:	0.11.0-py_0	conda-forge
python_abi:	3.6.1_cp36m	conda-forge

The following packages will be UPDATED:

certifi:	2020.6.20-py36_0	--> 2020.6.20-py36h9f8ad1d_0	conda-forge
openssl:	1.1.1g-h7b6447c_0	--> 1.1.1g-h516909a_1	conda-forge

The following packages will be DOWNGRADED:

ca-certificates:	2020.7.22-0	--> 2020.6.20-hecd8079_0	conda-forge
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Downloading and Extracting Packages

folium-0.11.0	61 KB		100%
ca-certificates-2020	145 KB		100%
openssl-1.1.1g	2.1 MB		100%
certifi-2020.6.20	151 KB		100%
branca-0.4.1	26 KB		100%
python_abi-3.6	4 KB		100%

Preparing transaction: done  
Verifying transaction: done  
Executing transaction: done  
Libraries imported.

## Get City and Venue data respectively in NYC

```
In [3]: #NYC Data from FourSquare

def geo_location(address):
    # get geo location of address
    geolocator = Nominatim(user_agent="my_explorer")
    location = geolocator.geocode(address)
    latitude = location.latitude
    longitude = location.longitude
    return latitude, longitude
```

In [66]: #Top 100 results within 1000 metres from lat-lon

```
def get_venues(lat,lng):

    #set variables
    radius=1000
    LIMIT=100
    CLIENT_ID = 'D2PD3BA1FC3LC1004042H8IM6XJY0WDAYUQ1Z5BKDAN43RQ2'# Foursquare ID, note there is a daily call quota limit
    CLIENT_SECRET = '4NfCKQGL5QDP5QGUB3HXASAEAV2H9KUSN8YMS1Z1QNDIYD' # Foursquare Secret, note there is a daily call quota it
    VERSION = '20200905' # Foursquare API version

    #url to fetch data from foursquare api
    url = 'https://api.foursquare.com/v2/venues/explore?&client_id={}&client_secret={}&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 [67]: #Get Venue Details for Rankings

```
def get_venue_details(venue_id):

    CLIENT_ID = 'D2PD3BA1F3CL180404ZHN1MAK7Y0MDAYUQ1Z5BKDAM3RQ2'# Foursquare ID, note there is a daily call quota limit
    CLIENT_SECRET = '4NFCXQQLGSDQSPGGB3HMA5AEAV2HMKUSM8VMS1Z1QNDIYD' # Foursquare Secret, note there is a daily call quota if it
    VERSION = '20280905' # 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
```

In [68]: #Define NYC function with Location data

```
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_lation = data['geometry']['coordinates']
        neighborhood_lat = neighborhood_lation[1]
        neighborhood_lon = neighborhood_lation[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 [69]: # get NY Data  
new\_york\_data=get\_new\_york\_data()  
new\_york\_data.head()

Out[69]:

	Borough	Neighborhood	Latitude	Longitude
0	Bronx	Wakefield	40.894705	-73.847201
1	Bronx	Co-op City	40.874294	-73.829939
2	Bronx	Eastchester	40.887566	-73.827806
3	Bronx	Fieldston	40.895437	-73.905643
4	Bronx	Riverdale	40.890834	-73.912585

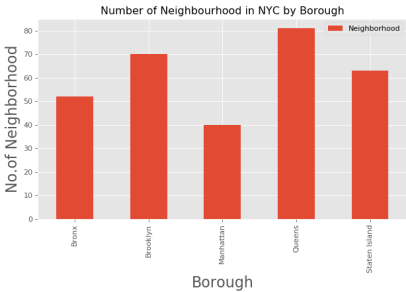
In [70]: new\_york\_data.shape  
Out[70]: (386, 4)

Analyze Potential Site Locations by Boroughs

```
In [71]: #Total Neighborhoods in NYC by Borough

from matplotlib import pyplot as plt
plt.style.use('ggplot')

plt.figure(figsize=(9,5), dpi = 80)
# title
plt.title('Number of Neighbourhood in NYC by Borough')
#On x-axis
plt.xlabel('Borough', fontsize = 20)
#On y-axis
plt.ylabel('No. of Neighbourhood', fontsize=20)
#giving a bar plot
new_york_data.groupby('Borough')['Neighborhood'].count().plot(kind='bar')
#legend
plt.legend()
plt.show()
```



Query Existing Halal Restaurant Locations in NYC

```
In [173]: # Find neighborhoods with Halal restaurant

column_names=['Borough', 'Neighborhood', 'ID','Name']
halal_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)
    halal_restaurants=venues[venues['category']=='Halal Restaurant']
    print('({},{})'.format(count,len(new_york_data)), 'Halal Restaurants in '+Neighborhood+', '+Borough+':'+str(len(halal_restaurants)))
    for restaurant_detail in halal_restaurants.values.tolist():
        id, name , category=restaurant_detail
        halal_rest_ny = halal_rest_ny.append({'Borough': Borough,
        'Neighborhood': Neighborhood,
        'ID': id,
        'Name': name
        }, ignore_index=True)

    count+=1

( 1 / 386 ) Halal Resturants in Wakefield, Bronx:0
( 2 / 386 ) Halal Resturants in Co-op City, Bronx:0
( 3 / 386 ) Halal Resturants in Eastchester, Bronx:0
( 4 / 386 ) Halal Resturants in Fieldston, Bronx:0
( 5 / 386 ) Halal Resturants in Riverdale, Bronx:0
( 6 / 386 ) Halal Resturants in Kingsbridge, Bronx:0
( 7 / 386 ) Halal Resturants in Marble Hill, Manhattan:0
( 8 / 386 ) Halal Resturants in Woodlawn, Bronx:0
( 9 / 386 ) Halal Resturants in Norwood, Bronx:0
( 10 / 386 ) Halal Resturants in Williamsbridge, Bronx:0
( 11 / 386 ) Halal Resturants in Baychester, Bronx:0
( 12 / 386 ) Halal Resturants in Pelham Parkway, Bronx:0
( 13 / 386 ) Halal Resturants in City Island, Bronx:0
( 14 / 386 ) Halal Resturants in Bedford Park, Bronx:0
( 15 / 386 ) Halal Resturants in University Heights, Bronx:0
( 16 / 386 ) Halal Resturants in Morris Heights, Bronx:0
( 17 / 386 ) Halal Resturants in Fordham, Bronx:0
( 18 / 386 ) Halal Resturants in East Tremont, Bronx:0
( 19 / 386 ) Halal Resturants in West Farms, Bronx:0
( 20 / 386 ) Halal Resturants in High Bridge, Bronx:0
( 21 / 386 ) Halal Resturants in Melrose, Bronx:0
```

( 22 / 386 ) Halal Resturants in Mott Haven, Bronx:0  
( 23 / 386 ) Halal Resturants in Port Morris, Bronx:0  
( 24 / 386 ) Halal Resturants in Longwood, Bronx:0  
( 25 / 386 ) Halal Resturants in Hunts Point, Bronx:0  
( 26 / 386 ) Halal Resturants in Morrisania, Bronx:0  
( 27 / 386 ) Halal Resturants in Soundview, Bronx:0  
( 28 / 386 ) Halal Resturants in Clason Point, Bronx:0  
( 29 / 386 ) Halal Resturants in Throgs Neck, Bronx:0  
( 30 / 386 ) Halal Resturants in Country Club, Bronx:0  
( 31 / 386 ) Halal Resturants in Parkchester, Bronx:0  
( 32 / 386 ) Halal Resturants in Westchester Square, Bronx:0  
( 33 / 386 ) Halal Resturants in Van Nest, Bronx:0  
( 34 / 386 ) Halal Resturants in Morris Park, Bronx:0  
( 35 / 386 ) Halal Resturants in Belmont, Bronx:0  
( 36 / 386 ) Halal Resturants in Spuyten Duyvil, Bronx:0  
( 37 / 386 ) Halal Resturants in North Riverdale, Bronx:0  
( 38 / 386 ) Halal Resturants in Pelham Bay, Bronx:0  
( 39 / 386 ) Halal Resturants in Schuylerville, Bronx:0  
( 40 / 386 ) Halal Resturants in Edgewater Park, Bronx:0  
( 41 / 386 ) Halal Resturants in Castle Hill, Bronx:0  
( 42 / 386 ) Halal Resturants in Olmville, Bronx:0  
( 43 / 386 ) Halal Resturants in Pelham Gardens, Bronx:0  
( 44 / 386 ) Halal Resturants in Concourse, Bronx:0  
( 45 / 386 ) Halal Resturants in Unionport, Bronx:0  
( 46 / 386 ) Halal Resturants in Edgemond, Bronx:0  
( 47 / 386 ) Halal Resturants in Bay Ridge, Brooklyn:1  
( 48 / 386 ) Halal Resturants in Bensonhurst, Brooklyn:0  
( 49 / 386 ) Halal Resturants in Sunset Park, Brooklyn:0  
( 50 / 386 ) Halal Resturants in Greenpoint, Brooklyn:0  
( 51 / 386 ) Halal Resturants in Gravesend, Brooklyn:0  
( 52 / 386 ) Halal Resturants in Brighton Beach, Brooklyn:0  
( 53 / 386 ) Halal Resturants in Sheepshead Bay, Brooklyn:0  
( 54 / 386 ) Halal Resturants in Manhattan Terrace, Brooklyn:1  
( 55 / 386 ) Halal Resturants in Flatbush, Brooklyn:1  
( 56 / 386 ) Halal Resturants in Crown Heights, Brooklyn:0  
( 57 / 386 ) Halal Resturants in East Flatbush, Brooklyn:0  
( 58 / 386 ) Halal Resturants in Kensington, Brooklyn:0  
( 59 / 386 ) Halal Resturants in Windsor Terrace, Brooklyn:0  
( 60 / 386 ) Halal Resturants in Prospect Heights, Brooklyn:0  
( 61 / 386 ) Halal Resturants in Brownsville, Brooklyn:0  
( 62 / 386 ) Halal Resturants in Williamsburg, Brooklyn:0  
( 63 / 386 ) Halal Resturants in Bushwick, Brooklyn:0  
( 64 / 386 ) Halal Resturants in Bedford Stuyvesant, Brooklyn:0  
( 65 / 386 ) Halal Resturants in Brooklyn Heights, Brooklyn:0  
( 66 / 386 ) Halal Resturants in Cobble Hill, Brooklyn:0  
( 67 / 386 ) Halal Resturants in Carroll Gardens, Brooklyn:0  
( 68 / 386 ) Halal Resturants in Red Hook, Brooklyn:0  
( 69 / 386 ) Halal Resturants in Gowanus, Brooklyn:0  
( 70 / 386 ) Halal Resturants in Fort Greene, Brooklyn:0  
( 71 / 386 ) Halal Resturants in Park Slope, Brooklyn:0  
( 72 / 386 ) Halal Resturants in Cypress Hills, Brooklyn:0  
( 73 / 386 ) Halal Resturants in East New York, Brooklyn:0  
( 74 / 386 ) Halal Resturants in Starrett City, Brooklyn:0  
( 75 / 386 ) Halal Resturants in Canarsie, Brooklyn:0  
( 76 / 386 ) Halal Resturants in Flatlands, Brooklyn:0  
( 77 / 386 ) Halal Resturants in Mill Island, Brooklyn:0  
( 78 / 386 ) Halal Resturants in Manhattan Beach, Brooklyn:0  
( 79 / 386 ) Halal Resturants in Coney Island, Brooklyn:0  
( 80 / 386 ) Halal Resturants in Bath Beach, Brooklyn:0  
( 81 / 386 ) Halal Resturants in Borough Park, Brooklyn:0  
( 82 / 386 ) Halal Resturants in Dyker Heights, Brooklyn:1  
( 83 / 386 ) Halal Resturants in Gerritsen Beach, Brooklyn:0  
( 84 / 386 ) Halal Resturants in Marine Park, Brooklyn:0  
( 85 / 386 ) Halal Resturants in Clinton Hill, Brooklyn:0  
( 86 / 386 ) Halal Resturants in Sea Gate, Brooklyn:0  
( 87 / 386 ) Halal Resturants in Downtown, Brooklyn:0  
( 88 / 386 ) Halal Resturants in Boerum Hill, Brooklyn:0  
( 89 / 386 ) Halal Resturants in Prospect Lefferts Gardens, Brooklyn:0  
( 90 / 386 ) Halal Resturants in Ocean Hill, Brooklyn:0  
( 91 / 386 ) Halal Resturants in City Line, Brooklyn:0  
( 92 / 386 ) Halal Resturants in Bergen Beach, Brooklyn:0  
( 93 / 386 ) Halal Resturants in Midwood, Brooklyn:0  
( 94 / 386 ) Halal Resturants in Prospect Park South, Brooklyn:0  
( 95 / 386 ) Halal Resturants in Georgetown, Brooklyn:0  
( 96 / 386 ) Halal Resturants in East Williamsburg, Brooklyn:0  
( 97 / 386 ) Halal Resturants in North Side, Brooklyn:0  
( 98 / 386 ) Halal Resturants in South Side, Brooklyn:0  
( 99 / 386 ) Halal Resturants in Ocean Parkway, Brooklyn:1  
( 100 / 386 ) Halal Resturants in Fort Hamilton, Brooklyn:1  
( 101 / 386 ) Halal Resturants in Chinatown, Manhattan:0  
( 102 / 386 ) Halal Resturants in Washington Heights, Manhattan:0  
( 103 / 386 ) Halal Resturants in Inwood, Manhattan:0  
( 104 / 386 ) Halal Resturants in Hamilton Heights, Manhattan:0  
( 105 / 386 ) Halal Resturants in Manhattanville, Manhattan:0  
( 106 / 386 ) Halal Resturants in Central Harlem, Manhattan:0  
( 107 / 386 ) Halal Resturants in East Harlem, Manhattan:0  
( 108 / 386 ) Halal Resturants in Upper East Side, Manhattan:0  
( 109 / 386 ) Halal Resturants in Yorkville, Manhattan:0  
( 110 / 386 ) Halal Resturants in Lenox Hill, Manhattan:0  
( 111 / 386 ) Halal Resturants in Roosevelt Island, Manhattan:0  
( 112 / 386 ) Halal Resturants in Upper West Side, Manhattan:0  
( 113 / 386 ) Halal Resturants in Lincoln Square, Manhattan:0  
( 114 / 386 ) Halal Resturants in Clinton, Manhattan:0  
( 115 / 386 ) Halal Resturants in Midtown, Manhattan:0  
( 116 / 386 ) Halal Resturants in Murray Hill, Manhattan:0  
( 117 / 386 ) Halal Resturants in Chelsea, Manhattan:0  
( 118 / 386 ) Halal Resturants in Greenwich Village, Manhattan:0  
( 119 / 386 ) Halal Resturants in East Village, Manhattan:0  
( 120 / 386 ) Halal Resturants in Lower East Side, Manhattan:0  
( 121 / 386 ) Halal Resturants in Tribeca, Manhattan:0  
( 122 / 386 ) Halal Resturants in Little Italy, Manhattan:0  
( 123 / 386 ) Halal Resturants in Soho, Manhattan:0  
( 124 / 386 ) Halal Resturants in West Village, Manhattan:0  
( 125 / 386 ) Halal Resturants in Manhattan Valley, Manhattan:0  
( 126 / 386 ) Halal Resturants inorningside Heights, Manhattan:0  
( 127 / 386 ) Halal Resturants in Gramercy, Manhattan:1  
( 128 / 386 ) Halal Resturants in Battery Park City, Manhattan:0  
( 129 / 386 ) Halal Resturants in Financial District, Manhattan:0  
( 130 / 386 ) Halal Resturants in Astoria, Queens:0  
( 131 / 386 ) Halal Resturants in Woodside, Queens:0  
( 132 / 386 ) Halal Resturants in Jackson Heights, Queens:0  
( 133 / 386 ) Halal Resturants in Elmhurst, Queens:0  
( 134 / 386 ) Halal Resturants in Howard Beach, Queens:0  
( 135 / 386 ) Halal Resturants in Corona, Queens:0  
( 136 / 386 ) Halal Resturants in Forest Hills, Queens:0  
( 137 / 386 ) Halal Resturants in Kew Gardens, Queens:0  
( 138 / 386 ) Halal Resturants in Richmond Hill, Queens:0  
( 139 / 386 ) Halal Resturants in Flushing, Queens:0  
( 140 / 386 ) Halal Resturants in Long Island City, Queens:0  
( 141 / 386 ) Halal Resturants in Sunnyside, Queens:0  
( 142 / 386 ) Halal Resturants in East Elmhurst, Queens:0  
( 143 / 386 ) Halal Resturants in Maspeth, Queens:0  
( 144 / 386 ) Halal Resturants in Ridgewood, Queens:0  
( 145 / 386 ) Halal Resturants in Glendale, Queens:0  
( 146 / 386 ) Halal Resturants in Rego Park, Queens:0  
( 147 / 386 ) Halal Resturants in Woodhaven, Queens:0  
( 148 / 386 ) Halal Resturants in Ozone Park, Queens:0  
( 149 / 386 ) Halal Resturants in South Ozone Park, Queens:0  
( 150 / 386 ) Halal Resturants in College Point, Queens:0  
( 151 / 386 ) Halal Resturants in Whitestone, Queens:0  
( 152 / 386 ) Halal Resturants in Bayside, Queens:0  
( 153 / 386 ) Halal Resturants in Auburndale, Queens:0  
( 154 / 386 ) Halal Resturants in Little Neck, Queens:0  
( 155 / 386 ) Halal Resturants in Douglaston, Queens:0  
( 156 / 386 ) Halal Resturants in Glen Oaks, Queens:0  
( 157 / 386 ) Halal Resturants in Bellerose, Queens:1  
( 158 / 386 ) Halal Resturants in Kew Gardens Hills, Queens:0  
( 159 / 386 ) Halal Resturants in Fresh Meadows, Queens:0  
( 160 / 386 ) Halal Resturants in Briarwood, Queens:0  
( 161 / 386 ) Halal Resturants in Jamaica Center, Queens:1  
( 162 / 386 ) Halal Resturants in Oakland Gardens, Queens:0  
( 163 / 386 ) Halal Resturants in Queens Village, Queens:0  
( 164 / 386 ) Halal Resturants in Hollis, Queens:0  
( 165 / 386 ) Halal Resturants in South Jamaica, Queens:0  
( 166 / 386 ) Halal Resturants in St. Albans, Queens:0  
( 167 / 386 ) Halal Resturants in Rochdale, Queens:0  
( 168 / 386 ) Halal Resturants in Springfield Gardens, Queens:0  
( 169 / 386 ) Halal Resturants in Cambria Heights, Queens:0  
( 170 / 386 ) Halal Resturants in Rosedale, Queens:0  
( 171 / 386 ) Halal Resturants in Far Rockaway, Queens:0  
( 172 / 386 ) Halal Resturants in Broad Channel, Queens:0  
( 173 / 386 ) Halal Resturants in Breezy Point, Queens:0  
( 174 / 386 ) Halal Resturants in Steinway, Queens:0  
( 175 / 386 ) Halal Resturants in Beechhurst, Queens:0  
( 176 / 386 ) Halal Resturants in Bay Terrace, Queens:0  
( 177 / 386 ) Halal Resturants in Edgemere, Queens:0  
( 178 / 386 ) Halal Resturants in Arverne, Queens:0  
( 179 / 386 ) Halal Resturants in Rockaway Beach, Queens:0  
( 180 / 386 ) Halal Resturants in Neponsit, Queens:0  
( 181 / 386 ) Halal Resturants in Murray Hill, Queens:0  
( 182 / 386 ) Halal Resturants in Floral Park, Queens:1  
( 183 / 386 ) Halal Resturants in Holliswood, Queens:0  
( 184 / 386 ) Halal Resturants in Jamaica Estates, Queens:1  
( 185 / 386 ) Halal Resturants in Queensboro Hill, Queens:0  
( 186 / 386 ) Halal Resturants in Hillcrest, Queens:0  
( 187 / 386 ) Halal Resturants in Ravenswood, Queens:0  
( 188 / 386 ) Halal Resturants in Lindenwood, Queens:0  
( 189 / 386 ) Halal Resturants in Laurelton, Queens:0  
( 190 / 386 ) Halal Resturants in Leffrak City, Queens:0  
( 191 / 386 ) Halal Resturants in Belle Harbor, Queens:0  
( 192 / 386 ) Halal Resturants in Rockaway Park, Queens:0  
( 193 / 386 ) Halal Resturants in Somerville, Queens:0  
( 194 / 386 ) Halal Resturants in Brookville, Queens:0  
( 195 / 386 ) Halal Resturants in Bellaire, Queens:0  
( 196 / 386 ) Halal Resturants in North Corona, Queens:0

( 197 / 386 ) Halal Resturants in Forest Hills Gardens, Queens:0  
( 198 / 386 ) Halal Resturants in St. George, Staten Island:0  
( 199 / 386 ) Halal Resturants in New Brighton, Staten Island:0  
( 200 / 386 ) Halal Resturants in Stapleton, Staten Island:0  
( 201 / 386 ) Halal Resturants in Rosebank, Staten Island:0  
( 202 / 386 ) Halal Resturants in West Brighton, Staten Island:0  
( 203 / 386 ) Halal Resturants in Grymes Hill, Staten Island:0  
( 204 / 386 ) Halal Resturants in Todt Hill, Staten Island:0  
( 205 / 386 ) Halal Resturants in South Beach, Staten Island:0  
( 206 / 386 ) Halal Resturants in Port Richmond, Staten Island:0  
( 207 / 386 ) Halal Resturants in Mariner's Harbor, Staten Island:0  
( 208 / 386 ) Halal Resturants in Port Ivory, Staten Island:0  
( 209 / 386 ) Halal Resturants in Castleton Corners, Staten Island:0  
( 210 / 386 ) Halal Resturants in New Springville, Staten Island:0  
( 211 / 386 ) Halal Resturants in Travis, Staten Island:0  
( 212 / 386 ) Halal Resturants in New Dorp, Staten Island:0  
( 213 / 386 ) Halal Resturants in Oakwood, Staten Island:0  
( 214 / 386 ) Halal Resturants in Great Kills, Staten Island:0  
( 215 / 386 ) Halal Resturants in Eltingville, Staten Island:0  
( 216 / 386 ) Halal Resturants in Annadale, Staten Island:0  
( 217 / 386 ) Halal Resturants in Woodrow, Staten Island:0  
( 218 / 386 ) Halal Resturants in Tottenville, Staten Island:0  
( 219 / 386 ) Halal Resturants in Tompkinsville, Staten Island:0  
( 220 / 386 ) Halal Resturants in Silver Lake, Staten Island:0  
( 221 / 386 ) Halal Resturants in Sunnyside, Staten Island:0  
( 222 / 386 ) Halal Resturants in Ditmas Park, Brooklyn:0  
( 223 / 386 ) Halal Resturants in Kingate, Brooklyn:0  
( 224 / 386 ) Halal Resturants in Rugby, Brooklyn:0  
( 225 / 386 ) Halal Resturants in Park Hill, Staten Island:0  
( 226 / 386 ) Halal Resturants in Westerleigh, Staten Island:0  
( 227 / 386 ) Halal Resturants in Graniteville, Staten Island:0  
( 228 / 386 ) Halal Resturants in Arlington, Staten Island:0  
( 229 / 386 ) Halal Resturants in Arrochar, Staten Island:0  
( 230 / 386 ) Halal Resturants in Grasmere, Staten Island:0  
( 231 / 386 ) Halal Resturants in Old Town, Staten Island:0  
( 232 / 386 ) Halal Resturants in Dongan Hills, Staten Island:0  
( 233 / 386 ) Halal Resturants in Midland Beach, Staten Island:0  
( 234 / 386 ) Halal Resturants in Grant City, Staten Island:0  
( 235 / 386 ) Halal Resturants in New Dorp Beach, Staten Island:0  
( 236 / 386 ) Halal Resturants in Bay Terrace, Staten Island:0  
( 237 / 386 ) Halal Resturants in Huguenot, Staten Island:0  
( 238 / 386 ) Halal Resturants in Pleasant Plains, Staten Island:0  
( 239 / 386 ) Halal Resturants in Butler Manor, Staten Island:0  
( 240 / 386 ) Halal Resturants in Charleston, Staten Island:0  
( 241 / 386 ) Halal Resturants in Rossville, Staten Island:0  
( 242 / 386 ) Halal Resturants in Arden Heights, Staten Island:0  
( 243 / 386 ) Halal Resturants in Greenridge, Staten Island:0  
( 244 / 386 ) Halal Resturants in Heartland Village, Staten Island:0  
( 245 / 386 ) Halal Resturants in Chelsea, Staten Island:0  
( 246 / 386 ) Halal Resturants in Bloomfield, Staten Island:0  
( 247 / 386 ) Halal Resturants in Bulls Head, Staten Island:0  
( 248 / 386 ) Halal Resturants in Carnegie Hill, Manhattan:0  
( 249 / 386 ) Halal Resturants in Noho, Manhattan:0  
( 250 / 386 ) Halal Resturants in Civic Center, Manhattan:0  
( 251 / 386 ) Halal Resturants in Midtown South, Manhattan:0  
( 252 / 386 ) Halal Resturants in Richmond Town, Staten Island:0  
( 253 / 386 ) Halal Resturants in Shore Acres, Staten Island:0  
( 254 / 386 ) Halal Resturants in Clifton, Staten Island:0  
( 255 / 386 ) Halal Resturants in Concord, Staten Island:0  
( 256 / 386 ) Halal Resturants in Emerson Hill, Staten Island:0  
( 257 / 386 ) Halal Resturants in Randall Manor, Staten Island:0  
( 258 / 386 ) Halal Resturants in Howland Hook, Staten Island:0  
( 259 / 386 ) Halal Resturants in Elm Park, Staten Island:0  
( 260 / 386 ) Halal Resturants in Rensen Village, Brooklyn:0  
( 261 / 386 ) Halal Resturants in New Lots, Brooklyn:0  
( 262 / 386 ) Halal Resturants in Faerdegat Basin, Brooklyn:0  
( 263 / 386 ) Halal Resturants in Mill Basin, Brooklyn:0  
( 264 / 386 ) Halal Resturants in Jamaica Hills, Queens:2  
( 265 / 386 ) Halal Resturants in Utopia, Queens:1  
( 266 / 386 ) Halal Resturants in Pomonok, Queens:1  
( 267 / 386 ) Halal Resturants in Astoria Heights, Queens:0  
( 268 / 386 ) Halal Resturants in Claremont Village, Bronx:0  
( 269 / 386 ) Halal Resturants in Concourse Village, Bronx:0  
( 270 / 386 ) Halal Resturants in Mount Eden, Bronx:0  
( 271 / 386 ) Halal Resturants in Mount Hope, Brooklyn:0  
( 272 / 386 ) Halal Resturants in Sutton Place, Manhattan:0  
( 273 / 386 ) Halal Resturants in Hunters Point, Queens:0  
( 274 / 386 ) Halal Resturants in Turtle Bay, Manhattan:0  
( 275 / 386 ) Halal Resturants in Tudor City, Manhattan:0  
( 276 / 386 ) Halal Resturants in Stuyvesant Town, Manhattan:0  
( 277 / 386 ) Halal Resturants in Flatiron, Manhattan:0  
( 278 / 386 ) Halal Resturants in Sunnyside Gardens, Queens:0  
( 279 / 386 ) Halal Resturants in Blissville, Queens:0  
( 280 / 386 ) Halal Resturants in Fulton Ferry, Brooklyn:0  
( 281 / 386 ) Halal Resturants in Vinegar Hill, Brooklyn:0  
( 282 / 386 ) Halal Resturants in Weeksville, Brooklyn:0  
( 283 / 386 ) Halal Resturants in Broadway Junction, Brooklyn:1  
( 284 / 386 ) Halal Resturants in Dumbo, Brooklyn:0  
( 285 / 386 ) Halal Resturants in Manor Heights, Staten Island:0  
( 286 / 386 ) Halal Resturants in Willowbrook, Staten Island:0  
( 287 / 386 ) Halal Resturants in Sandy Ground, Staten Island:0  
( 288 / 386 ) Halal Resturants in Egbertville, Staten Island:0  
( 289 / 386 ) Halal Resturants in Rosbury, Queens:0  
( 290 / 386 ) Halal Resturants in Homecrest, Brooklyn:0  
( 291 / 386 ) Halal Resturants in Middle Village, Queens:0  
( 292 / 386 ) Halal Resturants in Prince's Bay, Staten Island:0  
( 293 / 386 ) Halal Resturants in Lighthouse Hill, Staten Island:0  
( 294 / 386 ) Halal Resturants in Richmond Valley, Staten Island:0  
( 295 / 386 ) Halal Resturants in Malba, Queens:0  
( 296 / 386 ) Halal Resturants in Highland Park, Brooklyn:0  
( 297 / 386 ) Halal Resturants in Madison, Brooklyn:0  
( 298 / 386 ) Halal Resturants in Brossdale, Bronx:0  
( 299 / 386 ) Halal Resturants in Allerton, Bronx:0  
( 300 / 386 ) Halal Resturants in Kingsbridge Heights, Bronx:0  
( 301 / 386 ) Halal Resturants in Erasmus, Brooklyn:0  
( 302 / 386 ) Halal Resturants in Hudson Yards, Manhattan:0  
( 303 / 386 ) Halal Resturants in Hammels, Queens:0  
( 304 / 386 ) Halal Resturants in Bayswater, Queens:0  
( 305 / 386 ) Halal Resturants in Queensbridge, Queens:0  
( 306 / 386 ) Halal Resturants in Fox Hills, Staten Island:0

In [174]: halal\_rest\_ny.head()

Out[174]:

	Borough	Neighborhood	ID	Name
0	Brooklyn	Bay Ridge	55a88497498ae3c7364c0d21	Istanbul Kitchen
1	Brooklyn	Manhattan Terrace	56282872498ae6b65c7a257c	Affy's Premium Grill
2	Brooklyn	Flatbush	5b542872632ec002c9d7c0da	Jalaa - Grill And Gravy
3	Brooklyn	Dyker Heights	55a88497498ae3c7364c0d21	Istanbul Kitchen
4	Brooklyn	Ocean Parkway	56282872498ae6b65c7a257c	Affy's Premium Grill

In [175]: halal\_rest\_ny.shape

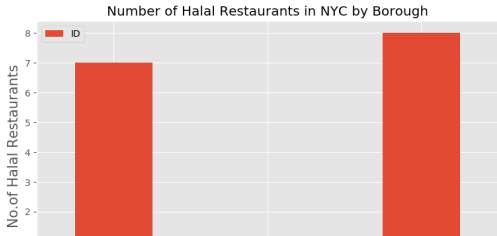
Out[175]: (16, 4)

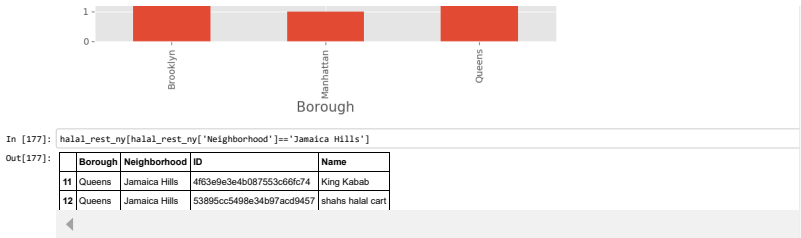
Sort Halal restaurant site locations by borough

In [176]: #Halal Restaurants in NYC by Borough

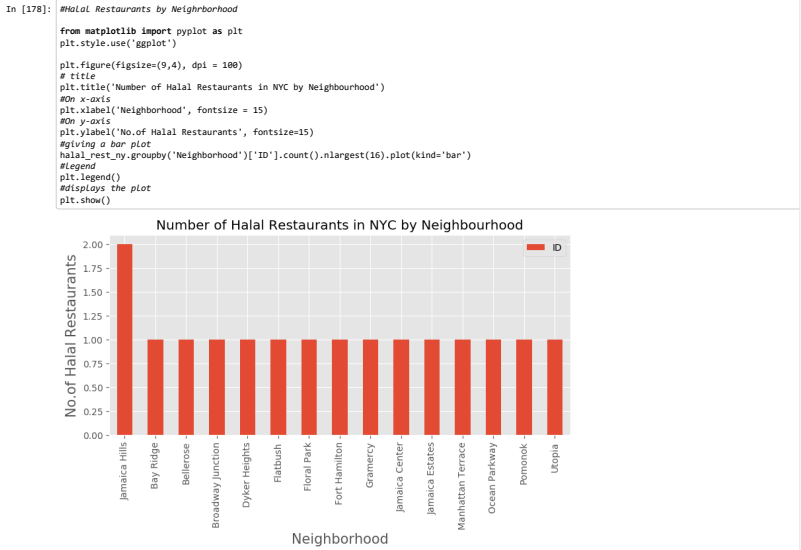
```
from matplotlib import pyplot as plt
plt.style.use('ggplot')

plt.figure(figsize=(9,5), dpi = 100)
# title
plt.title('Number of Halal Restaurants in NYC by Borough')
#On x-axis
plt.xlabel('Borough', fontsize = 15)
#On y-axis
plt.ylabel('No.of Halal Restaurants', fontsize=15)
#giving a bar plot
halal_rest_ny.groupby('Borough')['ID'].count().plot(kind='bar')
#Legend
plt.legend()
#displays the plot
plt.show()
```

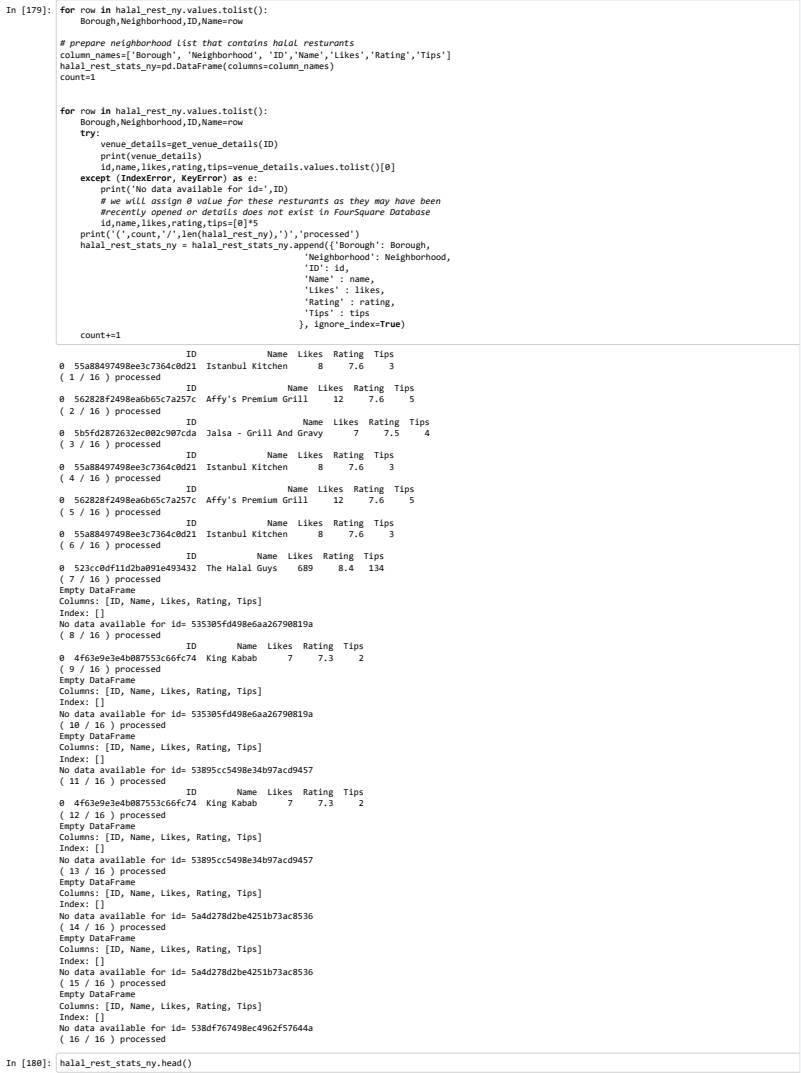




### Sort Halal restaurant locations by individual neighborhoods



### Analyze ratings for halal restuarant query



Out[180]:

	Borough	Neighborhood	ID	Name	Likes	Rating	Tips
0	Brooklyn	Bay Ridge	55a88497498ea3c7364c0d21	Istanbul Kitchen	8	7.6	3
1	Brooklyn	Manhattan Terrace	562828f2498ea6b65c7a257c	Affy's Premium Grill	12	7.6	5
2	Brooklyn	Flatbush	5b5f42872632ec002c907cda	Jalsa - Grill And Gravy	7	7.5	4
3	Brooklyn	Dyker Heights	55a88497498ea3c7364c0d21	Istanbul Kitchen	8	7.6	3
4	Brooklyn	Ocean Parkway	562828f2498ea6b65c7a257c	Affy's Premium Grill	12	7.6	5

In [181]:

halal\_rest\_stats\_ny.shape

Out[181]:

(16, 7)

In [182]:

halal\_rest\_ny.shape

Out[182]:

(16, 4)

In [183]:

halal\_rest\_stats\_ny.to\_csv('halal\_rest\_stats\_ny.csv', index=False)

In [184]:

halal\_rest\_stats\_ny\_csvpd.read\_csv('halal\_rest\_stats\_ny.csv')

In [185]:

halal\_rest\_stats\_ny\_csv.shape

Out[185]:

(16, 7)

In [186]:

halal\_rest\_stats\_ny\_csv.head()

Out[186]:

	Borough	Neighborhood	ID	Name	Likes	Rating	Tips
0	Brooklyn	Bay Ridge	55a88497498ea3c7364c0d21	Istanbul Kitchen	8	7.6	3
1	Brooklyn	Manhattan Terrace	562828f2498ea6b65c7a257c	Affy's Premium Grill	12	7.6	5
2	Brooklyn	Flatbush	5b5f42872632ec002c907cda	Jalsa - Grill And Gravy	7	7.5	4
3	Brooklyn	Dyker Heights	55a88497498ea3c7364c0d21	Istanbul Kitchen	8	7.6	3
4	Brooklyn	Ocean Parkway	562828f2498ea6b65c7a257c	Affy's Premium Grill	12	7.6	5

In [187]:

halal\_rest\_stats\_ny.info()

<class 'pandas.core.frame.DataFrame'>  
RangeIndex: 16 entries, 0 to 15  
Data columns (total 7 columns):  
Borough 16 non-null object  
Neighborhood 16 non-null object  
ID 16 non-null object  
Name 16 non-null object  
Likes 16 non-null object  
Rating 16 non-null float64  
Tips 16 non-null object  
dtypes: float64(1), object(6)  
memory usage: 976.0+ bytes

In [188]:

halal\_rest\_stats\_ny['Likes']=halal\_rest\_stats\_ny['Likes'].astype('float64')

In [189]:

halal\_rest\_stats\_ny['Tips']=halal\_rest\_stats\_ny['Tips'].astype('float64')

In [190]:

halal\_rest\_stats\_ny.info()

<class 'pandas.core.frame.DataFrame'>  
RangeIndex: 16 entries, 0 to 15  
Data columns (total 7 columns):  
Borough 16 non-null object  
Neighborhood 16 non-null object  
ID 16 non-null object  
Name 16 non-null object  
Likes 16 non-null float64  
Rating 16 non-null float64  
Tips 16 non-null float64  
dtypes: float64(3), object(4)  
memory usage: 976.0+ bytes

Analyze existing competition in 'halal' NY restaurant market

In [191]:

# Restaurants with maximum Likes  
halal\_rest\_stats\_ny.iloc[halal\_rest\_stats\_ny['Likes'].idxmax()]

Out[191]:

Borough	Manhattan
Neighborhood	Gramercy
ID	523cc0df11d2ba891e493432
Name	The Halal Guys
Likes	689
Rating	8.4
Tips	134
Name: 6, dtype: object	

In [192]:

# Restaurants with maximum Rating  
halal\_rest\_stats\_ny.iloc[halal\_rest\_stats\_ny['Rating'].idxmax()]

Out[192]:

Borough	Manhattan
Neighborhood	Gramercy
ID	523cc0df11d2ba891e493432
Name	The Halal Guys
Likes	689
Rating	8.4
Tips	134
Name: 6, dtype: object	

In [193]:

# Restaurants with maximum Tips  
halal\_rest\_stats\_ny.iloc[halal\_rest\_stats\_ny['Tips'].idxmax()]

Out[193]:

Borough	Manhattan
Neighborhood	Gramercy
ID	523cc0df11d2ba891e493432
Name	The Halal Guys
Likes	689
Rating	8.4
Tips	134
Name: 6, dtype: object	

In [194]:

ny\_neighborhood\_stats=halal\_rest\_stats\_ny.groupby('Neighborhood',as\_index=False).mean()[['Neighborhood','Rating']]  
ny\_neighborhood\_stats.columns=['Neighborhood','Average Rating']

Sort potential site locations relative to strongest competition

In [143]:

ny\_neighborhood\_stats.sort\_values(['Average Rating'],ascending=False).head(10)

Out[143]:

	Neighborhood	Average Rating
7	Gramercy	8.40
0	Bay Ridge	7.60
3	Dyker Heights	7.60
6	Fort Hamilton	7.60
11	Manhattan Terrace	7.60
12	Ocean Parkway	7.60
4	Flatbush	7.50
8	Jamaica Center	7.30
10	Jamaica Hills	3.65
1	Bellerose	0.00

In [195]:

ny\_borough\_stats=halal\_rest\_stats\_ny.groupby('Borough',as\_index=False).mean()[['Borough','Rating']]  
ny\_borough\_stats.columns=['Borough','Average Rating']

In [163]:

ny\_borough\_stats.sort\_values(['Average Rating'],ascending=False).head()

Out[163]:

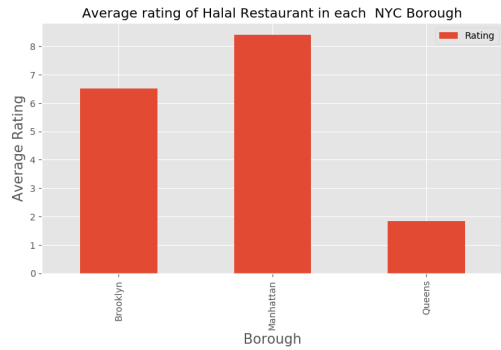
	Borough	Average Rating
1	Manhattan	8.400
0	Brooklyn	6.500
2	Queens	1.825

Results - Potential site locations based on demand and popularity of existing market

In [196]:

plt.figure(figsize=(9,5), dpi = 100)  
# title  
plt.title('Average rating of Halal Restaurant in each NYC Borough')  
---

```
#On x-axis
plt.xlabel('Borough', fontsize = 15)
#On y-axis
plt.ylabel('Average Rating', fontsize=15)
#Giving a bar plot
halal_rest_stats_ny.groupby('Borough').mean()['Rating'].plot(kind='bar')
#legend
plt.legend()
#displays the plot
plt.show()
```



```
In [199]: ny_neighborhood_stats=ny_neighborhood_stats[ny_neighborhood_stats['Average Rating']>=7.5]
```

```
In [200]: ny_neighborhood_stats
```

```
Out[200]:
```

	Neighborhood	Average Rating
0	Bay Ridge	7.6
3	Dyker Heights	7.6
4	Flatbush	7.5
6	Fort Hamilton	7.6
7	Gramercy	8.4
11	Manhattan Terrace	7.6
12	Ocean Parkway	7.6

```
In [201]: ny_neighborhood_stats=pd.merge(ny_neighborhood_stats,new_york_data, on='Neighborhood')
```

```
In [202]: ny_neighborhood_stats=ny_neighborhood_stats[['Borough','Neighborhood','Latitude','Longitude','Average Rating']]
```

```
In [203]: ny_neighborhood_stats.sort_values(['Average Rating'],ascending=False).head(10)
```

```
Out[203]:
```

	Borough	Neighborhood	Latitude	Longitude	Average Rating
4	Manhattan	Gramercy	40.737210	-73.981376	8.4
0	Brooklyn	Bay Ridge	40.625801	-74.030621	7.6
1	Brooklyn	Dyker Heights	40.619219	-74.019314	7.6
3	Brooklyn	Fort Hamilton	40.614768	-74.031979	7.6
8	Brooklyn	Manhattan Terrace	40.614433	-73.957438	7.6
6	Brooklyn	Ocean Parkway	40.613060	-73.968367	7.6
2	Brooklyn	Flatbush	40.636326	-73.958401	7.5

## Results - Visualize Potential Site Location

```
In [204]: # create map and display it
ny_map = folium.Map(location=(40.693943, -73.985888), zoom_start=12)
```

```
In [205]: # instantiate a feature group for the incidents in the dataframe
incidents = folium.map.FeatureGroup()

# Loop through the 100 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 [206]: ny_neighborhood_stats['label']=ny_neighborhood_stats['Neighborhood']+','+'ny_neighborhood_stats['Borough']+'('+'ny_neighborhood_stats['Average Rat
```

```
In [207]: # 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
```