

Introducion and Business Problem

In todays dyanmic envirnment, so many people keep relocating from one to other place depending on multiple circumstances e.g. relocating due the jobs requirement, better career project etc. But before reloacting to any new place they need to decide on what are their expectation from the new place then get the relevant information for the that new location and make an informed decision.

The problem I am trying to solve here is if I have to relocate to New York city, and given the option that I can choose any location from the city, which one shall I go for. My requirement for deciding on the place would be 'to have atleast one venue of all the folloing categories in at-max 1 km distance of its center'.

- Play ground / Park / Garden / Field
- School
- Pharmacy stores
- Super Market

Data

To make the informed decision, first thing would be to find out all the borough in New York city. This I will get from wikipedia page https://en.wikipedia.org/wiki/Boroughs_of_New_York_City. I will use the FourSquare APIs, to explore each of the borough to find out which one is the most appropriate for me.

Methodology

For this exercise, we will follow the below mentioned process.

- Get the list of boroughs from wikipedia link mentioned in data section.
- Get the geographical coordinates of each of the borough using geopy package.
- List all the venues within the range of 1 Km for each borough using FourSquare API.
- Clean the data we have got, to have only the once in which we are interested in as per the requirement.
- Present the data to highlight the findings which will be used for drawing the conclusion of the study.

Import all the packages and libraires which would be used during the process of this exercise.

```
In [2]: import json
import requests
!conda install -c conda-forge folium=0.5.0 --yes
import folium
import pandas as pd
from lxml import etree
from pandas.io.json import json_normalize
from geopy.geocoders import Nominatim
```

Solving environment: done

Package Plan

environment location: /opt/conda/envs/Python36

added / updated specs:

- folium=0.5.0

The following packages will be downloaded:

package	build			
vincent-0.4.4	py_1	28 KB	conda-forge	
certifi-2019.9.11	py36_0	147 KB	conda-forge	
openssl-1.1.1c	h516909a_0	2.1 MB	conda-forge	
altair-3.2.0	py36_0	770 KB	conda-forge	
branca-0.3.1	py_0	25 KB	conda-forge	
folium-0.5.0	py_0	45 KB	conda-forge	
ca-certificates-2019.9.11	hecc5488_0	144 KB	conda-forge	
		Total:	3.3 MB	

The following NEW packages will be INSTALLED:

altair:	3.2.0-py36_0	conda-forge
branca:	0.3.1-py_0	conda-forge
folium:	0.5.0-py_0	conda-forge
vincent:	0.4.4-py_1	conda-forge

The following packages will be UPDATED:

ca-certificates:	2019.5.15-1	---> 2019.9.11-hecc5488_0 c
onda-forge		
certifi:	2019.6.16-py36_1	---> 2019.9.11-py36_0 c
onda-forge		

The following packages will be DOWNGRADED:

openssl:	1.1.1d-h7b6447c_1	---> 1.1.1c-h516909a_0 c
onda-forge		

Downloading and Extracting Packages

vincent-0.4.4	28 KB	#####	10
0%			
certifi-2019.9.11	147 KB	#####	10
0%			
openssl-1.1.1c	2.1 MB	#####	10
0%			
altair-3.2.0	770 KB	#####	10
0%			
branca-0.3.1	25 KB	#####	10
0%			
folium-0.5.0	45 KB	#####	10
0%			

```
ca-certificates-2019 | 144 KB      | ##### | 10
0%
Preparing transaction: done
Verifying transaction: done
Executing transaction: done
```

Get the borough information table from the wikipedia

```
In [3]: wikiData = requests.get('https://en.wikipedia.org/wiki/Boroughs_of_New_York_City')
html = etree.HTML(wikiData.text)
boroughTable = html.xpath('//table[@class="wikitable sortable"]/tbody/tr')
```

Create a dataframe which will be used to keep the extracted information of each borough of New York city from wikipedia

```
In [4]: newyork_df_columns = ['Borough', 'Latitude', 'Longitude', 'Population', 'Density (Persons/Sq. Km)']
newyork_borough_df = pd.DataFrame(columns = newyork_df_columns)
```

Create a function which will populate the latitude and longitude details of each borough using geopy library

```
In [5]: geolocator = Nominatim(user_agent="ny_explorer")
for row in boroughTable[3:8]:
    rowElements = row.xpath('td')
    name = rowElements[0].xpath('div/b/a')[0].text.strip()

    population_str = rowElements[2].text.strip().split(',')
    population = int("".join(population_str))

    density_str = rowElements[8].text.strip().split(',')
    density = int("".join(density_str))

    location = geolocator.geocode(name)
    latitude = location.latitude
    longitude = location.longitude
    newyork_borough_df = newyork_borough_df.append({ 'Borough' : name,
                                                    'Latitude' : latitude,
                                                    'Longitude' : longitude,
                                                    'Population' : population,
                                                    'Density(Persons/Sq. Km)' :
                                                    density}, ignore_index=True)
```

Sort the dataframe of borough and their relevant information based on decending order of their population density

```
In [6]: newyork_borough_df = newyork_borough_df.sort_values(by = 'Density(Persons/Sq. Km)', ascending = False)
newyork_borough_df = newyork_borough_df.reset_index(drop=True)
```

```
In [7]: newyork_borough_df
```

Out[7]:

	Borough	Latitude	Longitude	Population	Density(Persons/Sq. Km)
0	Manhattan	40.790087	-73.959829	1664727	27826
1	Brooklyn	40.650104	-73.949582	2648771	14649
2	The Bronx	40.850485	-73.840404	1471160	13231
3	Queens	40.652493	-73.791421	2358582	8354
4	Staten Island	40.583456	-74.149605	479458	3132

Get the geographical coordinates of New York City

```
In [8]: location = geolocator.geocode('New York City')
latitude = location.latitude
longitude = location.longitude
print('The geographical coordinate of New York City are {}, {}'.format(latitude, longitude))
```

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

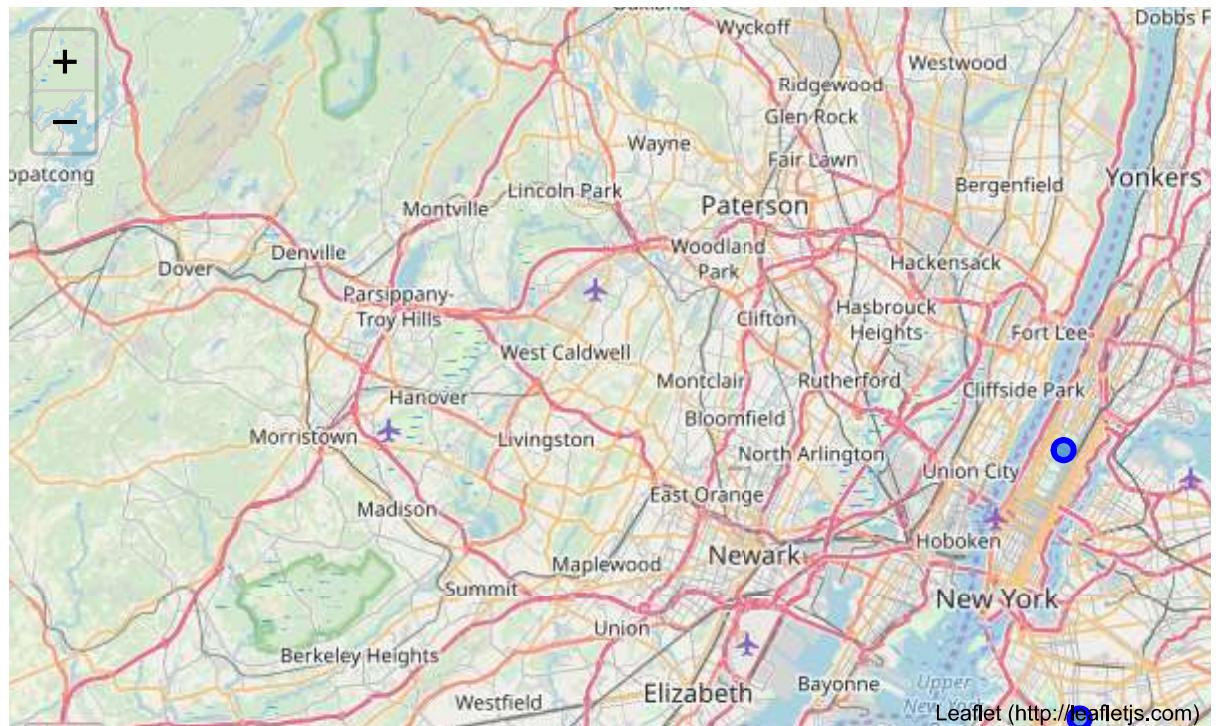
Create a function to map all the borough of New York city using Folium pacake, to help in visualizing them on map.

```
In [9]: # create map of New York using Latitude and Longitude values
map_newyork = folium.Map(location=[latitude, longitude], zoom_start=10)

# add markers to map
for lat, lng, borough in zip(newyork_borough_df['Latitude'], newyork_borough_df['Longitude'], newyork_borough_df['Borough']):
    label = '{}'.format(borough)
    label = folium.Popup(label, parse_html=True)
    folium.CircleMarker(
        [lat, lng],
        radius=5,
        popup=label,
        color='blue',
        fill=True,
        fill_color='#3186cc',
        fill_opacity=0.7,
        parse_html=False).add_to(map_newyork)
```

In [10]: map_newyork

Out[10]:



Set up the Foursquare credentail which will used while making the request to thier API for getting any information

```
In [ ]: CLIENT_ID = 'Your ID' # your Foursquare ID
CLIENT_SECRET = 'Password for that ID' # your Foursquare Secret
VERSION = '20190820' # Foursquare API version

radius = 1000 # Radius of 1000 meters which is my requirement as mentioned in
               introduction section
LIMIT = 100 # Limit the number of venues from foursquare requests
```

Define the function to be used to getting the nearby venues of each borough

```
In [ ]: def getNearbyVeuues(lat, long):
    url = 'https://api.foursquare.com/v2/venues/explore?&client_id={}&client_s
ecret={}&v={}&ll={},{},{}&radius={}&limit={}'.format(
        CLIENT_ID,
        CLIENT_SECRET,
        VERSION,
        lat,
        long,
        radius,
        LIMIT)
    return requests.get(url).json()
```

Define the function to get the category of each venue returned by the foursquare API

```
In [ ]: # function that extracts the category of the venue
def get_category_type(row):
    try:
        categories_list = row['categories']
    except:
        categories_list = row['venue.categories']

    if len(categories_list) == 0:
        return None
    else:
        return categories_list[0]['name']
```

Now get the list of all the nearby venues for each borough and keep them in a dataframe

```
In [34]: # This dataframe is created to keep all the venues extracted for all the five
#           borough
nearby_venues_to_all_borough = pd.DataFrame()

for borough, lat, long in zip(newyork_borough_df['Borough'], newyork_borough_df['Latitude'], newyork_borough_df['Longitude']):
    results = getNearbyVenues(lat, long)

    nearby_venues = json_normalize(results['response']['groups'][0]['items'])
    # flatten JSON

    # filter columns
    filtered_columns = ['venue.name', 'venue.categories', 'venue.location.lat',
    'venue.location.lng']
    nearby_venues = nearby_venues.loc[:, filtered_columns]

    # filter the category for each row
    nearby_venues['venue.categories'] = nearby_venues.apply(get_category_type,
axis=1)

    # clean columns
    nearby_venues.columns = [col.split(".")[1] for col in nearby_venues.columns]
    nearby_venues['Borough'] = borough

    nearby_venues_to_all_borough = nearby_venues_to_all_borough.append(nearby_venues)
```

See a total of how many venues have we got for all the borough

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

```
Out[37]: (349, 5)
```

Clean the dataframe of all the venues to have the ordered indexes, which are in an unordered fashion due to venues being appended one after the other for each borough, and each append call creates a new index starting from 0

```
In [38]: nearby_venues_to_all_borrow = nearby_venues_to_all_borrow.reset_index(drop=True)
```

Let's print the dataframe to see what it has

```
In [41]: pd.set_option('display.max_columns', 10)
pd.set_option('display.max_rows', 500)
nearby_venues_to_all_borrow
```

Out[41]:

	name	categories	lat	lng	Borough
0	North Meadow	Park	40.792027	-73.959853	Manhattan
1	Central Park Tennis Center	Tennis Court	40.789313	-73.961862	Manhattan
2	East Meadow	Field	40.790160	-73.955498	Manhattan
3	Oldest Tree in Central Park	Park	40.789188	-73.957867	Manhattan
4	Central Park - North Meadow Recreation Center	Playground	40.790939	-73.960304	Manhattan
5	Central Park - Gate Of All Saints	Park	40.791591	-73.964795	Manhattan
6	The Jewish Museum	Museum	40.785276	-73.957411	Manhattan
7	Da Capo	Café	40.787679	-73.953899	Manhattan
8	K&D Wines & Spirits	Wine Shop	40.787096	-73.954261	Manhattan
9	Russ & Daughters	Kosher Restaurant	40.785332	-73.957481	Manhattan
10	Central Park - Woodman's Gate	Park	40.787786	-73.955924	Manhattan
11	Jacqueline Kennedy Onassis Reservoir	Reservoir	40.784519	-73.960966	Manhattan
12	Central Park - 99th & 5th Ave	Park	40.788791	-73.955232	Manhattan
13	Central Park - Wild West Playground	Playground	40.789715	-73.965471	Manhattan
14	Cooper Hewitt Smithsonian Design Museum	Art Museum	40.784333	-73.957765	Manhattan
15	The Ravine	Scenic Lookout	40.795527	-73.956029	Manhattan
16	Conservatory Garden Center Fountain	Fountain	40.793896	-73.952816	Manhattan
17	Jackie Onassis Running Track	Track	40.784538	-73.958738	Manhattan
18	Museum of the City of New York	History Museum	40.792578	-73.952075	Manhattan
19	Central Park - North Meadow Fields 1-4	Baseball Field	40.792128	-73.961362	Manhattan
20	Whole Foods Wine Store	Wine Shop	40.794285	-73.966558	Manhattan
21	Conservatory Garden	Garden	40.793531	-73.952032	Manhattan
22	Tarr Family Playground	Playground	40.793706	-73.962432	Manhattan
23	The Corner Bookstore	Bookstore	40.785147	-73.955684	Manhattan
24	Whole Foods Market	Grocery Store	40.794110	-73.966633	Manhattan
25	Earl's Beer & Cheese	American Restaurant	40.787331	-73.951725	Manhattan
26	Central Park	Park	40.784083	-73.964853	Manhattan
27	Bluestone Lane	Café	40.783757	-73.958526	Manhattan
28	Shape House Upper East Side	Spa	40.785433	-73.955534	Manhattan
29	Paola's Restaurant	Restaurant	40.784655	-73.955869	Manhattan
30	Sammy's Gourmet	Deli / Bodega	40.788138	-73.953520	Manhattan
31	Sarabeth's East	Breakfast Spot	40.784857	-73.955927	Manhattan
32	Robert Bendheim Playground	Playground	40.790254	-73.954150	Manhattan
33	The Guthrie Inn	Cocktail Bar	40.787423	-73.951908	Manhattan

		name	categories	lat	lng	Borough
34		Trader Joe's	Grocery Store	40.790624	-73.969191	Manhattan
35	Solomon R Guggenheim Museum		Art Museum	40.783051	-73.959265	Manhattan
36		Birch Coffee	Coffee Shop	40.793131	-73.967241	Manhattan
37	John Purroy Mitchel Memorial		Sculpture Garden	40.784395	-73.959229	Manhattan
38	Central Park - Vanderbilt Gate		Plaza	40.793579	-73.951743	Manhattan
39		Five Pillars Yoga	Yoga Studio	40.784819	-73.956054	Manhattan
40		Table d'Hote	French Restaurant	40.784492	-73.955712	Manhattan
41		juice press	Vegetarian / Vegan Restaurant	40.784718	-73.955995	Manhattan
42		Girls' Gate	Plaza	40.791756	-73.953068	Manhattan
43	Central Park- North Meadow Field # 8		Baseball Field	40.793167	-73.955526	Manhattan
44		Vinyl Wine	Wine Shop	40.786129	-73.950771	Manhattan
45		Guggenheim Store	Gift Shop	40.782922	-73.959113	Manhattan
46		Kitchen Arts & Letters	Bookstore	40.784226	-73.952135	Manhattan
47		Burnett Fountain	Fountain	40.793175	-73.952743	Manhattan
48	Central Park - 96th Street Playground		Playground	40.787813	-73.956257	Manhattan
49	Central Park West - W 88th St		Park	40.786633	-73.968445	Manhattan
50		Bridle Path	Trail	40.784604	-73.967171	Manhattan
51	Central Park West - W 86th St		Park	40.785417	-73.969519	Manhattan
52		Columbus Natural Foods	Grocery Store	40.792686	-73.967521	Manhattan
53		North Woods	Park	40.797970	-73.955358	Manhattan
54		Steep Rock Bouldering	Climbing Gym	40.786687	-73.950391	Manhattan
55	Central Park - Strangers' Gate		Park	40.798237	-73.959899	Manhattan
56		El Museo del Barrio	Art Museum	40.793438	-73.951734	Manhattan
57		Starbucks	Coffee Shop	40.795369	-73.965589	Manhattan
58		HomeGoods	Furniture / Home Store	40.794523	-73.965898	Manhattan
59		92nd Street Y	Community Center	40.783077	-73.952772	Manhattan
60		Bluestone Lane	Coffee Shop	40.792240	-73.952480	Manhattan
61		Neue Galerie	Art Museum	40.781436	-73.960325	Manhattan
62		Michaels	Arts & Crafts Store	40.794918	-73.966032	Manhattan
63	Chipotle Mexican Grill		Mexican Restaurant	40.795021	-73.965613	Manhattan
64	Bonjour Crêpes & Wine		Café	40.784543	-73.951990	Manhattan
65	Storylines: Contemporary Art at the Guggenheim		Exhibit	40.783014	-73.959169	Manhattan
66		SEPHORA	Cosmetics Shop	40.794780	-73.966399	Manhattan
67		Café Sabarsky	Austrian Restaurant	40.781445	-73.960385	Manhattan
68		Osteria 106	Italian Restaurant	40.798825	-73.961793	Manhattan

		name	categories	lat	lng	Borough
69		JOE & THE JUICE	Juice Bar	40.788144	-73.953676	Manhattan
70		Fhitting Room UWS	Gym	40.787886	-73.971262	Manhattan
71		Tre Otto	Italian Restaurant	40.788336	-73.953422	Manhattan
72		Lexington Pizza Parlour	Pizza Place	40.789141	-73.948603	Manhattan
73		Central Park - Fort Clinton	Scenic Lookout	40.795285	-73.952065	Manhattan
74		92nd Street Y May Center	Gym / Fitness Center	40.783108	-73.952758	Manhattan
75		Mila Cafe	Breakfast Spot	40.791435	-73.968650	Manhattan
76		Untermeyer Fountain	Fountain	40.794253	-73.951946	Manhattan
77		Effy's Cafe	Israeli Restaurant	40.793107	-73.968106	Manhattan
78		Felo Deli	Deli / Bodega	40.795028	-73.964180	Manhattan
79		Little Luzzo's Pizza	Pizza Place	40.786209	-73.951696	Manhattan
80		Frenchy Cafe NYC	Café	40.789803	-73.948164	Manhattan
81		Rudin Family Playground	Playground	40.791822	-73.964147	Manhattan
82		Central Park Cherry Blossoms	Garden	40.785298	-73.966694	Manhattan
83		Sfoglia	Italian Restaurant	40.783419	-73.952768	Manhattan
84		Columbus Wines & Spirits	Wine Shop	40.792800	-73.967609	Manhattan
85		Joy Burger Bar	Burger Joint	40.788403	-73.949059	Manhattan
86		Malecon Restaurant II	Latin American Restaurant	40.794932	-73.969648	Manhattan
87		Pascalou	French Restaurant	40.785046	-73.955813	Manhattan
88		Noglu	Bakery	40.783801	-73.956687	Manhattan
89		Lloyds Carrot Cake Shop	Dessert Shop	40.788000	-73.949503	Manhattan
90		Central Park - South Gate House	Park	40.782129	-73.962668	Manhattan
91		Shangri-La Nails & Spa	Spa	40.783594	-73.952466	Manhattan
92		Marco Polo Pizza & Deli	Pizza Place	40.784518	-73.956131	Manhattan
93		Huddlestone Arch	Bridge	40.795774	-73.955688	Manhattan
94		Lex Restaurant	Italian Restaurant	40.782530	-73.953700	Manhattan
95		Bawarchi	Indian Restaurant	40.792644	-73.950183	Manhattan
96		Arthur Ross Pinetum	Garden	40.783271	-73.966613	Manhattan
97		La Shuk	Moroccan Restaurant	40.788732	-73.948913	Manhattan
98		Superior Cafe	Deli / Bodega	40.791304	-73.951295	Manhattan
99		Crossfit Metropolis	Gym	40.788206	-73.948695	Manhattan
100		Exquisite Delight	Caribbean Restaurant	40.649091	-73.949243	Brooklyn
101		Jus Juice	Juice Bar	40.652208	-73.949723	Brooklyn
102		Nostrand Health Foods	Juice Bar	40.649092	-73.949243	Brooklyn
103		Bad Gym	Gym / Fitness Center	40.650007	-73.950000	Brooklyn
104		Nio's Trinidad Roti Shop	Caribbean Restaurant	40.650638	-73.952338	Brooklyn

		name	categories	lat	lng	Borough
105	Courts (Furniture, Electronics, & Appliances)		Furniture / Home Store	40.650529	-73.950617	Brooklyn
106	Nostrand Donut Shop		Donut Shop	40.651030	-73.949457	Brooklyn
107	Caribbean Vibes	Caribbean Restaurant	40.651227	-73.949675	Brooklyn	
108	Tastee Pattee	Caribbean Restaurant	40.650850	-73.947838	Brooklyn	
109	Bake & Things Restaurant	Caribbean Restaurant	40.650835	-73.944777	Brooklyn	
110	Kings Theatre	Theater	40.646110	-73.957175	Brooklyn	
111	Gandhi Fine Indian Cuisine	Indian Restaurant	40.655168	-73.956325	Brooklyn	
112	The Yoga Studio	Yoga Studio	40.650000	-73.950000	Brooklyn	
113	Island Express	Caribbean Restaurant	40.647111	-73.958108	Brooklyn	
114	Blink Fitness Flatbush	Gym	40.651821	-73.959014	Brooklyn	
115	Rite Aid	Pharmacy	40.650874	-73.950663	Brooklyn	
116	Sixpoint Craft Ale	Bar	40.650005	-73.949952	Brooklyn	
117	Crunch Flatbush	Gym / Fitness Center	40.645798	-73.958149	Brooklyn	
118	MangoSeed Restaurant	Caribbean Restaurant	40.654403	-73.959560	Brooklyn	
119	ZuriLee Pizza Bar	Pizza Place	40.654513	-73.959320	Brooklyn	
120	Chase Bank	Bank	40.650351	-73.949864	Brooklyn	
121	Zen Vegetarian House	Vegetarian / Vegan Restaurant	40.653919	-73.959496	Brooklyn	
122	Trini Breakfast Shed II	Caribbean Restaurant	40.649092	-73.949231	Brooklyn	
123	Dale View Biscuits&Beer	Café	40.658966	-73.950518	Brooklyn	
124	MaCdonalds Avenue Playground	Playground	40.650010	-73.949940	Brooklyn	
125	House of Juice	Juice Bar	40.655883	-73.953059	Brooklyn	
126	Gino's Pizzeria	Pizza Place	40.652191	-73.959108	Brooklyn	
127	fisherman's Cove	Caribbean Restaurant	40.650217	-73.960017	Brooklyn	
128	La Baguette Bakery	Bakery	40.650732	-73.951708	Brooklyn	
129	Best Farm Market	Grocery Store	40.652772	-73.959346	Brooklyn	
130	Green Lake Chinese Restaurant	Chinese Restaurant	40.653110	-73.959343	Brooklyn	
131	GameStop	Video Game Store	40.648145	-73.958177	Brooklyn	
132	Jen's Roti Shop	Caribbean Restaurant	40.652400	-73.959174	Brooklyn	
133	Domino's Pizza	Pizza Place	40.648116	-73.949052	Brooklyn	
134	T-Mobile	Mobile Phone Shop	40.650723	-73.947526	Brooklyn	
135	Soldiers Jamaican	Caribbean Restaurant	40.655912	-73.950138	Brooklyn	
136	IHOP	Breakfast Spot	40.650540	-73.957209	Brooklyn	
137	FIB Tattoo Bar	Bar	40.645261	-73.958033	Brooklyn	
138	Duane Reade	Pharmacy	40.655389	-73.947631	Brooklyn	
139	STREETSWEEPER	Pizza Place	40.657146	-73.953219	Brooklyn	

		name	categories	lat	lng	Borough
140	Electronics & Appliances Liquidations		Electronics Store	40.648757	-73.958264	Brooklyn
141	Kanz Express Delicatessen		Deli / Bodega	40.655918	-73.942570	Brooklyn
142	Vyne Yard		Wine Shop	40.657195	-73.953218	Brooklyn
143	Five Below		Miscellaneous Shop	40.648400	-73.958021	Brooklyn
144	Kal's Bakery & Restaurant		Caribbean Restaurant	40.651083	-73.945810	Brooklyn
145	Gap Factory Store		Clothing Store	40.646246	-73.958257	Brooklyn
146	Capital One Bank		Bank	40.649122	-73.958069	Brooklyn
147	Melany Restaurant		Latin American Restaurant	40.653469	-73.959364	Brooklyn
148	Marab Deli & Grocery		Deli / Bodega	40.655858	-73.942778	Brooklyn
149	Michelle's Cocktail Lounge		Lounge	40.647832	-73.955881	Brooklyn
150	La cabana rodriguez		Latin American Restaurant	40.644880	-73.958007	Brooklyn
151	Dollar Tree		Discount Store	40.650554	-73.956935	Brooklyn
152	Dollar Tree		Discount Store	40.655198	-73.952742	Brooklyn
153	Caribbean Social		Caribbean Restaurant	40.651650	-73.958898	Brooklyn
154	T-Mobile		Mobile Phone Shop	40.648949	-73.958211	Brooklyn
155	Chase Bank		Bank	40.650586	-73.958536	Brooklyn
156	Cafe Omar		Music Venue	40.643360	-73.949023	Brooklyn
157	Modell's Sporting Goods		Sporting Goods Shop	40.650345	-73.959447	Brooklyn
158	De Bamboo Express Restaurant & Bakery		Caribbean Restaurant	40.653984	-73.959611	Brooklyn
159	Family Dollar		Discount Store	40.649546	-73.938212	Brooklyn
160	Planet Fitness		Gym / Fitness Center	40.650432	-73.957626	Brooklyn
161	T-Mobile		Mobile Phone Shop	40.645216	-73.958307	Brooklyn
162	AT&T		Mobile Phone Shop	40.651789	-73.958789	Brooklyn
163	Mike's Pizza		Pizza Place	40.655308	-73.956439	Brooklyn
164	Corner Store		Convenience Store	40.648738	-73.944831	Brooklyn
165	SUBWAY		Sandwich Place	40.655898	-73.942076	Brooklyn
166	Subway Sub Shops		Sandwich Place	40.650165	-73.960570	Brooklyn
167	C-Town Supermarkets		Grocery Store	40.653413	-73.949920	Brooklyn
168	Dunkin'		Donut Shop	40.655710	-73.942685	Brooklyn
169	Papa John's Pizza		Pizza Place	40.657063	-73.952911	Brooklyn
170	Neighborhood Sbarro		Pizza Place	40.655681	-73.942773	Brooklyn
171	Food Dynasty		Grocery Store	40.655069	-73.952429	Brooklyn
172	Rite Aid		Pharmacy	40.651240	-73.938530	Brooklyn
173	Brooklyn Sky		Men's Store	40.652254	-73.949773	Brooklyn
174	CVS pharmacy		Pharmacy	40.656348	-73.950192	Brooklyn

		name	categories	lat	lng	Borough
175	Popeyes Louisiana Kitchen	Fast Food Restaurant	40.655937	-73.942400	Brooklyn	
176	MTA Bus - B35/B35LTD - Church Ave & New York Ave	Bus Line	40.651014	-73.946691	Brooklyn	
177	Carl's Jr.	Fast Food Restaurant	40.655701	-73.942822	Brooklyn	
178	P.S. 181	School	40.648974	-73.946450	Brooklyn	
179	Key Food	Supermarket	40.651346	-73.938241	Brooklyn	
180	Key Food	Supermarket	40.656957	-73.950417	Brooklyn	
181	Brooklyn Pizzeria	Pizza Place	40.650047	-73.960690	Brooklyn	
182	NSA Food Market	Grocery Store	40.646610	-73.945609	Brooklyn	
183	Met Food	Supermarket	40.647581	-73.943930	Brooklyn	
184	Walgreens	Pharmacy	40.650492	-73.959789	Brooklyn	
185	Ideal Food Basket	Supermarket	40.654825	-73.956265	Brooklyn	
186	friday flowers	Flower Shop	40.655255	-73.943350	Brooklyn	
187	Smart Workout	Gym	40.651213	-73.940135	Brooklyn	
188	Danice	Women's Store	40.650540	-73.959580	Brooklyn	
189	Brick Oven Pizza	Pizza Place	40.655905	-73.942667	Brooklyn	
190	Ortiz Liquors	Liquor Store	40.653116	-73.959146	Brooklyn	
191	Mango Mango Dessert - Brooklyn	Dessert Shop	40.647515	-73.960358	Brooklyn	
192	LA Fitness	Gym / Fitness Center	40.849739	-73.841949	The Bronx	
193	Residence Inn by Marriott New York The Bronx a...	Hotel	40.850020	-73.842579	The Bronx	
194	Starbucks	Coffee Shop	40.851371	-73.844087	The Bronx	
195	Zeppieri & Sons Italian Bakery	Bakery	40.847119	-73.832057	The Bronx	
196	Skyline Bar & Lounge	Lounge	40.852904	-73.842612	The Bronx	
197	Starbucks	Coffee Shop	40.847132	-73.844449	The Bronx	
198	Stop & Shop	Supermarket	40.847089	-73.843463	The Bronx	
199	Empire Bagels	Bagel Shop	40.849392	-73.830527	The Bronx	
200	Pruzzo's	Deli / Bodega	40.846831	-73.832663	The Bronx	
201	Franks Pizza	Pizza Place	40.843550	-73.836006	The Bronx	
202	M&R Deli	Sandwich Place	40.850978	-73.848337	The Bronx	
203	George's Restaurant	Diner	40.846945	-73.832184	The Bronx	
204	Ann Clair's Salumeria	Deli / Bodega	40.850046	-73.851796	The Bronx	
205	Dolphin Fitness	Gym	40.853942	-73.843596	The Bronx	
206	Crosby Pizza	Pizza Place	40.846140	-73.831970	The Bronx	
207	Warehouse Liquor & Wine	Liquor Store	40.846717	-73.843892	The Bronx	
208	Applebee's Grill + Bar	American Restaurant	40.848867	-73.842386	The Bronx	
209	Mexico Magico Restaurant	Mexican Restaurant	40.846655	-73.832072	The Bronx	

		name	categories	lat	lng	Borough
210		Estrellita Poblana IV	Mexican Restaurant	40.842072	-73.844044	The Bronx
211		Enterprise Rent-A-Car	Rental Car Location	40.852523	-73.843106	The Bronx
212		Pine Bar and Grill	Restaurant	40.845272	-73.845059	The Bronx
213		Wendy's	Fast Food Restaurant	40.842900	-73.845360	The Bronx
214		Shangri-La	Asian Restaurant	40.847160	-73.832642	The Bronx
215	The Pelham Parkway Christmas House		Historic Site	40.857817	-73.839794	The Bronx
216		WSPT	Medical Center	40.846291	-73.842338	The Bronx
217		Bases Loaded	Sports Bar	40.847233	-73.832290	The Bronx
218		Key Food	Supermarket	40.850759	-73.830227	The Bronx
219		S&J Deli	Deli / Bodega	40.846495	-73.848342	The Bronx
220		Lucca Italian Restaurant	Italian Restaurant	40.847645	-73.831615	The Bronx
221		McDermott's Pub	Pub	40.842743	-73.846028	The Bronx
222		Monte Grab & Go Market	Buffet	40.848888	-73.844938	The Bronx
223		Giovanni's Italian Restaurant	Italian Restaurant	40.851786	-73.829786	The Bronx
224		Pelham Bake Shop	Bakery	40.845464	-73.831025	The Bronx
225		Planet Fitness	Gym / Fitness Center	40.848290	-73.830875	The Bronx
226		Honey's Thai Pavilion	Thai Restaurant	40.847845	-73.831320	The Bronx
227		Dunkin'	Donut Shop	40.849036	-73.842190	The Bronx
228		Walgreens	Pharmacy	40.850767	-73.851316	The Bronx
229		Shamrock Inn	Bar	40.846093	-73.831859	The Bronx
230		Hertz	Rental Car Location	40.854095	-73.842562	The Bronx
231		Juice Me	Juice Bar	40.848259	-73.831370	The Bronx
232		Westchester Square	Park	40.844191	-73.845185	The Bronx
233		Carvel	Ice Cream Shop	40.847581	-73.831686	The Bronx
234		SUBWAY	Sandwich Place	40.846647	-73.843357	The Bronx
235		Dollar Tree	Discount Store	40.842994	-73.846074	The Bronx
236		Legacy Bar	Bar	40.841783	-73.843403	The Bronx
237		Au Bon Pain	Bakery	40.856463	-73.847383	The Bronx
238		Chirping Chicken	BBQ Joint	40.847454	-73.830761	The Bronx
239		Kai Asian Fusion	Asian Restaurant	40.843591	-73.845589	The Bronx
240		Lehigh Wines & Liquors	Food & Drink Shop	40.846700	-73.832851	The Bronx
241		Pelham Delite Bakery	Bakery	40.845235	-73.831037	The Bronx
242		The Famous Emilio's Pizza	Pizza Place	40.853765	-73.843408	The Bronx
243		Chase Bank	Bank	40.847057	-73.831591	The Bronx
244		Dunkin'	Donut Shop	40.851350	-73.843879	The Bronx
245		SUBWAY / Convenient Store	Sandwich Place	40.846383	-73.831864	The Bronx

		name	categories	lat	lng	Borough
246		7-Eleven	Convenience Store	40.851832	-73.828781	The Bronx
247		Redbox	Video Store	40.843271	-73.836484	The Bronx
248		Dunkin'	Donut Shop	40.842481	-73.845837	The Bronx
249		Chase Bank	Bank	40.842592	-73.844863	The Bronx
250		Rite Aid	Pharmacy	40.845876	-73.831214	The Bronx
251		Gleasons Cafe	Bar	40.854392	-73.843454	The Bronx
252		Capital One Bank	Bank	40.847851	-73.830867	The Bronx
253		McDonald's	Fast Food Restaurant	40.849566	-73.844645	The Bronx
254		Chase Bank	Bank	40.852051	-73.829651	The Bronx
255		Burger King	Fast Food Restaurant	40.842983	-73.836561	The Bronx
256		Vito's Deli	Italian Restaurant	40.845574	-73.831335	The Bronx
257		Key Food	Supermarket	40.842300	-73.845240	The Bronx
258		Dunkin'	Donut Shop	40.846408	-73.831573	The Bronx
259		Vivienne's Bar	Dive Bar	40.847949	-73.831276	The Bronx
260		Metro Cafe	Food Court	40.853087	-73.837699	The Bronx
261		ENT And Allergy Associates	Doctor's Office	40.852837	-73.837068	The Bronx
262		7-Eleven	Convenience Store	40.843263	-73.836354	The Bronx
263		DEAL\$	Department Store	40.842940	-73.845858	The Bronx
264		Apple Grocery	Grocery Store	40.854320	-73.843408	The Bronx
265		Towers Cafe	Food Court	40.854630	-73.846539	The Bronx
266		M&M Deli	Deli / Bodega	40.856363	-73.843667	The Bronx
267		China Pavillion	Asian Restaurant	40.856388	-73.843902	The Bronx
268	Bronx Park Greenway Moshulu / Pelham System @ ...		Trail	40.856930	-73.837220	The Bronx
269	MTA NYCT Bus - Bx31 - Pelham Pkwy S.		Bus Station	40.856912	-73.843907	The Bronx
270		Caridad Restaurant	Spanish Restaurant	40.842923	-73.845052	The Bronx
271	Harvest Home Jacobi Hospital Farmers' Market		Farmers Market	40.856436	-73.847078	The Bronx
272	Marjorie A Varrichio, Attorney At Law		Lawyer	40.850436	-73.830041	The Bronx
273		Thin Is In	Gym / Fitness Center	40.851260	-73.830032	The Bronx
274	Jacobi Medical Center Gift Shop		Gift Shop	40.857451	-73.845849	The Bronx
275		empire nails salon	Cosmetics Shop	40.843283	-73.845302	The Bronx
276		Lee Xing	Chinese Restaurant	40.851640	-73.829799	The Bronx
277		Aliano Hair Salon	Salon / Barbershop	40.851427	-73.829477	The Bronx
278	L'Occitane en Provence		Cosmetics Shop	40.650343	-73.792202	Queens
279		Starbucks	Coffee Shop	40.650657	-73.791711	Queens
280	American Airlines Flagship First Dining		Restaurant	40.648121	-73.791522	Queens

		name	categories	lat	lng	Borough
281	American Airline Flagship	The Bridge Lounge	Airport Lounge	40.648424	-73.790917	Queens
282	American Airlines Flagship	Lounge	Airport Lounge	40.648101	-73.791583	Queens
283		Auntie Anne's	Snack Place	40.647847	-73.791805	Queens
284		Dunkin'	Donut Shop	40.649824	-73.782311	Queens
285		Starbucks	Coffee Shop	40.647479	-73.790901	Queens
286		NYSB JFK	Bar	40.647806	-73.791942	Queens
287		Vino Volo	Wine Bar	40.649963	-73.793224	Queens
288		Kiehl's	Cosmetics Shop	40.646441	-73.789291	Queens
289		Victoria's Secret	Lingerie Store	40.647350	-73.793107	Queens
290		Baskin Robins	Dessert Shop	40.650123	-73.792497	Queens
291		Kiehl's	Cosmetics Shop	40.648687	-73.782442	Queens
292		Brooks Brothers	Clothing Store	40.647565	-73.792729	Queens
293		Auntie Anne's	Snack Place	40.649890	-73.783434	Queens
294	MAC COSMETICS	JFK T8	Cosmetics Shop	40.646800	-73.790319	Queens
295		Dunkin'	Donut Shop	40.650187	-73.792530	Queens
296		Thirsty Bar	Bar	40.650103	-73.782995	Queens
297		Starbucks	Coffee Shop	40.648971	-73.785037	Queens
298		The Concorde Room	Airport Lounge	40.649089	-73.783451	Queens
299		Red Mango	Frozen Yogurt Shop	40.649909	-73.783055	Queens
300		Nathan's Famous	Food Truck	40.646943	-73.790356	Queens
301		Brookstone	Electronics Store	40.647604	-73.791620	Queens
302		Panda Express	Chinese Restaurant	40.645682	-73.785502	Queens
303		Drink Martini Bar	Restaurant	40.647358	-73.793308	Queens
304	American Airlines	Admirals Club	Airport Lounge	40.649901	-73.792027	Queens
305		New York Sports Bar	Sports Bar	40.647690	-73.792443	Queens
306		Dunkin'	Donut Shop	40.646429	-73.782895	Queens
307		Brookstone	Electronics Store	40.650064	-73.783105	Queens
308		Alaska Lounge	Airport Lounge	40.649274	-73.782103	Queens
309		Bobby Van's	Steakhouse	40.648595	-73.790971	Queens
310		SUBWAY	Sandwich Place	40.648454	-73.783098	Queens
311		Juan Valdez	Coffee Shop	40.646845	-73.790298	Queens
312		Brooklyn Deli	Deli / Bodega	40.650104	-73.792885	Queens
313		Air France Lounge	Airport Lounge	40.643884	-73.791191	Queens
314		Abitino's Pizzeria	Pizza Place	40.647838	-73.791854	Queens
315		Duty Free	Duty-free Shop	40.648162	-73.791622	Queens
316		Euro Pan Cafe	Bakery	40.649444	-73.794447	Queens

		name	categories	lat	lng	Borough
317		O'Neal's	Airport Food Court	40.647587	-73.792752	Queens
318		American - Flight AA 138	Plane	40.648191	-73.792505	Queens
319		Concourse B	Airport Terminal	40.648007	-73.791721	Queens
320		Juan Valdez	Coffee Shop	40.647931	-73.791798	Queens
321		CIBO Express Gourmet Market	Snack Place	40.647573	-73.792815	Queens
322		L'Occitaine en Provence	Gift Shop	40.648871	-73.795641	Queens
323		Terminal 8	Airport Terminal	40.647430	-73.790770	Queens
324		TSA Security Checkpoint	Airport Service	40.646937	-73.790268	Queens
325		Wolfgang Puck Express	Pizza Place	40.649871	-73.783240	Queens
326		JFK Diner	Diner	40.646493	-73.791057	Queens
327		NYSG	Burger Joint	40.647453	-73.786341	Queens
328		McDonald's	Fast Food Restaurant	40.649707	-73.783254	Queens
329		The Brindle Room	American Restaurant	40.649871	-73.783327	Queens
330		Hudson Booksellers	Bookstore	40.649998	-73.783187	Queens
331	:10 Minute Massage (10 Minute Massage)		Massage Studio	40.646180	-73.788064	Queens
332		Coach	Accessories Store	40.649518	-73.783064	Queens
333		Global Entry Kiosk	Airport Service	40.648835	-73.783084	Queens
334		Taxi Stand	Taxi Stand	40.648394	-73.782141	Queens
335		Delta - Flight DL 481	Plane	40.644301	-73.788650	Queens
336		Greenbelt Nature Center	Trail	40.586616	-74.146917	Staten Island
337		LaTourette Park & Golf Course	Golf Course	40.575603	-74.147487	Staten Island
338		La Tourette Golf Course	Golf Course	40.578172	-74.148898	Staten Island
339		SUBWAY	Sandwich Place	40.587029	-74.152155	Staten Island
340		CVS pharmacy	Pharmacy	40.581150	-74.156524	Staten Island
341		Port Richmond Yatch Club	Harbor / Marina	40.584791	-74.153294	Staten Island
342		Staten island shoe repair	Shoe Store	40.583806	-74.154024	Staten Island
343		Decker Farm	Farm	40.583850	-74.154074	Staten Island
344		Greenbelt Trail	Trail	40.586655	-74.147020	Staten Island
345	MTA Bus - Forest Hill Rd & Rockland Av (S61/S9...		Bus Stop	40.588822	-74.146873	Staten Island
346		LaTourette Park	Park	40.580935	-74.156549	Staten Island

		name	categories	lat	long	Borough
347	MTA Bus - Marsh Av & Ring Rd (S44/S55/S56/S59/...)		Bus Stop	40.584248	-74.160776	Staten Island
348	MTA Bus - Travis Av & Evans St (S61/S91/X31)		Bus Stop	40.591590	-74.153850	Staten Island

Define the features sets which are part of my requirement as mentioned in introduction section and then keep only those entries in dataframe which are part of my requirement

```
In [83]: features = ['Park', 'School', 'Playground', 'Field', 'Tennis Court', 'Garden', 'Museum', 'Pharmacy', 'Supermarket', 'Medical']
borough_venues = nearby_venues_to_all_borrow
borough_venues = borough_venues[borough_venues['categories'].isin(features)]
```

Let's see it again as to how many entries are in dataframe after the non-mandatory venues has been filtered out

```
borough_venues.shape
```

Reset the index of dataframe which has been disturbed due to some rows being dropped from the previous operations

```
In [84]: borough_venues = borough_venues.reset_index(drop=True)
```

Re-order the columns of dataframe to make it more readable while having the quick view

```
In [85]: borough_venues = borough_venues.reindex(columns = ['Borough', 'categories', 'name', 'lat', 'lng'])
borough_venues
```

Out[85]:

	Borough	categories		name	lat	lng
0	Manhattan	Park		North Meadow	40.792027	-73.959853
1	Manhattan	Tennis Court		Central Park Tennis Center	40.789313	-73.961862
2	Manhattan	Field		East Meadow	40.790160	-73.955498
3	Manhattan	Park		Oldest Tree in Central Park	40.789188	-73.957867
4	Manhattan	Playground		Central Park - North Meadow Recreation Center	40.790939	-73.960304
5	Manhattan	Park		Central Park - Gate Of All Saints	40.791591	-73.964795
6	Manhattan	Museum		The Jewish Museum	40.785276	-73.957411
7	Manhattan	Park		Central Park - Woodman's Gate	40.787786	-73.955924
8	Manhattan	Park		Central Park - 99th & 5th Ave	40.788791	-73.955232
9	Manhattan	Playground		Central Park - Wild West Playground	40.789715	-73.965471
10	Manhattan	Garden		Conservatory Garden	40.793531	-73.952032
11	Manhattan	Playground		Tarr Family Playground	40.793706	-73.962432
12	Manhattan	Park		Central Park	40.784083	-73.964853
13	Manhattan	Playground		Robert Bendheim Playground	40.790254	-73.954150
14	Manhattan	Playground		Central Park - 96th Street Playground	40.787813	-73.956257
15	Manhattan	Park		Central Park West - W 88th St	40.786633	-73.968445
16	Manhattan	Park		Central Park West - W 86th St	40.785417	-73.969519
17	Manhattan	Park		North Woods	40.797970	-73.955358
18	Manhattan	Park		Central Park - Strangers' Gate	40.798237	-73.959899
19	Manhattan	Playground		Rudin Family Playground	40.791822	-73.964147
20	Manhattan	Garden		Central Park Cherry Blossoms	40.785298	-73.966694
21	Manhattan	Park		Central Park - South Gate House	40.782129	-73.962668
22	Manhattan	Garden		Arthur Ross Pinetum	40.783271	-73.966613
23	Brooklyn	Pharmacy		Rite Aid	40.650874	-73.950663
24	Brooklyn	Playground		MacDonalds Avenue Playground	40.650010	-73.949940
25	Brooklyn	Pharmacy		Duane Reade	40.655389	-73.947631
26	Brooklyn	Pharmacy		Rite Aid	40.651240	-73.938530
27	Brooklyn	Pharmacy		CVS pharmacy	40.656348	-73.950192
28	Brooklyn	School		P.S. 181	40.648974	-73.946450
29	Brooklyn	Supermarket		Key Food	40.651346	-73.938241
30	Brooklyn	Supermarket		Key Food	40.656957	-73.950417
31	Brooklyn	Supermarket		Met Food	40.647581	-73.943930
32	Brooklyn	Pharmacy		Walgreens	40.650492	-73.959789
33	Brooklyn	Supermarket		Ideal Food Basket	40.654825	-73.956265
34	The Bronx	Supermarket		Stop & Shop	40.847089	-73.843463

Borough	categories		name	lat	lng
35	The Bronx	Supermarket	Key Food	40.850759	-73.830227
36	The Bronx	Pharmacy	Walgreens	40.850767	-73.851316
37	The Bronx	Park	Westchester Square	40.844191	-73.845185
38	The Bronx	Pharmacy	Rite Aid	40.845876	-73.831214
39	The Bronx	Supermarket	Key Food	40.842300	-73.845240
40	Staten Island	Pharmacy	CVS pharmacy	40.581150	-74.156524
41	Staten Island	Park	LaTourette Park	40.580935	-74.156549

Drop the columns which are no more required for further analysis

```
In [ ]: borough_venues.drop(['name', 'lat', 'lng'], axis=1, inplace=True)
borough_venues
```

Results

Now when we are done with all the steps we intended to carry out, lets see how many venues do we have for each category in each borough.

Group each of the borough for each category of venues (the one which are part of the original requirement mentioned in introduction section)

In [88]: `borough_venues.groupby(['Borough', 'categories'])['Borough'].describe()`

Out[88]:

Borough	categories	count	unique	top	freq
	Pharmacy	5	1	Brooklyn	5
Brooklyn	Playground	1	1	Brooklyn	1
	School	1	1	Brooklyn	1
	Supermarket	4	1	Brooklyn	4
	Field	1	1	Manhattan	1
Manhattan	Garden	3	1	Manhattan	3
	Museum	1	1	Manhattan	1
	Park	11	1	Manhattan	11
	Playground	6	1	Manhattan	6
	Tennis Court	1	1	Manhattan	1
Staten Island	Park	1	1	Staten Island	1
	Pharmacy	1	1	Staten Island	1
The Bronx	Park	1	1	The Bronx	1
	Pharmacy	2	1	The Bronx	2
	Supermarket	3	1	The Bronx	3

The count column of the dataframe shows the number of venues that borough has for that category.

Discussion

The initial thought which I had before staring this exercise was that the borough 'Manhattan' which is the most corwded borough out of the five New York city is most likely to meet my requirement. Though it has more number of overall venues(23) and which is more than combined total of all other four boroughs (19), it doesn't meet my requirement and misses on not having a school within 1 Km distance from its center. This study also highlights that sometimes any specific area may not have all the facilities which anyone can expect to, though they have more number overall facilities offered by any other areas.

Though I have limite the number of venues to be 100 while getting all the nearby venues for each borough, increasing this limit doens't yeild any better results and none of the borough has more than 100 venues in range of 1 Km.

Conclusion

After analysing data and matching them against requirements, it can be concluded that the only borough which meets the requirement is 'Brooklyn' and that should be the place to which I can look forward to shift to.

In []: