# Capstone Project - The Battle of the Neighborhoods (Week 2)

## **Applied Data Science Capstone by IBM/Coursera**

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### **Introduction: Business Problem**

The objective of this project is to develop a tool that will help 2 immigrants identify the best location for opening a new ethinc resturant in New York City. The first immigrant is Mr. Lucino, a Polish immigrant, who wants to open a new Polish resturant and Mrs. Jundi, a Lebanese immigrant, who wants to open a new lebanese resturant. The new immigrants are overwhelmed looking for the best location in the NY, they want this tool to help them narrow down their options by determining the best neighborhood to open their resturants.

### **Data**

The tool will use NY city neighborhoods and boroughs database used in Week 3 lab for the list of neighborhoods and their coordinates. The database was exported as CSV file and used here. Foursquare API will be used to get the venues information. The tool will correlate all the venues categories to identify venues that open in the same proximity then it will identify neighborhoods where the new resturant category (Lebanese or Polish) is lacking.

The factors that will be considered are:

- Availablility of other venues that open within proximity of a Lebanese and Polish resturants.
- Number of existing Lebanese or Polish resturants in the neighborhood.

First, lets download all the dependencies we need.

```
In [1]:
```

```
import numpy as np # library to handle data in a vectorized manner
import pandas as pd # library for data analsysis
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
from geopy.geocoders import Nominatim # convert an address into latitude and longitude va lues
import requests # library to handle requests
from pandas.io.json import json_normalize # tranform JSON file into a pandas dataframe
# Matplotlib and associated plotting modules
import matplotlib.cm as cm
```

```
import matplotlib.colors as colors

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

import folium # map rendering library

print('Libraries imported.')
Collecting package metadata (current repodata ison): working done
```

Collecting package metadata (current\_repodata.json): ...working... done
Solving environment: ...working... done
# All requested packages already installed.
Libraries imported.

Then we upload NY neighboorhoods data from CSV file.

```
In [2]:
```

```
hoods = pd.read_csv('NY Neighborhoods.csv')
hoods.head(10)
```

#### Out[2]:

	Unnamed: 0	Borough	Neighborhood	Latitude	Longitude
0	0	Bronx	Wakefield	40.894705	-73.847201
1	1	Bronx	Co-op City	40.874294	-73.829939
2	2	Bronx	Eastchester	40.887556	-73.827806
3	3	Bronx	Fieldston	40.895437	-73.905643
4	4	Bronx	Riverdale	40.890834	-73.912585
5	5	Bronx	Kingsbridge	40.881687	-73.902818
6	6	Manhattan	Marble Hill	40.876551	-73.910660
7	7	Bronx	Woodlawn	40.898273	-73.867315
8	8	Bronx	Norwood	40.877224	-73.879391
9	9	Bronx	Williamsbridge	40.881039	-73.857446

Here we define our Foursquare API credentials.

```
In [3]:
```

```
CLIENT_ID = 'W5Y2SJWEORJOICYFVOD4PQNIWW3D00NKLT302I21GMAM3CQB' # your Foursquare ID
CLIENT_SECRET = 'K3ILU01A43TQRFNXAABVNDFLKK5INNLFXXFII2GN0PK15PNF' # your Foursquare Secr
et
VERSION = '20180605' # Foursquare API version
LIMIT = 100 # A default Foursquare API limit value
```

We create getNearbyVenues function that we will use to retreive venues information for each neighborhood.

#### In [4]:

```
VERSION,
            lat,
            lng,
            radius,
            LIMIT)
        # make the GET request
        results = requests.get(url).json()["response"]['groups'][0]['items']
        # return only relevant information for each nearby venue
        venues list.append([(
            name,
            lat,
            lng,
            v['venue']['name'],
            v['venue']['location']['lat'],
            v['venue']['location']['lng'],
            v['venue']['categories'][0]['name']) for v in results])
    nearby venues = pd.DataFrame([item for venue list in venues list for item in venue 1
ist])
    nearby_venues.columns = ['Neighborhood',
                  'Neighborhood Latitude',
                  'Neighborhood Longitude',
                  'Venue',
                  'Venue Latitude',
                  'Venue Longitude',
                  'Venue Category']
    return (nearby venues)
```

We use getNearbyVenues to get the list of top 100 venues in each neighborhood in NY.

Woodlawn Norwood Williamsbridge Baychester Pelham Parkway City Island Bedford Park University Heights Morris Heights Fordham East Tremont West Farms High Bridge Melrose Mott Haven Port Morris Longwood Hunts Point Morrisania Soundview Clason Point Throgs Neck Country Club Parkchester

westcnester Square Van Nest Morris Park Belmont Spuyten Duyvil North Riverdale Pelham Bay Schuylerville Edgewater Park Castle Hill Olinville Pelham Gardens Concourse Unionport Edenwald Bay Ridge Bensonhurst Sunset Park Greenpoint Gravesend Brighton Beach Sheepshead Bay Manhattan Terrace Flatbush Crown Heights East Flatbush Kensington Windsor Terrace Prospect Heights Brownsville Williamsburg Bushwick Bedford Stuyvesant Brooklyn Heights Cobble Hill Carroll Gardens Red Hook Gowanus Fort Greene Park Slope Cypress Hills East New York Starrett City Canarsie Flatlands Mill Island Manhattan Beach Coney Island Bath Beach Borough Park Dyker Heights Gerritsen Beach Marine Park Clinton Hill Sea Gate Downtown Boerum Hill Prospect Lefferts Gardens Ocean Hill City Line Bergen Beach Midwood Prospect Park South Georgetown East Williamsburg North Side South Side Ocean Parkway Fort Hamilton Chinatown Washington Heights Inwood

наmiiton неignts Manhattanville Central Harlem

East Harlem

Upper East Side

Yorkville

Lenox Hill

Roosevelt Island

Upper West Side

Lincoln Square

Clinton

Midtown

Murray Hill

Chelsea

Greenwich Village

East Village

Lower East Side

Tribeca

Little Italy

Soho

West Village

Manhattan Valley

Morningside Heights

Gramercy

Battery Park City

Financial District

Astoria

Woodside

Jackson Heights

Elmhurst

Howard Beach

Corona

Forest Hills

Kew Gardens

Richmond Hill

Flushing

Long Island City

Sunnyside

East Elmhurst

Maspeth

Ridgewood

Glendale

Rego Park

Woodhaven

Ozone Park

South Ozone Park

College Point

Whitestone

Bayside

Auburndale

Little Neck

Douglaston

Glen Oaks

Bellerose

Kew Gardens Hills

Fresh Meadows

Briarwood

Jamaica Center

Oakland Gardens

Queens Village

Hollis

South Jamaica

St. Albans

Rochdale

Springfield Gardens

Cambria Heights

Rosedale

Far Rockaway

Broad Channel Breezy Point

Steinway

Beechhurst

\_ \_

вау Terrace Edgemere Arverne Rockaway Beach Neponsit Murray Hill Floral Park Holliswood Jamaica Estates Queensboro Hill Hillcrest Ravenswood Lindenwood Laurelton Lefrak City Belle Harbor Rockaway Park Somerville Brookville Bellaire North Corona Forest Hills Gardens St. George New Brighton Stapleton Rosebank West Brighton Grymes Hill Todt Hill South Beach Port Richmond Mariner's Harbor Port Ivory Castleton Corners New Springville Travis New Dorp Oakwood Great Kills Eltingville Annadale Woodrow Tottenville Tompkinsville Silver Lake Sunnyside Ditmas Park Wingate Rugby Park Hill Westerleigh Graniteville Arlington Arrochar Grasmere Old Town Dongan Hills Midland Beach Grant City New Dorp Beach Bay Terrace Huguenot Pleasant Plains Butler Manor Charleston Rossville Arden Heights Greenridge Heartland Village Chelsea Bloomfield Bulls Head

Carnegie Hill Noho Civic Center Midtown South Richmond Town Shore Acres Clifton Concord Emerson Hill Randall Manor Howland Hook Elm Park Remsen Village New Lots Paerdegat Basin Mill Basin Jamaica Hills Utopia Pomonok Astoria Heights Claremont Village Concourse Village Mount Eden Mount Hope Sutton Place Hunters Point Turtle Bay Tudor City Stuyvesant Town Flatiron Sunnyside Gardens Blissville Fulton Ferry Vinegar Hill Weeksville Broadway Junction Dumbo Manor Heights Willowbrook Sandy Ground Egbertville Roxbury Homecrest Middle Village Prince's Bay Lighthouse Hill Richmond Valley Malba Highland Park Madison Bronxdale Allerton Kingsbridge Heights Erasmus Hudson Yards Hammels Bayswater Queensbridge

# let's examine the shape and data of venues dataframe

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-- - - - -

#### In [6]:

Fox Hills

```
print(venues.shape)
venues.head(5)
```

(10177, 7)

#### Out[6]:

	Neighborhood Neighborhood	Neighborhood Neighborhood Latitude	Neighborhood Neighborhood Longitude Longitude	Venue Venue	Venue LaXRUUS Latitude	Venue LongftUde Longitude	Venue Venue Category Category
0	Wakefield	40.894705	-73.847201	Lollipops Gelato	40.894123	-73.845892	Dessert Shop
1	Wakefield	40.894705	-73.847201	Rite Aid	40.896649	-73.844846	Pharmacy
2	Wakefield	40.894705	-73.847201	Walgreens	40.896528	-73.844700	Pharmacy
3	Wakefield	40.894705	-73.847201	Carvel Ice Cream	40.890487	-73.848568	Ice Cream Shop
4	Wakefield	40.894705	-73.847201	Dunkin'	40.890459	-73.849089	<b>Donut Shop</b>

Let's see how many unique venue categories there are

```
In [7]:
```

```
print('There are {} uniques categories.'.format(len(venues['Venue Category'].unique())))
```

There are 439 uniques categories.

# Methodology

We will use the venue categories to create 2 venue profiles of each neighborhood. One for the count of the venues and one for the mean. The mean profile will be used to corrolate then venues categories to identify venues that open in the same proximity of Lebanese and Polish restaurants. The count profile will be used to identify the neighborhoods where Lebanese and Polish restaurants are lacking. The neigborhoods will be ranked depending on their profile corrolation and availability of Polish or Lebanese restaurants. Two maps will be generated with markers that indicate the neighborhoods rankings.

# **Analysis**

Now, we will create a new dataframe with the neighborhood and the number of venues in each category

```
In [8]:
```

```
hotVenues = pd.get_dummies(venues[['Venue Category']], prefix="", prefix_sep="")

# add neighborhood column back to dataframe
hotVenues['Neighborhood'] = venues['Neighborhood']

# move neighborhood column to the first column
#fixed_columns = [toronto_onehot.columns[-1]] + list(toronto_onehot.columns[:-1])
#toronto_onehot = toronto_onehot[fixed_columns]
mid = hotVenues['Neighborhood']
hotVenues.drop(labels=['Neighborhood'], axis=1,inplace = True)
hotVenues.insert(0, 'Neighborhood', mid)
hotVenues.head()
```

Out[8]:

	Neighborhood	ATM	Accessories Store	Acupuncturist	Adult Boutique	Afghan Restaurant	African Restaurant		Antique Shop	Arcade	Are <sub>l</sub> Restaura
0	Wakefield	0	0	0	0	0	0	0	0	0	
1	Wakefield	0	0	0	0	0	0	0	0	0	
2	Wakefield	0	0	0	0	0	0	0	0	0	
3	Wakefield	0	0	0	0	0	0	0	0	0	
4	Wakefield	0	0	0	0	0	0	0	0	0	
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Then we create two grouped datasets, one grouped by the mean of the venues count (meanHoods) and one by the count of venues (countHoods). meanHoods will be used to correlate venues and count to determine neighborhoods with low Polish or Lebanese resturants.

```
In [9]:
```

```
meanHoods = hotVenues.groupby('Neighborhood').mean().reset_index()
print(meanHoods.shape)
meanHoods.head()
```

(302, 439)

Out[9]:

	Neighborhood	ATM	Accessories Store	Acupuncturist	Adult Boutique	Afghan Restaurant	African Restaurant	American Restaurant	Antique Shop	Arcade	Are <sub>l</sub> Restaura
0	Allerton	0.0	0.0	0.0	0.0	0.0	0.0	0.00	0.0	0.0	C
1	Annadale	0.0	0.0	0.0	0.0	0.0	0.0	0.00	0.0	0.0	С
2	Arden Heights	0.0	0.0	0.0	0.0	0.0	0.0	0.00	0.0	0.0	С
3	Arlington	0.0	0.0	0.0	0.0	0.0	0.0	0.25	0.0	0.0	С
4	Arrochar	0.0	0.0	0.0	0.0	0.0	0.0	0.00	0.0	0.0	С
4											· ·

#### In [10]:

```
countHoods = hotVenues.groupby('Neighborhood').sum().reset_index()
print(countHoods.shape)
countHoods.head()
```

(302, 439)

Out[10]:

	Neighborhood	ATM	Accessories Store	Acupuncturist	Adult Boutique	Afghan Restaurant			Antique Shop	Arcade	Are <sub>l</sub> Restaura
0	Allerton	0	0	0	0	0	0	0	0	0	
1	Annadale	0	0	0	0	0	0	0	0	0	
2	Arden Heights	0	0	0	0	0	0	0	0	0	
3	Arlington	0	0	0	0	0	0	1	0	0	
4	Arrochar	0	0	0	0	0	0	0	0	0	
4											Þ

Then we create normalized dataframes for the correlation of venues with Lebanese and Polish resturants.

# In [207]:

```
from sklearn import preprocessing

venuesCorr = meanHoods.corr()
lebCorr = venuesCorr[["Lebanese Restaurant"]]
polCorr = venuesCorr[[ "Polish Restaurant"]]

# Normalizing the dataframes

lebArr = lebCorr.values #returns a numpy array
min_max_scaler = preprocessing.MinMaxScaler()
lebArr = min_max_scaler.fit_transform(lebArr)
lebCorr["Weight"] = lebArr
```

```
lebCorr = lebCorr.drop(columns = "Lebanese Restaurant")
lebCorr = lebCorr.drop("Lebanese Restaurant") #remove Lebanese Restaurant form the list

polArr = polCorr.values #returns a numpy array

polArr = min_max_scaler.fit_transform(polArr)
polCorr["Weight"] = polArr
polCorr = polCorr.drop(columns = "Polish Restaurant")
polCorr = polCorr.drop("Polish Restaurant") #remove Polish Restaurant form the list

print(lebCorr)
print(polCorr)
```

ATM		
Accessories Store	ашм	_
Acupuncturist Adult Boutique Adult Boutique Afghan Restaurant Afghan Restaurant Acipuna R		
Adult Boutique Afghan Restaurant African Restaurant O.042205 African Restaurant O.043398 American Restaurant O.054035 Antique Shop O.040049 Arcade O.043319 Arepa Restaurant O.038612 Argentinian Restaurant O.038612 Argentinian Restaurant O.038121 Art Gallery O.028397 Art Museum O.041968 Arts & Crafts Store O.038151 Arts & Entertainment O.042302 Asian Restaurant O.049422 Athletics & Sports O.034779 Auditorium O.044142 Australian Restaurant O.039620 Australian Restaurant O.042277 Auto Garage O.043186 Auto Workshop O.042004 Automotive Shop O.042016 BBQ Joint O.030472 Baby Store Bapl Shop Bakery O.041109 Bakery O.087846 Bank O.020975 Bar Baseball Field O.034996 Baseball Stadium O.043519 Basketball Court Dasheth House Beach Bar Baseball Field Baseball Stadium O.043519 Basketball Court Dasheth House Beach Bar Baseball Field Baseball Stadium O.043519 Basketball Court Beach Bar O.044142 Beach Bear Garden O.075412 Beach Bar O.044142 Beach Bar O.044142 Beach Bear Store O.039033 Bike Rental / Bike Share O.041055 Bike Shop Board Shop Doard Shop Doard Shop Board Sh		
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Bar       0.036849         Baseball Field       0.034996         Baseball Stadium       0.043519         Basketball Court       0.036221         Bath House       0.044142         Beach       0.035412         Beach Bar       0.044142         Beer Bar       0.358172         Beer Garden       0.177488         Beer Store       0.197035         Big Box Store       0.039033         Bike Rental / Bike Share       0.041055         Bike Shop       0.042621         Bike Trail       0.270431         Bistro       0.036709         Board Shop       0.037916         Bookstore       0.026079         Boutique       0.249256         Bowling Alley       0.037673         Boxing Gym       0.034578         Brazilian Restaurant       0.038855         Breakfast Spot       0.027317         Brewery       0.037064         Bridal Shop       0.044142         Bridge       0.040617	<del>-</del>	
Baseball Field       0.034996         Baseball Stadium       0.043519         Basketball Court       0.036221         Bath House       0.044142         Beach       0.035412         Beach Bar       0.044142         Beer Bar       0.358172         Beer Garden       0.177488         Beer Store       0.197035         Big Box Store       0.039033         Bike Rental / Bike Share       0.041055         Bike Shop       0.042621         Bike Trail       0.270431         Bistro       0.036709         Board Shop       0.037319         Boat or Ferry       0.037916         Bookstore       0.026079         Boutique       0.249256         Bowling Alley       0.037673         Boxing Gym       0.034578         Brazilian Restaurant       0.03855         Breakfast Spot       0.027317         Brewery       0.037064         Bridal Shop       0.044142         Bridge       0.040617	Bank	
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Basketball Court       0.036221         Bath House       0.044142         Beach       0.035412         Beach Bar       0.044142         Beer Bar       0.358172         Beer Garden       0.177488         Beer Store       0.197035         Big Box Store       0.039033         Bike Rental / Bike Share       0.041055         Bike Shop       0.042621         Bike Trail       0.270431         Bistro       0.036709         Board Shop       0.037319         Boat or Ferry       0.037916         Bookstore       0.026079         Boutique       0.249256         Bowling Alley       0.037673         Boxing Gym       0.034578         Brazilian Restaurant       0.038855         Breakfast Spot       0.027317         Brewery       0.037064         Bridal Shop       0.044142         Bridge       0.040617		
Bath House       0.044142         Beach       0.035412         Beach Bar       0.044142         Beer Bar       0.358172         Beer Garden       0.177488         Beer Store       0.197035         Big Box Store       0.039033         Bike Rental / Bike Share       0.041055         Bike Shop       0.042621         Bike Trail       0.270431         Bistro       0.036709         Board Shop       0.037319         Boat or Ferry       0.037916         Bookstore       0.026079         Boutique       0.249256         Bowling Alley       0.037673         Boxing Gym       0.034578         Brazilian Restaurant       0.038855         Breakfast Spot       0.027317         Brewery       0.037064         Bridal Shop       0.044142         Bridge       0.040617		
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Beach Bar       0.044142         Beer Garden       0.177488         Beer Store       0.197035         Big Box Store       0.039033         Bike Rental / Bike Share       0.041055         Bike Shop       0.042621         Bike Trail       0.270431         Bistro       0.036709         Board Shop       0.037319         Boat or Ferry       0.037916         Bookstore       0.026079         Boutique       0.249256         Bowling Alley       0.037673         Boxing Gym       0.034578         Brazilian Restaurant       0.038855         Brewery       0.037064         Bridal Shop       0.044142         Bridge       0.040617		
Beer Bar       0.358172         Beer Garden       0.177488         Beer Store       0.197035         Big Box Store       0.039033         Bike Rental / Bike Share       0.041055         Bike Shop       0.042621         Bike Trail       0.270431         Bistro       0.036709         Board Shop       0.037319         Boat or Ferry       0.037916         Bookstore       0.026079         Boutique       0.249256         Bowling Alley       0.037673         Boxing Gym       0.034578         Brazilian Restaurant       0.038855         Brewery       0.037064         Bridal Shop       0.044142         Bridge       0.040617		
Beer Garden       0.177488         Beer Store       0.197035         Big Box Store       0.039033         Bike Rental / Bike Share       0.041055         Bike Shop       0.042621         Bike Trail       0.270431         Bistro       0.036709         Board Shop       0.037319         Boat or Ferry       0.037916         Bookstore       0.026079         Boutique       0.249256         Bowling Alley       0.037673         Boxing Gym       0.034578         Brazilian Restaurant       0.038855         Breakfast Spot       0.027317         Brewery       0.037064         Bridal Shop       0.044142         Bridge       0.040617		
Beer Store       0.197035         Big Box Store       0.039033         Bike Rental / Bike Share       0.041055         Bike Shop       0.042621         Bike Trail       0.270431         Bistro       0.036709         Board Shop       0.037319         Boat or Ferry       0.037916         Bookstore       0.026079         Boutique       0.249256         Bowling Alley       0.037673         Boxing Gym       0.034578         Brazilian Restaurant       0.038855         Breakfast Spot       0.027317         Brewery       0.037064         Bridal Shop       0.044142         Bridge       0.040617		
Big Box Store       0.039033         Bike Rental / Bike Share       0.041055         Bike Shop       0.042621         Bike Trail       0.270431         Bistro       0.036709         Board Shop       0.037319         Boat or Ferry       0.037916         Bookstore       0.026079         Boutique       0.249256         Bowling Alley       0.037673         Boxing Gym       0.034578         Brazilian Restaurant       0.038855         Breakfast Spot       0.027317         Brewery       0.037064         Bridal Shop       0.044142         Bridge       0.040617		
Bike Rental / Bike Share       0.041055         Bike Shop       0.042621         Bike Trail       0.270431         Bistro       0.036709         Board Shop       0.037319         Boat or Ferry       0.037916         Bookstore       0.026079         Boutique       0.249256         Bowling Alley       0.037673         Boxing Gym       0.034578         Brazilian Restaurant       0.038855         Breakfast Spot       0.027317         Brewery       0.037064         Bridal Shop       0.044142         Bridge       0.040617		
Bike Shop       0.042621         Bike Trail       0.270431         Bistro       0.036709         Board Shop       0.037319         Boat or Ferry       0.037916         Bookstore       0.026079         Boutique       0.249256         Bowling Alley       0.037673         Boxing Gym       0.034578         Brazilian Restaurant       0.038855         Breakfast Spot       0.027317         Brewery       0.037064         Bridal Shop       0.044142         Bridge       0.040617	2	
Bike Trail       0.270431         Bistro       0.036709         Board Shop       0.037319         Boat or Ferry       0.037916         Bookstore       0.026079         Boutique       0.249256         Bowling Alley       0.037673         Boxing Gym       0.034578         Brazilian Restaurant       0.038855         Breakfast Spot       0.027317         Brewery       0.037064         Bridal Shop       0.044142         Bridge       0.040617	•	
Bistro       0.036709         Board Shop       0.037319         Boat or Ferry       0.037916         Bookstore       0.026079         Boutique       0.249256         Bowling Alley       0.037673         Boxing Gym       0.034578         Brazilian Restaurant       0.038855         Breakfast Spot       0.027317         Brewery       0.037064         Bridal Shop       0.044142         Bridge       0.040617		
Board Shop       0.037319         Boat or Ferry       0.037916         Bookstore       0.026079         Boutique       0.249256         Bowling Alley       0.037673         Boxing Gym       0.034578         Brazilian Restaurant       0.038855         Breakfast Spot       0.027317         Brewery       0.037064         Bridal Shop       0.044142         Bridge       0.040617		
Boat or Ferry       0.037916         Bookstore       0.026079         Boutique       0.249256         Bowling Alley       0.037673         Boxing Gym       0.034578         Brazilian Restaurant       0.038855         Breakfast Spot       0.027317         Brewery       0.037064         Bridal Shop       0.044142         Bridge       0.040617		
Bookstore       0.026079         Boutique       0.249256         Bowling Alley       0.037673         Boxing Gym       0.034578         Brazilian Restaurant       0.038855         Breakfast Spot       0.027317         Brewery       0.037064         Bridal Shop       0.044142         Bridge       0.040617		
Boutique       0.249256         Bowling Alley       0.037673         Boxing Gym       0.034578         Brazilian Restaurant       0.038855         Breakfast Spot       0.027317         Brewery       0.037064         Bridal Shop       0.044142         Bridge       0.040617		
Bowling Alley       0.037673         Boxing Gym       0.034578         Brazilian Restaurant       0.038855         Breakfast Spot       0.027317         Brewery       0.037064         Bridal Shop       0.044142         Bridge       0.040617		
Boxing Gym       0.034578         Brazilian Restaurant       0.038855         Breakfast Spot       0.027317         Brewery       0.037064         Bridal Shop       0.044142         Bridge       0.040617		
Brazilian Restaurant 0.038855 Breakfast Spot 0.027317 Brewery 0.037064 Bridal Shop 0.044142 Bridge 0.040617		
Breakfast Spot       0.027317         Brewery       0.037064         Bridal Shop       0.044142         Bridge       0.040617		
Brewery       0.037064         Bridal Shop       0.044142         Bridge       0.040617		
Bridal Shop         0.044142           Bridge         0.040617		
Bridge 0.040617	<u> -</u>	
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Bubble Tea Shop 0.081596	Bubble Tea Shop	0.081596
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D (C )	0.00004
Buffet Building	0.038824 0.038797
Burger Joint	0.054590
Burmese Restaurant	0.044142
Burrito Place	0.125179
Bus Line	0.038996
Bus Station	0.019441
Bus Stop	0.025509
Business Service	0.040763
Butcher	0.039670
Cafeteria	0.044142
Café Caium / Craala Bastaumant	0.042422 0.037683
Cajun / Creole Restaurant Camera Store	0.037663
Campground	0.041302
Candy Store	0.061405
Cantonese Restaurant	0.040405
Caribbean Restaurant	0.032785
Caucasian Restaurant	0.042314
Cha Chaan Teng	0.044142
Check Cashing Service	0.035700
Cheese Shop	0.035225
Chinese Restaurant	0.042478
Chocolate Shop Church	0.039620
Circus	0.042425 0.044142
Climbing Gym	0.039922
Clothing Store	0.133704
Club House	0.040841
Cocktail Bar	0.051688
Coffee Shop	0.078034
College Academic Building	0.043600
College Arts Building	0.044142
College Basketball Court	0.044142
College Bookstore	0.044142
College Cafeteria	0.042972
College Gym College Theater	0.044142 0.044142
Colombian Restaurant	0.044142
Comedy Club	0.132329
Comfort Food Restaurant	0.043281
Comic Shop	0.043039
Community Center	0.042987
Concert Hall	0.040020
Construction & Landscaping	0.042488
Convenience Store	0.026354
Cooking School	0.044142
Cosmetics Shop	0.075550 0.044142
Costume Shop Coworking Space	0.044142
Creperie	0.156969
Cuban Restaurant	0.113025
Cultural Center	0.044142
Cupcake Shop	0.038637
Cycle Studio	0.030646
Czech Restaurant	0.044142
Dance Studio	0.036350
Daycare	0.043638
Deli / Bodega	0.011237
Department Store	0.104187
Dessert Shop Dim Sum Restaurant	0.123662 0.038346
Dimer	0.038346
Discount Store	0.017223
Distillery	0.043155
Dive Bar	0.039453
Dive Shop	0.044142
Doctor's Office	0.039175
Dog Run	0.041190
Donut Shop	0.00000
Dosa Place	0.044142
Drugstore	0.044142

Dry Cleaner	0.041654
Dumpling Restaurant	0.037591
Duty-free Shop	0.044142
Eastern European Restaurant	0.089698
Electronics Store	0.081470
Empanada Restaurant English Restaurant	0.042660 0.720229
Entertainment Service	0.720229
Ethiopian Restaurant	0.038166
Event Service	0.044142
Event Space	0.034977
Exhibit	0.043523
Factory Falafel Restaurant	0.044142 0.033795
Farm	0.041679
Farmers Market	0.031076
Fast Food Restaurant	0.015633
Field	0.044142
Filipino Restaurant Fish & Chips Shop	0.038541 0.040686
Fish Market	0.036370
Fishing Store	0.044142
Flea Market	0.039622
Flower Shop	0.032407
Food	0.031839
Food & Drink Shop Food Court	0.034692 0.035969
Food Stand	0.042866
Food Truck	0.027102
Fountain	0.042533
French Restaurant	0.153229
Fried Chicken Joint	0.017528 0.100796
Frozen Yogurt Shop Fruit & Vegetable Store	0.100798
Furniture / Home Store	0.065127
Gaming Cafe	0.277542
Garden	0.037384
Garden Center	0.038022
Gas Station Gastropub	0.030996 0.032361
Gay Bar	0.032301
General Entertainment	0.042555
German Restaurant	0.038265
Gift Shop	0.027922
Gluten-free Restaurant Go Kart Track	0.044142 0.044142
Golf Course	0.042401
Gourmet Shop	0.179342
Greek Restaurant	0.124724
Grocery Store	0.024493
Gym	0.074505
Gym / Fitness Center Gym Pool	0.093956 0.044142
Gymnastics Gym	0.042235
Halal Restaurant	0.040864
Harbor / Marina	0.038380
Hardware Store	0.150019
Hawaiian Restaurant Health & Beauty Service	0.039024 0.086386
Health Food Store	0.036335
Heliport	0.043186
Herbs & Spices Store	0.044142
High School	0.044142
Hill	0.044142
Himalayan Restaurant Historic Site	0.040875 0.041647
History Museum	0.096318
Hobby Shop	0.097706
Home Service	0.037572
Hookah Bar	0.033752
Hostel Hot Dog Joint	0.042161 0.040842
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II.L.I	0.050050
Hotel Hotel Bar	0.058950 0.035928
Hotel Pool	0.044142
Hotpot Restaurant	0.040292
Ice Cream Shop	0.056292
Indian Restaurant	0.193357
Indie Movie Theater	0.088736
Indie Theater	0.038941
Indonesian Restaurant	0.044142
Indoor Play Area	0.042793
Insurance Office	0.044142
Intersection Irish Pub	0.041536 0.087557
Irish Pub Israeli Restaurant	0.040085
Italian Restaurant	0.138534
Japanese Curry Restaurant	0.041366
Japanese Restaurant	0.044288
Jazz Club	0.147327
Jewelry Store	0.035970
Jewish Restaurant	0.042283
Juice Bar	0.051735
Karaoke Bar	0.035383
Kebab Restaurant	0.042347
Kids Store	0.034323
Korean BBQ Restaurant Korean Restaurant	0.044142 0.034339
Kosher Restaurant	0.040463
Lake	0.040405
Latin American Restaurant	0.042558
Laundromat	0.038737
Laundry Service	0.042277
Lawyer	0.039981
Leather Goods Store	0.521138
Library	0.041355
Lingerie Store	0.213058
Liquor Store	0.033098
Lourge	0.042159
Lounge Malay Restaurant	0.027779 0.042335
Marine Terminal	0.042333
Market.	0.039272
Martial Arts School	0.036492
Massage Studio	0.041110
Mattress Store	0.033877
Medical Center	0.044142
Mediterranean Restaurant	0.195922
Memorial Site	0.044142
Men's Store	0.033777
Metro Station	0.029240
Mexican Restaurant Middle Eastern Restaurant	0.037101 0.080654
Mini Golf	0.044142
Miscellaneous Shop	0.035297
Mobile Phone Shop	0.021484
Modern European Restaurant	0.042286
Molecular Gastronomy Restaurant	0.044142
Monument / Landmark	0.040001
Moroccan Restaurant	0.042277
Motorcycle Shop	0.041954
Movie Theater	0.036880
Moving Target	0.034973
Multiplex	0.044142
Music School	0.037228
Music School Music Store	0.042347 0.039811
Music Store Music Venue	0.039811
Nail Salon	0.035483
Nature Preserve	0.033403
New American Restaurant	0.088108
Newsstand	0.040838
Nightclub	0.038510
Nightlife Spot	0.044142
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Non-Profit	0.042751
Noodle House	0.035808
North Indian Restaurant	0.042338
Office	0.039722
Opera House Optical Shop	0.042902
Organic Grocery	0.038554
Other Great Outdoors	0.039268
Other Nightlife	0.043883
Other Repair Shop	0.041089
Outdoor Gym Outdoor Sculpture	0.044142
Outdoors & Recreation	0.038992
Outlet Mall	0.044142
Outlet Store	0.043015
Paella Restaurant	0.042280
Pakistani Restaurant Paper / Office Supplies Store	0.044142
Park	0.030330
Pastry Shop	0.044142
Pedestrian Plaza	0.043293
Performing Arts Venue	0.031948
Perfume Shop Persian Restaurant	0.044142
Peruvian Restaurant	0.720229
Peruvian Roast Chicken Joint	0.044142
Pet Café	0.041191
Pet Service	0.041874
Pet Store Pharmacy	0.023637
Photography Studio	0.043628
Physical Therapist	0.044142
Piano Bar	0.042277
Pie Shop Pier	0.040009 0.043710
Piercing Parlor	0.043710
Pilates Studio	0.228089
Pizza Place	0.022899
Platform	0.044142
Playground Plaza	0.036676 0.032191
Poke Place	0.032191
Polish Restaurant	0.039708
Pool	0.042024
Pool Hall	0.040962
Portuguese Restaurant Post Office	0.044142
Pub	0.041420
Public Art	0.043028
Puerto Rican Restaurant	0.042288
Racetrack Ramen Restaurant	0.043164
Record Shop	0.109007 0.159487
Recording Studio	0.043951
Recreation Center	0.043661
Rental Car Location	0.035927
Rental Service	0.043417
Residential Building (Apartment / Condo) Resort	0.030380
Rest Area	0.043985
Restaurant	0.053996
River	0.043686
Rock Climbing Spot Rock Club	0.044142
Roller Rink	0.039004
Romanian Restaurant	0.044142
Roof Deck	0.037149
Russian Restaurant	0.040068
Sake Bar Salad Place	0.042122
Salon / Barbershop	0.068817
Sandwich Place	0.028423

	0 044140
Scandinavian Restaurant Scenic Lookout	0.044142
School	0.031030
Sculpture Garden	0.041933
Seafood Restaurant	0.107538
Shabu-Shabu Restaurant	0.044142
Shanghai Restaurant	0.038328
Shipping Store	0.032170
Shoe Repair	0.720229
Shoe Store	0.070900
Shop & Service Shopping Mall	0.041880 0.036058
Skate Park	0.036036
Skating Rink	0.039963
Ski Area	0.044142
Smoke Shop	0.084384
Smoothie Shop	0.044142
Snack Place	0.159812
Soccer Field	0.042052
Social Club	0.043131
Soup Place South American Restaurant	0.043881 0.034158
South Indian Restaurant	0.034138
Southern / Soul Food Restaurant	0.038277
Souvlaki Shop	0.044142
Spa	0.055646
Spanish Restaurant	0.021132
Speakeasy	0.036187
Sporting Goods Shop	0.096727
Sports Bar	0.036203
Sports Club Sri Lankan Restaurant	0.042255 0.044142
Stadium	0.044142
State / Provincial Park	0.044142
Stationery Store	0.042344
Steakhouse	0.076068
Storage Facility	0.039298
Street Art	0.042278
Strip Club	0.521138
Supermarket	0.017622
Supplement Shop Surf Spot	0.031157 0.043661
Sushi Restaurant	0.094909
Swiss Restaurant	0.044142
Szechuan Restaurant	0.236580
Taco Place	0.025998
Tailor Shop	0.039821
Taiwanese Restaurant	0.039328
Tanning Salon	0.044142
Tapas Restaurant Tattoo Parlor	0.125586 0.037314
Tea Room	0.037314
Tech Startup	0.044142
Tennis Court	0.059921
Tennis Stadium	0.042317
Tex-Mex Restaurant	0.044142
Thai Restaurant	0.048269
Theater	0.031413
Theme Park Theme Park Ride / Attraction	0.042604 0.041851
Thrift / Vintage Store	0.034814
Tibetan Restaurant	0.042387
Tiki Bar	0.040359
Toll Plaza	0.044142
Tourist Information Center	0.042959
Toy / Game Store	0.035531
Track	0.041058
Trail	0.039195
Train Train Station	0.044142
Train Station Tree	0.031212 0.044142
Turkish Restaurant	0.044142

Used Bookstore 0.040935 Vape Store 0.042390 Varenyky restaurant 0.041412 Vegetarian / Vegan Restaurant 0.117276 Venezuelan Restaurant 0.04216 Veterinarian 0.04216 Video Game Store 0.031643 Video Store 0.036578 Vietnamese Restaurant 0.194102 Varenyky for 0.041412 Warehouse Store 0.036578 Vietnamese Restaurant 0.194102 Waster Facility 0.044142 Warehouse Store 0.043021 Waste Facility 0.044142 Waterfront 0.043936 Weight Loss Center 0.043319 Whisky Bar 0.063936 Wine Shop 0.051665 Wings Joint 0.034706 Women's Store 0.028755 Vemeni Restaurant 0.044142 Yoga Studio 0.089596 Accessories Store 0.05219 Accessories Store 0.051219 Accessories Store 0.051219 Afghan Restaurant 0.05451 American Restaurant 0.055451 American Restaurant 0.055451 Arepa Restaurant 0.055451 Arepa Restaurant 0.055451 Arepa Restaurant 0.033799 African Restaurant 0.055451 Arepa Restaurant 0.048625 Art Gallery 0.036680 Art & Crafts Store 0.068008 Art & Cra		0 501130
Varenyky restaurant         0.042390           Varenyky restaurant         0.044142           Vegetarian / Vegan Restaurant         0.117276           Venezuelan Restaurant         0.044142           Veterinarian         0.042416           Video Game Store         0.031843           Videnamese Restaurant         0.194102           Volleyball Court         0.044142           Warehouse Store         0.043021           Waster Facility         0.044142           Waterfront         0.04306           Weight Loss Center         0.043319           Whisky Bar         0.040134           Wine Bar         0.056396           Wine Shop         0.051665           Wings Joint         0.034706           Women's Store         0.028755           Yemeni Restaurant         0.044142           Yoga Studio         0.089596           Accessories Store         0.051665           Accessories Store         0.051219           Accessories Store         0.051219           Accessories Store         0.051219           Accessories Store         0.055480           Adult Boutique         0.05680           Affjan Restaurant         0.055481	Udon Restaurant	0.521138
Varenyky restaurant Vegetarian / Vegan Restaurant Venezuelan Restaurant Venezuelan Restaurant Veterinarian Video Game Store Video Store Vietnamese Restaurant Video Store Vietnamese Restaurant Volleyball Court Volleyball Court Volleyball Court Warehouse Store Vietnamese Restaurant Volleyball Court Waste Facility Volleyball Court Waterfront Weight Loss Center Whisky Bar Video Store Vietnamese Restaurant Volleyball Court Waterfront Weight Loss Center Vietnamese Store Vietnamese Volleyball Vietnamese Voll		
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Baby Store       0.056480         Bagel Shop       0.130814         Bakery       0.184234         Bank       0.041872         Bar       0.065711         Baseball Field       0.043819         Baseball Stadium       0.055618         Basketball Court       0.045515         Bath House       0.056480         Beach       0.056480         Beach Bar       0.056480         Beer Bar       0.099008         Beer Garden       0.043802         Beer Store       0.107021         Big Box Store       0.061494         Bike Rental / Bike Share       0.052206         Bike Shop       0.054374         Bike Trail       0.050856         Bistro       0.046192         Board Shop       0.047036         Boat or Ferry       0.047862         Bookstore       0.053060         Boutique       0.073023         Bowling Alley       0.047526	<del>_</del>	0.053538
Bagel Shop       0.130814         Bakery       0.184234         Bank       0.041872         Bar       0.065711         Baseball Field       0.043819         Baseball Stadium       0.055618         Basketball Court       0.045515         Bath House       0.056480         Beach       0.054395         Beach Bar       0.056480         Beer Bar       0.099008         Beer Garden       0.043802         Beer Store       0.107021         Big Box Store       0.061494         Bike Rental / Bike Share       0.052206         Bike Shop       0.054374         Bike Trail       0.050856         Bistro       0.047036         Board Shop       0.047036         Boat or Ferry       0.047862         Bookstore       0.053060         Boutique       0.073023         Bowling Alley       0.047526	BBQ Joint	
Bakery       0.184234         Bar       0.065711         Baseball Field       0.043819         Baseball Stadium       0.055618         Basketball Court       0.045515         Bath House       0.056480         Beach       0.04395         Beach Bar       0.056480         Beer Bar       0.099008         Beer Garden       0.043802         Beer Store       0.107021         Big Box Store       0.061494         Bike Rental / Bike Share       0.052206         Bike Shop       0.054374         Bistro       0.046192         Board Shop       0.047036         Boat or Ferry       0.047862         Bookstore       0.053060         Boutique       0.073023         Bowling Alley       0.047526		
Bank       0.041872         Bar       0.065711         Baseball Field       0.043819         Baseball Stadium       0.055618         Basketball Court       0.045515         Bath House       0.056480         Beach       0.044395         Beach Bar       0.056480         Beer Bar       0.099008         Beer Garden       0.043802         Beer Store       0.107021         Big Box Store       0.061494         Bike Rental / Bike Share       0.052206         Bike Shop       0.054374         Bistro       0.047036         Board Shop       0.047036         Boat or Ferry       0.047862         Bookstore       0.053060         Boutique       0.073023         Bowling Alley       0.047526		
Bar       0.065711         Baseball Field       0.043819         Baseball Stadium       0.055618         Basketball Court       0.045515         Bath House       0.056480         Beach       0.043805         Beach Bar       0.099008         Beer Bar       0.099008         Beer Garden       0.043802         Beer Store       0.107021         Big Box Store       0.061494         Bike Rental / Bike Share       0.052206         Bike Shop       0.054374         Bike Trail       0.050856         Bistro       0.047036         Board Shop       0.047036         Boat or Ferry       0.047862         Bookstore       0.053060         Boutique       0.073023         Bowling Alley       0.047526	<del>-</del>	
Baseball Field       0.043819         Baseball Stadium       0.055618         Basketball Court       0.045515         Bath House       0.056480         Beach       0.044395         Beach Bar       0.056480         Beer Bar       0.099008         Beer Garden       0.043802         Beer Store       0.107021         Big Box Store       0.061494         Bike Rental / Bike Share       0.052206         Bike Shop       0.054374         Bike Trail       0.050856         Bistro       0.047036         Board Shop       0.047036         Boat or Ferry       0.047862         Bookstore       0.053060         Boutique       0.073023         Bowling Alley       0.047526		
Baseball Stadium       0.055618         Basketball Court       0.045515         Bath House       0.056480         Beach       0.044395         Beach Bar       0.056480         Beer Bar       0.099008         Beer Garden       0.043802         Beer Store       0.107021         Big Box Store       0.061494         Bike Rental / Bike Share       0.052206         Bike Shop       0.054374         Bike Trail       0.050856         Bistro       0.047036         Board Shop       0.047036         Boat or Ferry       0.047862         Bookstore       0.053060         Boutique       0.073023         Bowling Alley       0.047526		
Basketball Court       0.045515         Bath House       0.056480         Beach       0.044395         Beach Bar       0.056480         Beer Bar       0.099008         Beer Garden       0.043802         Beer Store       0.107021         Big Box Store       0.061494         Bike Rental / Bike Share       0.052206         Bike Shop       0.054374         Bike Trail       0.050856         Bistro       0.046192         Board Shop       0.047036         Boat or Ferry       0.047862         Bookstore       0.053060         Boutique       0.073023         Bowling Alley       0.047526		
Beach       0.044395         Beach Bar       0.056480         Beer Bar       0.099008         Beer Garden       0.043802         Beer Store       0.107021         Big Box Store       0.061494         Bike Rental / Bike Share       0.052206         Bike Shop       0.054374         Bike Trail       0.050856         Bistro       0.046192         Board Shop       0.047036         Boat or Ferry       0.047862         Bookstore       0.053060         Boutique       0.073023         Bowling Alley       0.047526		
Beach Bar       0.056480         Beer Bar       0.099008         Beer Garden       0.043802         Beer Store       0.107021         Big Box Store       0.061494         Bike Rental / Bike Share       0.052206         Bike Shop       0.054374         Bike Trail       0.050856         Bistro       0.046192         Board Shop       0.047036         Boat or Ferry       0.047862         Bookstore       0.053060         Boutique       0.073023         Bowling Alley       0.047526	Bath House	0.056480
Beer Bar       0.099008         Beer Garden       0.043802         Beer Store       0.107021         Big Box Store       0.061494         Bike Rental / Bike Share       0.052206         Bike Shop       0.054374         Bike Trail       0.050856         Bistro       0.046192         Board Shop       0.047036         Boat or Ferry       0.047862         Bookstore       0.053060         Boutique       0.073023         Bowling Alley       0.047526	Beach	0.044395
Beer Garden       0.043802         Beer Store       0.107021         Big Box Store       0.061494         Bike Rental / Bike Share       0.052206         Bike Shop       0.054374         Bike Trail       0.050856         Bistro       0.046192         Board Shop       0.047036         Boat or Ferry       0.047862         Bookstore       0.053060         Boutique       0.073023         Bowling Alley       0.047526	Beach Bar	0.056480
Beer Store       0.107021         Big Box Store       0.061494         Bike Rental / Bike Share       0.052206         Bike Shop       0.054374         Bike Trail       0.050856         Bistro       0.046192         Board Shop       0.047036         Boat or Ferry       0.047862         Bookstore       0.053060         Boutique       0.073023         Bowling Alley       0.047526		
Big Box Store       0.061494         Bike Rental / Bike Share       0.052206         Bike Shop       0.054374         Bike Trail       0.050856         Bistro       0.046192         Board Shop       0.047036         Boat or Ferry       0.047862         Bookstore       0.053060         Boutique       0.073023         Bowling Alley       0.047526		
Bike Rental / Bike Share       0.052206         Bike Shop       0.054374         Bike Trail       0.050856         Bistro       0.046192         Board Shop       0.047036         Boat or Ferry       0.047862         Bookstore       0.053060         Boutique       0.073023         Bowling Alley       0.047526		
Bike Shop       0.054374         Bike Trail       0.050856         Bistro       0.046192         Board Shop       0.047036         Boat or Ferry       0.047862         Bookstore       0.053060         Boutique       0.073023         Bowling Alley       0.047526		
Bike Trail       0.050856         Bistro       0.046192         Board Shop       0.047036         Boat or Ferry       0.047862         Bookstore       0.053060         Boutique       0.073023         Bowling Alley       0.047526		
Bistro       0.046192         Board Shop       0.047036         Boat or Ferry       0.047862         Bookstore       0.053060         Boutique       0.073023         Bowling Alley       0.047526	<u> </u>	
Board Shop       0.047036         Boat or Ferry       0.047862         Bookstore       0.053060         Boutique       0.073023         Bowling Alley       0.047526		
Bookstore 0.053060 Boutique 0.073023 Bowling Alley 0.047526	Board Shop	
Boutique 0.073023 Bowling Alley 0.047526	<del>-</del>	
Bowling Alley 0.047526		
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DOXING GYM 0.00/031		
	DOXING GYM	

Duarilian Dashaumant	0 040161
Brazilian Restaurant	0.049161 0.033190
Breakfast Spot Brewery	0.051298
Bridal Shop	0.056480
Bridge	0.051601
Bubble Tea Shop	0.052422
Buffet	0.049119
Building	0.049081
Burger Joint	0.043047
Burmese Restaurant	0.056480
Burrito Place	0.061436
Bus Line	0.068665
Bus Station	0.033666
Bus Stop Business Service	0.118077 0.051803
Butcher	0.050290
Cafeteria	0.056480
Café	0.060822
Cajun / Creole Restaurant	0.047539
Camera Store	0.052549
Campground	0.056480
Candy Store	0.049049
Cantonese Restaurant	0.051308
Caribbean Restaurant	0.030035
Caucasian Restaurant	0.053950
Cha Chaan Teng	0.056480
Check Cashing Service	0.044794
Cheese Shop	0.044137
Chinese Restaurant Chocolate Shop	0.000000 0.050221
Church	0.054104
Circus	0.056480
Climbing Gym	0.050639
Clothing Store	0.037403
Club House	0.051911
Cocktail Bar	0.085291
Coffee Shop	0.038003
College Academic Building	0.055730
College Arts Building	0.056480
College Basketball Court	0.056480
College Bookstore	0.056480
College Cafeteria	0.054860
College Gym	0.056480
College Theater Colombian Restaurant	0.056480 0.056480
Comedy Club	0.053103
Comfort Food Restaurant	0.055288
Comic Shop	0.054953
Community Center	0.054882
Concert Hall	0.050774
Construction & Landscaping	0.054191
Convenience Store	0.031857
Cooking School	0.056480
Cosmetics Shop	0.079047
Costume Shop	0.056480
Coworking Space	0.296614
Creperie	0.067346
Cultural Cartan	0.056281
Cultural Center	0.056480 0.048859
Cupcake Shop Cycle Studio	0.037799
Czech Restaurant	0.056480
Dance Studio	0.054003
Daycare	0.055783
Deli / Bodega	0.053899
Department Store	0.036361
Dessert Shop	0.027936
Dim Sum Restaurant	0.048456
Diner	0.040358
Discount Store	0.026705
Distillery	0 0 5 5 4 4 4
=	0.055114
Dive Bar	0.055114

	0.056400
Dive Shop Doctor's Office	0.056480 0.049605
Dog Run	0.052394
Donut Shop	0.059872
Dosa Place	0.056480
Drugstore	0.056480
Dry Cleaner	0.065684
Dumpling Restaurant	0.047411
Duty-free Shop	0.056480
Eastern European Restaurant	0.108052
Electronics Store Empanada Restaurant	0.047251 0.054428
English Restaurant	0.056480
Entertainment Service	0.054612
Ethiopian Restaurant	0.048208
Event Service	0.056480
Event Space	0.043794
Exhibit	0.055623
Factory	0.056480
Falafel Restaurant	0.042158 0.053071
Farm Farmers Market	0.038393
Fast Food Restaurant	0.017017
Field	0.056480
Filipino Restaurant	0.048727
Fish & Chips Shop	0.051697
Fish Market	0.045722
Fishing Store	0.056480
Flea Market	0.050224
Flower Shop	0.056952
Food Food & Drink Shop	0.039449 0.184568
Food Court	0.057690
Food Stand	0.054714
Food Truck	0.102210
Fountain	0.054253
French Restaurant	0.086910
Fried Chicken Joint	0.025586
Frozen Yogurt Shop	0.047014
Fruit & Vegetable Store	0.075717 0.060019
Furniture / Home Store Gaming Cafe	0.052944
Garden	0.032344
Garden Center	0.204202
Gas Station	0.038282
Gastropub	0.083190
Gay Bar	0.050449
General Entertainment	0.054284
German Restaurant	0.217457
	0.050063
Gift Shop	0 056480
Gluten-free Restaurant	0.056480
Gluten-free Restaurant Go Kart Track	0.056480
Gluten-free Restaurant	
Gluten-free Restaurant Go Kart Track Golf Course	0.056480 0.054070
Gluten-free Restaurant Go Kart Track Golf Course Gourmet Shop	0.056480 0.054070 0.033743 0.091162 0.116557
Gluten-free Restaurant Go Kart Track Golf Course Gourmet Shop Greek Restaurant Grocery Store Gym	0.056480 0.054070 0.033743 0.091162 0.116557 0.040374
Gluten-free Restaurant Go Kart Track Golf Course Gourmet Shop Greek Restaurant Grocery Store Gym Gym / Fitness Center	0.056480 0.054070 0.033743 0.091162 0.116557 0.040374 0.020524
Gluten-free Restaurant Go Kart Track Golf Course Gourmet Shop Greek Restaurant Grocery Store Gym Gym / Fitness Center Gym Pool	0.056480 0.054070 0.033743 0.091162 0.116557 0.040374 0.020524 0.056480
Gluten-free Restaurant Go Kart Track Golf Course Gourmet Shop Greek Restaurant Grocery Store Gym Gym / Fitness Center Gym Pool Gymnastics Gym	0.056480 0.054070 0.033743 0.091162 0.116557 0.040374 0.020524 0.056480 0.098818
Gluten-free Restaurant Go Kart Track Golf Course Gourmet Shop Greek Restaurant Grocery Store Gym Gym / Fitness Center Gym Pool Gymnastics Gym Halal Restaurant	0.056480 0.054070 0.033743 0.091162 0.116557 0.040374 0.020524 0.056480
Gluten-free Restaurant Go Kart Track Golf Course Gourmet Shop Greek Restaurant Grocery Store Gym Gym / Fitness Center Gym Pool Gymnastics Gym	0.056480 0.054070 0.033743 0.091162 0.116557 0.040374 0.020524 0.056480 0.098818 0.051942
Gluten-free Restaurant Go Kart Track Golf Course Gourmet Shop Greek Restaurant Grocery Store Gym Gym / Fitness Center Gym Pool Gymnastics Gym Halal Restaurant Harbor / Marina Hardware Store Hawaiian Restaurant	0.056480 0.054070 0.033743 0.091162 0.116557 0.040374 0.020524 0.056480 0.098818 0.051942 0.048504
Gluten-free Restaurant Go Kart Track Golf Course Gourmet Shop Greek Restaurant Grocery Store Gym Gym / Fitness Center Gym Pool Gymnastics Gym Halal Restaurant Harbor / Marina Hardware Store Hawaiian Restaurant Health & Beauty Service	0.056480 0.054070 0.033743 0.091162 0.116557 0.040374 0.020524 0.056480 0.098818 0.051942 0.048504 0.047948 0.088363 0.050145
Gluten-free Restaurant Go Kart Track Golf Course Gourmet Shop Greek Restaurant Grocery Store Gym Gym / Fitness Center Gym Pool Gymnastics Gym Halal Restaurant Harbor / Marina Hardware Store Hawaiian Restaurant Health & Beauty Service Health Food Store	0.056480 0.054070 0.033743 0.091162 0.116557 0.040374 0.020524 0.056480 0.098818 0.051942 0.048504 0.047948 0.088363 0.050145 0.045674
Gluten-free Restaurant Go Kart Track Golf Course Gourmet Shop Greek Restaurant Grocery Store Gym Gym / Fitness Center Gym Pool Gymnastics Gym Halal Restaurant Harbor / Marina Hardware Store Hawaiian Restaurant Health & Beauty Service Health Food Store Heliport	0.056480 0.054070 0.033743 0.091162 0.116557 0.040374 0.020524 0.056480 0.098818 0.051942 0.048504 0.047948 0.088363 0.050145 0.045674 0.055156
Gluten-free Restaurant Go Kart Track Golf Course Gourmet Shop Greek Restaurant Grocery Store Gym Gym / Fitness Center Gym Pool Gymnastics Gym Halal Restaurant Harbor / Marina Hardware Store Hawaiian Restaurant Health & Beauty Service Health Food Store Heliport Herbs & Spices Store	0.056480 0.054070 0.033743 0.091162 0.116557 0.040374 0.020524 0.056480 0.098818 0.051942 0.048504 0.047948 0.088363 0.050145 0.045674 0.055156 0.056480
Gluten-free Restaurant Go Kart Track Golf Course Gourmet Shop Greek Restaurant Grocery Store Gym Gym / Fitness Center Gym Pool Gymnastics Gym Halal Restaurant Harbor / Marina Hardware Store Hawaiian Restaurant Health & Beauty Service Health Food Store Heliport Herbs & Spices Store High School	0.056480 0.054070 0.033743 0.091162 0.116557 0.040374 0.020524 0.056480 0.098818 0.051942 0.048504 0.047948 0.088363 0.050145 0.045674 0.055156 0.056480 0.056480
Gluten-free Restaurant Go Kart Track Golf Course Gourmet Shop Greek Restaurant Grocery Store Gym Gym / Fitness Center Gym Pool Gymnastics Gym Halal Restaurant Harbor / Marina Hardware Store Hawaiian Restaurant Health & Beauty Service Health Food Store Heliport Herbs & Spices Store High School Hill	0.056480 0.054070 0.033743 0.091162 0.116557 0.040374 0.020524 0.056480 0.098818 0.051942 0.048504 0.047948 0.088363 0.050145 0.045674 0.055156 0.056480 0.056480 0.056480
Gluten-free Restaurant Go Kart Track Golf Course Gourmet Shop Greek Restaurant Grocery Store Gym Gym / Fitness Center Gym Pool Gymnastics Gym Halal Restaurant Harbor / Marina Hardware Store Hawaiian Restaurant Health & Beauty Service Health Food Store Heliport Herbs & Spices Store High School	0.056480 0.054070 0.033743 0.091162 0.116557 0.040374 0.020524 0.056480 0.098818 0.051942 0.048504 0.047948 0.088363 0.050145 0.045674 0.055156 0.056480 0.056480

History Museum	0.047839
Hobby Shop	0.050875
Home Service	0.047386
Hookah Bar	0.042098
Hostel	0.053738
Hot Dog Joint Hotel	0.051912 0.110032
Hotel Bar	0.045109
Hotel Pool	0.056480
Hotpot Restaurant	0.051150
Ice Cream Shop	0.112883
Indian Restaurant	0.040959
Indie Movie Theater Indie Theater	0.048006 0.049280
Indonesian Restaurant	0.056480
Indoor Play Area	0.054612
Insurance Office	0.056480
Intersection	0.052872
Irish Pub	0.053818
Israeli Restaurant Italian Restaurant	0.050865 0.098000
Japanese Curry Restaurant	0.052637
Japanese Restaurant	0.033375
Jazz Club	0.047194
Jewelry Store	0.045168
Jewish Restaurant	0.053906
Juice Bar Karaoke Bar	0.046213 0.044356
Kebab Restaurant	0.053995
Kids Store	0.052848
Korean BBQ Restaurant	0.056480
Korean Restaurant	0.075160
Kosher Restaurant Lake	0.051388
Latin American Restaurant	0.054727 0.026728
Laundromat	0.048999
Laundry Service	0.053898
Lawyer	0.050721
Leather Goods Store	0.053898
Lebanese Restaurant Library	0.053898 0.052622
Lingerie Store	0.043502
Liquor Store	0.023997
Locksmith	0.053735
Lounge	0.044104
Malay Restaurant Marine Terminal	0.053979 0.056480
Market	0.054054
Martial Arts School	0.051048
Massage Studio	0.052283
Mattress Store	0.042271
Medical Center	0.056480
Mediterranean Restaurant Memorial Site	0.269534 0.056480
Men's Store	0.042132
Metro Station	0.035852
Mexican Restaurant	0.112697
Middle Eastern Restaurant	0.258932
Mini Golf	0.056480
Miscellaneous Shop Mobile Phone Shop	0.044236 0.073112
Modern European Restaurant	0.053910
Molecular Gastronomy Restaurant	0.056480
Monument / Landmark	0.050748
Moroccan Restaurant	0.053898
Motorcycle Shop Movie Theater	0.053451 0.063045
Moving Target	0.063045
Multiplex	0.056480
Museum	0.046910
Music School	0.053995
Music Store	0.050486

Music Venue	0.048009
Nail Salon	0.061394
Nature Preserve	0.056480
New American Restaurant Newsstand	0.351403
Nightclub	0.051907 0.060656
Nightlife Spot	0.056480
Non-Profit	0.054554
Noodle House	0.510459
North Indian Restaurant	0.053983
Office	0.050361 0.054763
Opera House Optical Shop	0.034763
Organic Grocery	0.097051
Other Great Outdoors	0.049733
Other Nightlife	0.056121
Other Repair Shop	0.052254
Outdoor Gym Outdoor Sculpture	0.176547 0.051410
Outdoors & Recreation	0.387289
Outlet Mall	0.056480
Outlet Store	0.054921
Paella Restaurant	0.053902
Pakistani Restaurant Paper / Office Supplies Store	0.176547 0.045954
Park	0.043934
Pastry Shop	0.056480
Pedestrian Plaza	0.055305
Performing Arts Venue	0.055940
Perfume Shop	0.056480
Persian Restaurant Peruvian Restaurant	0.056480 0.050422
Peruvian Roast Chicken Joint	0.056480
Pet Café	0.052396
Pet Service	0.053341
Pet Store	0.067553
Pharmacy Photography Studio	0.069859 0.055769
Physical Therapist	0.056480
Piano Bar	0.053898
Pie Shop	0.050759
Pier	0.055882
Piercing Parlor Pilates Studio	0.053898 0.048761
Pizza Place	0.090120
Platform	0.056480
Playground	0.084121
Plaza	0.133504
Poke Place Pool	0.049401 0.053548
Pool Hall	0.052078
Portuguese Restaurant	0.056480
Post Office	0.052724
Pub	0.037223
Public Art Puerto Rican Restaurant	0.054938 0.053914
Racetrack	0.055126
Ramen Restaurant	0.035541
Record Shop	0.132620
Recording Studio	0.056216
Recreation Center Rental Car Location	0.055814 0.053747
Rental Service	0.055476
Residential Building (Apartment / Condo)	
Resort	0.054511
Rest Area	0.056262
Restaurant	0.055984
River Rock Climbing Spot	0.055849 0.056480
Rock Club	0.050199
Roller Rink	0.056480
Romanian Restaurant	0.056480

	0.046000
Roof Deck Russian Restaurant	0.046800 0.050841
Sake Bar	0.053684
Salad Place	0.037365
Salon / Barbershop	0.037903
Sandwich Place	0.119716
Scandinavian Restaurant	0.056480
Scenic Lookout	0.038338
School	0.052592
Sculpture Garden	0.056113
Seafood Restaurant	0.027198
Shabu-Shabu Restaurant	0.056480
Shanghai Restaurant	0.073351
Shipping Store	0.039908
Shoe Repair	0.056480
Shoe Store	0.035407
Shop & Service	0.053348
Shopping Mall	0.051274
Skate Park	0.052973
Skating Rink	0.050696
Ski Area	0.056480
Smoke Shop	0.040559
Smoothie Shop Snack Place	0.056480 0.044218
Soccer Field	0.053586
Social Club	0.055080
Soup Place	0.056119
South American Restaurant	0.030119
South Indian Restaurant	0.056480
Southern / Soul Food Restaurant	0.048362
Souvlaki Shop	0.056480
Spa	0.041255
Spanish Restaurant	0.024628
Speakeasy	0.045468
Sporting Goods Shop	0.052390
Sports Bar	0.045490
Sports Club	0.053868
Sri Lankan Restaurant	0.056480
Stadium	0.056480
State / Provincial Park	0.056480
Stationery Store	0.053992
Steakhouse	0.040701
Storage Facility	0.049774
Street Art	0.053900
Strip Club Supermarket	0.053898 0.065231
Supplement Shop	0.104899
Surf Spot	0.055815
Sushi Restaurant	0.120070
Swiss Restaurant	0.056480
Szechuan Restaurant	0.118512
Taco Place	0.246654
Tailor Shop	0.050498
Taiwanese Restaurant	0.049816
Tanning Salon	0.056480
Tapas Restaurant	0.039556
Tattoo Parlor	0.047029
Tea Room	0.109784
Tech Startup	0.056480
Tennis Court	0.051918
Tennis Stadium	0.053953
Tex-Mex Restaurant	0.056480
Thai Restaurant	0.069489
Theater	0.049438
Theme Park	0.054352
Theme Park Ride / Attraction	0.053308
Thrift / Vintage Store Tibetan Restaurant	0.043568 0.054051
Tibetan Restaurant Tiki Bar	0.054051
Toll Plaza	0.051244
Tourist Information Center	0.054842
Toy / Game Store	0.061374
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Track
                                           0.052211
                                           0.049632
Trail
                                           0.056480
Train
                                           0.038582
Train Station
Tree
                                           0.056480
Turkish Restaurant
                                           0.051264
Udon Restaurant
                                           0.053898
Used Bookstore
                                           0.052041
Vape Store
                                           0.189293
Varenyky restaurant
                                           0.056480
Vegetarian / Vegan Restaurant
                                           0.104575
Venezuelan Restaurant
                                          0.056480
Veterinarian
                                          0.054091
Video Game Store
                                          0.039455
Video Store
                                           0.046009
Vietnamese Restaurant
                                           0.060633
Volleyball Court
                                           0.056480
Warehouse Store
                                           0.054928
Waste Facility
                                           0.056480
Waterfront
                                           0.055032
Weight Loss Center
                                           0.055341
Whisky Bar
                                           0.108735
                                           0.053097
Wine Bar
Wine Shop
                                           0.037333
Wings Joint
                                           0.043418
Women's Store
                                           0.035181
Yemeni Restaurant
                                           0.056480
Yoga Studio
                                           0.067771
<ipython-input-207-95fb74ce3c21>:13: SettingWithCopyWarning:
A value is trying to be set on a copy of a slice from a DataFrame.
Try using .loc[row indexer,col indexer] = value instead
See the caveats in the documentation: https://pandas.pydata.org/pandas-docs/stable/user g
uide/indexing.html#returning-a-view-versus-a-copy
  lebCorr["Weight"] = lebArr
<ipython-input-207-95fb74ce3c21>:23: SettingWithCopyWarning:
A value is trying to be set on a copy of a slice from a DataFrame.
Try using .loc[row indexer,col indexer] = value instead
See the caveats in the documentation: https://pandas.pydata.org/pandas-docs/stable/user g
uide/indexing.html#returning-a-view-versus-a-copy
 polCorr["Weight"] = polArr
Lets explore the top 10 venues for each type of restaurants.
In [208]:
topleb = lebCorr.nlargest(10,"Weight")
toppol = polCorr.nlargest(10,"Weight")
```

```
print(topleb)
print(toppol)
```

Persian Restaurant	0.720229
Shoe Repair	0.720229
English Restaurant	0.720229
Leather Goods Store	0.521138
Strip Club	0.521138
Udon Restaurant	0.521138
Beer Bar	0.358172
Adult Boutique	0.322458
Gaming Cafe	0.277542
Bike Trail	0.270431
	Weight
Noodle House	0.510459
Outdoors & Recreation	n 0.387289
New American Restaur	ant 0.351403

Weight

```
Coworking Space 0.296614

Mediterranean Restaurant 0.269534

Middle Eastern Restaurant 0.258932

Taco Place 0.246654

German Restaurant 0.217457

Garden Center 0.204202

Vape Store 0.189293
```

From this we can confirm that Lebanese Resturants are usually in neighborhoods that has Persian and English Restaurants as well as Shoe repair and Leather Goods shops. While Polish Restaurants are in neighborhoods with Noodle Houses, Outdoors and Recreation, New American restaurants and Coworking spaces.

Now we will correlate the retaurants profiles with venues means in each neighborhood to see how similar the neighborhood venues are to the venues that open near Lebanese and Polish restaurants.

```
In [209]:
```

```
lebHoods = meanHoods.drop(["Lebanese Restaurant"],1) #remove Lebanese Restaurant since the
value will be 1
lebHoods = lebHoods.T # transpose the dataframe to match the shape of the restaurant prof
ile matrix
lebHoods.columns = lebHoods.iloc[0]
lebHoods = lebHoods.drop("Neighborhood", axis = 0) # make Neighborhoods as teh column head
lebHoods = pd.DataFrame(lebHoods) # convert to pandas DataFrame
lebHoodsCorr = pd.DataFrame(index =lebHoods.columns, columns = ["Value"]) # create a da
taframe for the neighborhoods correlations with Lebanese restaurants profiles
for i in range(len(lebHoods.columns)):
     lebHoodsCorr.loc[lebHoods.columns[i]] = lebHoods[lebHoods.columns[i]].astype('float
64').corr(lebCorr["Weight"].astype('float64')) #correlate the neighborhoods with the prof
iles
polHoods = meanHoods.drop(["Polish Restaurant"],1) #remove Polish Restaurant since the va
lue will be 1
polHoods = polHoods.T # transpose the dataframe to match the shape of the restaurant prof
ile matrix
polHoods.columns = polHoods.iloc[0]
polHoods = polHoods.drop("Neighborhood", axis = 0) # make Neighborhoods as teh column head
ers
polHoods = pd.DataFrame(polHoods) # convert to pandas DataFrame
polHoodsCorr = pd.DataFrame(index =polHoods.columns, columns = ["Value"] ) # create a da
taframe for the neighborhoods correlations with Polish restaurants profiles
for i in range(len(polHoods.columns)):
    polHoodsCorr.loc[polHoods.columns[i]] = polHoods[polHoods.columns[i]].astype('float
64').corr(polCorr["Weight"].astype('float64')) #correlate the neighborhoods with the prof
```

### let's explore the top 10 neighborhoods for Lebanese restaurants

```
In [210]:
lebHoodsCorr.sort_values("Value", ascending=False).head(10)
Out[210]:
```

#### Value

#### Neighborhood

Sutton Place 0.293417

**Greenwich Village** 0.228352

```
        Soho
        0.198378

        NeighborNebe
        0.082809

        West Village
        0.062787

        Upper West Side
        0.050469

        Astoria
        0.050225

        Civic Center
        0.048836

        Egbertville
        0.044713

        Carroll Gardens
        0.042252
```

In [211]:

#### let's explore the top 10 neighborhoods for Polish restaurants

polHoodsCorr.sort values("Value", ascending=False).head(10)

#### let's normalize the two correlation dataframes

```
In [213]:
```

```
lebArr = lebHoodsCorr.values #returns a numpy array
min_max_scaler = preprocessing.MinMaxScaler()
lebArr = min_max_scaler.fit_transform(lebArr)
lebHoodsCorr["Value"] = lebArr

polArr = polHoodsCorr.values #returns a numpy array
polArr = min_max_scaler.fit_transform(polArr)
polHoodsCorr["Value"] = polArr
```

At this point, we have identified the neighborhoods that are correlated with the restaurants. Now we need to identify the availability of Lebanese and Polish Restaurants in the neighborhoods.

we will do this by creating two normalized availability dataframes for the count of lebanese and polish restaurants. Higher availability values for a neighborhood indicates higher number of lebanse or polish restaurants.

```
In [214]:
```

```
lebCount = countHoods[["Neighborhood","Lebanese Restaurant"]].copy()
lebCount = lebCount.set_index("Neighborhood")
lebArr = lebCount.values #returns a numpy array
min max scaler = preprocessing.MinMaxScaler()
```

```
lebArr = min_max_scaler.fit_transform(lebArr)
lebCount["Avail"] = lebArr
lebCount = lebCount.drop(["Lebanese Restaurant"],axis = 1)

polCount = countHoods[["Neighborhood","Polish Restaurant"]].copy()
polCount = polCount.set_index("Neighborhood")
polArr = polCount.values #returns a numpy array
min_max_scaler = preprocessing.MinMaxScaler()
polArr = min_max_scaler.fit_transform(polArr)
polCount["Avail"] = polArr
polCount = polCount.drop(["Polish Restaurant"],axis = 1)
```

Finally, we will calculate a score for each neighborhood based on their venues profile and availability of the restaurants types. The score is calculated by multiplyting the value of correlation by (1-availability). Neighborhoods with higher number of restaurant type will score lower.

```
In [235]:
```

```
lebHoodsRank = pd.DataFrame(columns = ["Score"], index = lebCount.index) # create a data
frame for the neighborhoods Scores for Lebanese Restaurants
for i in range(len(lebCount.index)):
    lebHoodsRank.loc[lebCount.index[i]] = lebHoodsCorr.loc[lebCount.index[i]]["Value"] *
(1-lebCount.loc[lebCount.index[i]]["Avail"])

polHoodsRank = pd.DataFrame(columns = ["Score"], index = polCount.index) # create a data
frame for the neighborhoods Scores for Polish Restaurants
for i in range(len(polCount.index)):
    polHoodsRank.loc[polCount.index[i]] = polHoodsCorr.loc[polCount.index[i]]["Value"] *
(1-polCount.loc[polCount.index[i]]["Avail"])
```

lets explore the top 10 neighborhoods for Lebanese restaurants and compare it with the correlations rank to see the effect of availability.

```
In [242]:
```

```
lebHoodsExp = pd.DataFrame(columns = ["Score", "Corr", "Avail"], index = lebCount.index)
lebHoodsExp["Score"] = lebHoodsRank["Score"]
lebHoodsExp["Corr"] = lebHoodsCorr["Value"]
lebHoodsExp["Avail"] = lebCount["Avail"]
lebHoodsExp.sort_values("Avail", ascending = False).head()
```

## Out[242]:

	Score	Corr	Avail
Neighborhood			
Greenwich Village	0.0	0.829073	1.0
Sutton Place	0.0	1.000000	1.0
Allerton	0.035489	0.035489	0.0
Ozone Park	0.040313	0.040313	0.0
Olinville	0.10001	0.100010	0.0

We can see that accounting for the availability has exclueded Sutton Place and Greenwich Village even though they are highly correlated with Lebanese Restaurants profile.

```
In [244]:
```

```
polHoodsExp = pd.DataFrame(columns = ["Score", "Corr", "Avail"], index = polCount.index)
polHoodsExp["Score"] = polHoodsRank["Score"]
polHoodsExp["Corr"] = polHoodsCorr["Value"]
polHoodsExp["Avail"] = polCount["Avail"]
```

```
polHoodsExp.sort_values("Avail", ascending = False).head(10)
```

Out[244]:

	Score	Corr	Avail
Neighborhood			
Greenpoint	0.0	0.479657	1.0
Arrochar	0.401521	0.803042	0.5
Downtown	0.178483	0.356967	0.5
Ridgewood	0.326656	0.653312	0.5
Forest Hills Gardens	0.5	1.000000	0.5
Allerton	0.074009	0.074009	0.0
Ocean Hill	0.289871	0.289871	0.0
Paerdegat Basin	0.112729	0.112729	0.0
Ozone Park	0.100603	0.100603	0.0
Olinville	0.092924	0.092924	0.0

For the Polish restaurant, Greenpoint has been excluded while Arrochar, Downtown, Ridgewood and Forest Hills Gardens scores have been lowered since they aleady have Polish restaurants.

Lets explore the top 10 neighborhoods scores for Lebanese restaurants.

```
In [251]:
```

```
lebHoodsExp.sort_values("Score", ascending = False).head(10)
```

Out[251]:

	Score	Corr	Avail
Neighborhood			
Soho	0.500507	0.500507	0.0
Noho	0.446732	0.446732	0.0
West Village	0.394136	0.394136	0.0
Upper West Side	0.361777	0.361777	0.0
Astoria	0.361135	0.361135	0.0
Civic Center	0.357485	0.357485	0.0
Egbertville	0.346655	0.346655	0.0
Carroll Gardens	0.340191	0.340191	0.0
Flatiron	0.338216	0.338216	0.0
Midtown	0.338191	0.338191	0.0

We can see that Soho, Noho and West Village are teh best location to open a new Lebanese Restaurant because they are highly correlated with the profile of a Lebanese restaurant and currently does not have any lebanese restaurants.

Now, lets explore the top 10 neighborhoods scores for Lebanese restaurants.

```
In [250]:
```

```
polHoodsExp.sort_values("Score", ascending = False).head(10)
```

	Score	Corr	Avail
Neighborhood			
Astoria	0.536243	0.536243	0.0
West Village	0.505879	0.505879	0.0
Forest Hills Gardens	0.5	1.000000	0.5
East Harlem	0.469997	0.469997	0.0
Kensington	0.469199	0.469199	0.0
Noho	0.455759	0.455759	0.0
Little Italy	0.453306	0.453306	0.0
Auburndale	0.448815	0.448815	0.0
Bushwick	0.423651	0.423651	0.0
Cobble Hill	0.422321	0.422321	0.0

This tell us that the best neighborhoods for a new Polish restaurant are Astoria, West Village, and Forest Hills Gardens because they are highly correlated with the Polish restaurant profile and with the exception of Forest Hills Gardens have no Polish restaurants.

Now Lets create a map to visually represent the neighborhoods score. First of all, we will create a dataframe with the scores and the Neighborhoods longitudes and latitudes.

#### In [311]:

```
mapHoods = pd.DataFrame(columns = ["Neighborhood","Latitude","Longitude","Leb Score","Le
b Color","Pol Score", "Pol Color"])

mapHoods[["Neighborhood","Latitude","Longitude"]] = hoods[["Neighborhood","Latitude","Lon
gitude"]]
mapHoods = mapHoods.set_index("Neighborhood")
mapHoods["Leb Score"] = lebHoodsExp["Score"]
mapHoods["Pol Score"] = polHoodsExp["Score"]
mapHoods = mapHoods.reset_index()

mapHoods["Leb Color"] = pd.cut(mapHoods["Leb Score"], bins=4, labels=['red', 'orange','
yellow' ,'green'])
mapHoods["Pol Color"] = pd.cut(mapHoods["Pol Score"], bins=4, labels=['red', 'orange','
yellow' ,'green'])

mapHoods.head()
```

#### Out[311]:

	Neighborhood	Latitude	Longitude	Leb Score	Leb Color	Pol Score	Pol Color
0	Wakefield	40.894705	-73.847201	0.108154	red	0.218721	orange
1	Co-op City	40.874294	-73.829939	0.073231	red	0.187542	orange
2	Eastchester	40.887556	-73.827806	0.056022	red	0.099989	red
3	Fieldston	40.895437	-73.905643	0.141728	orange	0.220873	orange
4	Riverdale	40.890834	-73.912585	0.121452	red	0.19621	orange

Then we will create the map for Lebanese Restaurants

#### In [312]:

```
map_newyork = folium.Map(location=[40.710318150000006, -74.00496837048613], zoom_start=1
0)

for lat, lng, neighborhood, score, clr in zip(mapHoods['Latitude'], mapHoods['Longitude'])
```

```
, mapHoods['Neighborhood'], mapHoods['Leb Score'], mapHoods['Leb Color'] ):
    label = '{}, Score: {}'.format(neighborhood, score)
    label = folium.Popup(label, parse_html=True)
    folium.CircleMarker(
        [lat, lng],
        radius=3,
        popup=label,
        color= clr,
        fill=True,
        fill_color=clr,
        fill_opacity=0.7,
        parse_html=False).add_to(map_newyork)
```

Out[312]:

Make this Notebook Trusted to load map: File -> Trust Notebook

We will create a map for Polish Restaurants.

```
In [313]:
```

```
map_newyork = folium.Map(location=[40.710318150000006, -74.00496837048613], zoom_start=1
0)

for lat, lng, neighborhood, score, clr in zip(mapHoods['Latitude'], mapHoods['Longitude'],
    mapHoods['Neighborhood'], mapHoods['Pol Score'], mapHoods['Pol Color'] ):
    label = '{}, Score: {}'.format(neighborhood, score)
    label = folium.Popup(label, parse_html=True)
    folium.CircleMarker(
        [lat, lng],
        radius=3,
        popup=label,
        color= clr,
        fill=True,
        fill_color=clr,
        fill_opacity=0.7,
        parse_html=False).add_to(map_newyork)

map_newyork
```

Out[313]:

Make this Notebook Trusted to load map: File -> Trust Notebook

# **Results and Discussion**

#### **Lebanese Restaurant**

By examining the neighborhoods rankings we can see that Soho, Noho and West Village are the best neighbohoods to open a new Lebanese Restaurant because they are highly correlated with the profile of a Lebanese restaurant and currently does not have any lebanese restaurants. In addition, by examining the map, we can see that Manhattan is the best Borough to open a Lebanese Restaurant.

#### **Polish Restaurant**

Neighborhoods rankings tell us that the best neighborhoods for a new Polish restaurant are Astoria, West Village, and Forest Hills Gardens because they are highly correlated with the Polish restaurant profile and with the exception of Forest Hills Gardens have no Polish restaurants. By examining the map, we can see that for Polish Restaurants the best borough is also Manhattan with few neighborhoods in other boroughs such as Bushwick in Brooklyn, Bayside in Queens and Fox Hills in Staten Island.

# **Conclusion**

The objective of this project is to develop a tool that will help a Lebanese and a Polish immigrants immigrants identify the best neighborhood for opening a new ethnic resturant in New York City. The project utilized New York neighborhood information used in Week 3 as well as Foursquare API to collect neighborhoods venues information. Profiles for Lebanese and Polish restuarnts were creatare Astoria, West Village, and Forest Hills Gardensed to correlate the neighborhoods venues with the profiles. Then a score for each neighborhoods was calculated based on its correlation with the restaurant profile and availability of the type of resturants. finally, maps were created to visualize the neighborhoods and their scores to get a birds eye view of the results.

The project concluded that Manhattan is the best Borough for both types of restaurants. For Lebanese Restaurants, the best neighborhoods are Soho, Noho and West Village (neighborhoods in west Manhattan). For Polish Restaurants, the best neighborhoods are Astoria, West Village, and Forest Hills Gardens.