

# Applied Data Science Capstone Coursera Week 3 Assignment

Goal: Segmenting and clustering neighborhoods in the city of Toronto, Canada

## Part 1

Import necessary libraries

In [6]:

```
!pip install lxml
#!pip install pandas
import pandas as pd
import numpy as np
df = pd.read_html('https://en.wikipedia.org/wiki/List_of_postal_codes_of_Canada:_M')[0]
df.rename(columns={'Neighbourhood': 'Neighborhood'}, inplace=True)
```

Requirement already satisfied: lxml in c:\users\shraavya\anaconda3\envs\notebook\lib\site-packages (4.6.3)

Read table into dataframe

Ignore cells with a borough that is Not assigned.

In [3]:

```
df = df[df['Borough'] != 'Not assigned']
df.head(10)
```

Out[3]:

	Postal Code	Borough	Neighborhood
2	M3A	North York	Parkwoods
3	M4A	North York	Victoria Village
4	M5A	Downtown Toronto	Regent Park, Harbourfront
5	M6A	North York	Lawrence Manor, Lawrence Heights
6	M7A	Downtown Toronto	Queen's Park, Ontario Provincial Government
8	M9A	Etobicoke	Islington Avenue, Humber Valley Village
9	M1B	Scarborough	Malvern, Rouge
11	M3B	North York	Don Mills
12	M4B	East York	Parkview Hill, Woodbine Gardens
13	M5B	Downtown Toronto	Garden District, Ryerson

Combining rows into one row with the neighborhoods separated with a comma.

In [4]:

```
df_new = df.groupby('Postal Code', sort=False).agg(', '.join)
df_new.head(10)
```

Out[4]:

Borough

Neighborhood

Postal Code		Borough	Neighborhood
Postal Code	M3A	North York	Parkwoods
	M4A	North York	Victoria Village
	M5A	Downtown Toronto	Regent Park, Harbourfront
	M6A	North York	Lawrence Manor, Lawrence Heights
	M7A	Downtown Toronto	Queen's Park, Ontario Provincial Government
	M9A	Etobicoke	Islington Avenue, Humber Valley Village
	M1B	Scarborough	Malvern, Rouge
	M3B	North York	Don Mills
	M4B	East York	Parkview Hill, Woodbine Gardens
	M5B	Downtown Toronto	Garden District, Ryerson

Replacing cells with a borough but a Not assigned neighborhood with the neighborhood same as the borough.

In [5]:

```
df_new.loc[df_new['Neighborhood'] == 'Not assigned', 'Neighborhood'] = df_new.loc[df_new['Neighborhood'] == 'Not assigned', 'Borough']
df_new.reset_index(inplace=True)
df_new.head(10)
```

Out[5]:

Postal Code		Borough	Neighborhood
0	M3A	North York	Parkwoods
1	M4A	North York	Victoria Village
2	M5A	Downtown Toronto	Regent Park, Harbourfront
3	M6A	North York	Lawrence Manor, Lawrence Heights
4	M7A	Downtown Toronto	Queen's Park, Ontario Provincial Government
5	M9A	Etobicoke	Islington Avenue, Humber Valley Village
6	M1B	Scarborough	Malvern, Rouge
7	M3B	North York	Don Mills
8	M4B	East York	Parkview Hill, Woodbine Gardens
9	M5B	Downtown Toronto	Garden District, Ryerson

Displaying shape of final dataframe

In [6]:

```
df_new.shape
```

Out[6]:

(103, 3)

## Part 2

Importing geocoder for getting latitude and logitude

In [7]:

```
!pip install geocoder
import geocoder
print('Done')
```

Requirement already satisfied: geocoder in /opt/conda/envs/Python36/lib/python3.6/site-packages (1.38.1)  
Requirement already satisfied: six in /opt/conda/envs/Python36/lib/python3.6/site-packages (from geocoder) (1.12.0)  
Requirement already satisfied: future in /opt/conda/envs/Python36/lib/python3.6/site-packages (from geocoder) (0.17.1)  
Requirement already satisfied: requests in /opt/conda/envs/Python36/lib/python3.6/site-packages (from geocoder) (2.21.0)  
Requirement already satisfied: ratelim in /opt/conda/envs/Python36/lib/python3.6/site-packages (from geocoder) (0.1.6)  
Requirement already satisfied: click in /opt/conda/envs/Python36/lib/python3.6/site-packages (from geocoder) (7.0)  
Requirement already satisfied: urllib3<1.25,>=1.21.1 in /opt/conda/envs/Python36/lib/python3.6/site-packages (from requests->geocoder) (1.24.1)  
Requirement already satisfied: chardet<3.1.0,>=3.0.2 in /opt/conda/envs/Python36/lib/python3.6/site-packages (from requests->geocoder) (3.0.4)  
Requirement already satisfied: idna<2.9,>=2.5 in /opt/conda/envs/Python36/lib/python3.6/site-packages (from requests->geocoder) (2.8)  
Requirement already satisfied: certifi>=2017.4.17 in /opt/conda/envs/Python36/lib/python3.6/site-packages (from requests->geocoder) (2020.6.20)  
Requirement already satisfied: decorator in /opt/conda/envs/Python36/lib/python3.6/site-packages (from ratelim->geocoder) (4.3.2)  
Done

Creating empty columns for latitude and longitude

In [8]:

```
df_new['Latitude'] = None
df_new['Longitude'] = None
df_new.head(5)
```

Out[8]:

	Postal Code	Borough	Neighborhood	Latitude	Longitude
0	M3A	North York	Parkwoods	None	None
1	M4A	North York	Victoria Village	None	None
2	M5A	Downtown Toronto	Regent Park, Harbourfront	None	None
3	M6A	North York	Lawrence Manor, Lawrence Heights	None	None
4	M7A	Downtown Toronto	Queen's Park, Ontario Provincial Government	None	None

Obtaining latitude and longitude from geocoder.arcgis and adding it to df\_new

In [9]:

```
for i, pc in enumerate(df_new['Postal Code']):
    lat_lng_coords = None

    while(lat_lng_coords is None):
        g = geocoder.arcgis('{} , Toronto, Ontario'.format(pc))
        lat_lng_coords = g.latlng

    if lat_lng_coords:
        latitude = lat_lng_coords[0]
        longitude = lat_lng_coords[1]

    df_new.loc[i, 'Latitude'] = latitude
    df_new.loc[i, 'Longitude'] = longitude

df_new.head(10)
```

Out[9]:

	Postal Code	Borough	Neighborhood	Latitude	Longitude
0	M3A	North York	Parkwoods	43.7519	-79.3304

1	M4A	North York	Victoria Village	43.7304	-79.3128
2	M5A	Downtown Toronto	Regent Park, Harbourfront	43.6551	-79.3626
3	M6A	North York	Lawrence Manor, Lawrence Heights	43.7232	-79.4514
4	M7A	Downtown Toronto	Queen's Park, Ontario Provincial Government	43.6645	-79.393
5	M9A	Etobicoke	Islington Avenue, Humber Valley Village	43.6628	-79.5283
6	M1B	Scarborough	Malvern, Rouge	43.8115	-79.1955
7	M3B	North York	Don Mills	43.7493	-79.3617
8	M4B	East York	Parkview Hill, Woodbine Gardens	43.7079	-79.3116
9	M5B	Downtown Toronto	Garden District, Ryerson	43.6574	-79.3782

## Part 3

### Using Geopy to get latitude and longitude of Toronto for visualization

In [11]:

```

!pip install geopy
from geopy.geocoders import Nominatim

address = 'Toronto, CA'
geolocator = Nominatim()
location = geolocator.geocode(address)
latitude = location.latitude
longitude = location.longitude
print('The geograpical coordinate of Toronto are {}, {}'.format(latitude, longitude))

```

Requirement already satisfied: geopy in /opt/conda/envs/Python36/lib/python3.6/site-packa  
ges (1.18.1)  
Requirement already satisfied: geographiclib<2,>=1.49 in /opt/conda/envs/Python36/lib/pyt  
hon3.6/site-packages (from geopy) (1.49)  
The geographical coordinate of Toronto are 43.6534817, -79.3839347.

/opt/conda/envs/Python36/lib/python3.6/site-packages/ipykernel/\_\_main\_\_.py:5: Deprecation  
Warning: Using Nominatim with the default "geopy/1.18.1" `user\_agent` is strongly discour  
aged, as it violates Nominatim's ToS [https://operations.osmfoundation.org/policies/nomina  
tim/](https://operations.osmfoundation.org/policies/nomina<br/>tim/) and may possibly cause 403 and 429 HTTP errors. Please specify a custom `user\_agent`  
with `Nominatim(user\_agent="my-application")` or by overriding the default `user\_agent`:  
`geopy.geocoders.options.default\_user\_agent = "my-application"`. In geopy 2.0 this will b  
ecome an exception.

### Importing folium for creating visualizations

In [12]:

```

!pip install folium
import folium
print('Done')

```

Requirement already satisfied: folium in /opt/conda/envs/Python36/lib/python3.6/site-pack  
ages (0.11.0)  
Requirement already satisfied: requests in /opt/conda/envs/Python36/lib/python3.6/site-pa  
ckages (from folium) (2.21.0)  
Requirement already satisfied: numpy in /opt/conda/envs/Python36/lib/python3.6/site-packa  
ges (from folium) (1.15.4)  
Requirement already satisfied: branca>=0.3.0 in /opt/conda/envs/Python36/lib/python3.6/si  
te-packages (from folium) (0.4.1)  
Requirement already satisfied: Jinja2>=2.9 in /opt/conda/envs/Python36/lib/python3.6/site  
-packages (from folium) (2.10)  
Requirement already satisfied: urllib3<1.25,>=1.21.1 in /opt/conda/envs/Python36/lib/pyth  
on3.6/site-packages (from requests->folium) (1.24.1)  
Requirement already satisfied: idna<2.9,>=2.5 in /opt/conda/envs/Python36/lib/python3.6/s  
ite-packages (from requests->folium) (2.8)  
Requirement already satisfied: chardet<3.1.0,>=3.0.2 in /opt/conda/envs/Python36/lib/pyth  
on3.6/site-packages (from requests->folium) (3.0.4)

Requirement already satisfied: certifi>=2017.4.17 in /opt/conda/envs/Python36/lib/python3.6/site-packages (from requests->folium) (2020.6.20)  
Requirement already satisfied: MarkupSafe>=0.23 in /opt/conda/envs/Python36/lib/python3.6/site-packages (from jinja2>=2.9->folium) (1.1.0)  
Done

## Creating the map of Toronto with neighborhoods superimposed on top

In [13]:

```
map_toronto = folium.Map(location=[latitude, longitude], zoom_start=12)

for lat, lng, borough, neighborhood in zip(df_new['Latitude'], df_new['Longitude'], df_new['Borough'], df_new['Neighborhood']):
    label = '{} , {}'.format(neighborhood, 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_toronto)

map_toronto
```

Out[13]:

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

## Creating Foursquare Credentials

In [1]:

```
CLIENT_ID = 'Y0HXHNP4OTTXTRGTH1K01HO2XTRUZ13I2LV3PIFL1GLJ2FVM' #Please Input Personalized Credentials here
CLIENT_SECRET = 'VZGSX02NYILB1HQQSFP5RCMRBZRDOHIOHQ2N2WYVGU0ZMNNU'
VERSION = '20200803'
```

## Creating a function to process all neighborhoods and obtain their nearby venues

In [16]:

```
import requests
LIMIT = 50
radius = 500

def getNearbyVenues(names, latitudes, longitudes, radius=500):

    venues_list=[]
    for name, lat, lng in zip(names, latitudes, longitudes):
        print(name)

        # create the API request URL
        url = 'https://api.foursquare.com/v2/venues/explore?&client_id={}&client_secret=
        {}&v={} &ll={},{}&radius={} &limit={} '.format(
            CLIENT_ID,
            CLIENT_SECRET,
            VERSION,
            lat,
            lng,
            radius,
            LIMIT)

        # 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)
```

**Running the function getNearbyVenues on each neighborhood and creating a new dataframe called venues**

In [17]:

```
venues = getNearbyVenues(names=df_new['Neighborhood'], latitudes=df_new['Latitude'], lon
gitudes=df_new['Longitude'])
```

```
Parkwoods
Victoria Village
Regent Park, Harbourfront
Lawrence Manor, Lawrence Heights
Queen's Park, Ontario Provincial Government
Islington Avenue, Humber Valley Village
Malvern, Rouge
Don Mills
Parkview Hill, Woodbine Gardens
Garden District, Ryerson
Glencairn
West Deane Park, Princess Gardens, Martin Grove, Islington, Cloverdale
Rouge Hill, Port Union, Highland Creek
Don Mills
Woodbine Heights
St. James Town
Humberwood-Cedarvale
```

Hamwood Cedarvale  
Eringate, Bloordale Gardens, Old Burnhamthorpe, Markland Wood  
Guildwood, Morningside, West Hill  
The Beaches  
Berczy Park  
Caledonia-Fairbanks  
Woburn  
Leaside  
Central Bay Street  
Christie  
Cedarbrae  
Hillcrest Village  
Bathurst Manor, Wilson Heights, Downsview North  
Thorncliffe Park  
Richmond, Adelaide, King  
Dufferin, Dovercourt Village  
Scarborough Village  
Fairview, Henry Farm, Oriole  
Northwood Park, York University  
East Toronto, Broadview North (Old East York)  
Harbourfront East, Union Station, Toronto Islands  
Little Portugal, Trinity  
Kennedy Park, Ionview, East Birchmount Park  
Bayview Village  
Downsview  
The Danforth West, Riverdale  
Toronto Dominion Centre, Design Exchange  
Brockton, Parkdale Village, Exhibition Place  
Golden Mile, Clairlea, Oakridge  
York Mills, Silver Hills  
Downsview  
India Bazaar, The Beaches West  
Commerce Court, Victoria Hotel  
North Park, Maple Leaf Park, Upwood Park  
Humber Summit  
Cliffside, Cliffcrest, Scarborough Village West  
Willowdale, Newtonbrook  
Downsview  
Studio District  
Bedford Park, Lawrence Manor East  
Del Ray, Mount Dennis, Keelsdale and Silverthorn  
Humberlea, Emery  
Birch Cliff, Cliffside West  
Willowdale, Willowdale East  
Downsview  
Lawrence Park  
Roselawn  
Runnymede, The Junction North  
Weston  
Dorset Park, Wexford Heights, Scarborough Town Centre  
York Mills West  
Davisville North  
Forest Hill North & West, Forest Hill Road Park  
High Park, The Junction South  
Westmount  
Wexford, Maryvale  
Willowdale, Willowdale West  
North Toronto West, Lawrence Park  
The Annex, North Midtown, Yorkville  
Parkdale, Roncesvalles  
Canada Post Gateway Processing Centre  
Kingsview Village, St. Phillips, Martin Grove Gardens, Richview Gardens  
Agincourt  
Davisville  
University of Toronto, Harbord  
Runnymede, Swansea  
Clarks Corners, Tam O'Shanter, Sullivan  
Moore Park, Summerhill East  
Kensington Market, Chinatown, Grange Park  
Milliken, Agincourt North, Steeles East, L'Amoreaux East  
Summerhill West, Rathnelly, South Hill, Forest Hill SE, Deer Park  
CN Tower, King and Spadina, Railway Lands, Harbourfront West, Bathurst Quay, South Niagar  
a Island airport

u, Island Airport  
New Toronto, Mimico South, Humber Bay Shores  
South Steeles, Silverstone, Humbergate, Jamestown, Mount Olive, Beaumont Heights, Thistle town, Albion Gardens  
Steeles West, L'Amoreaux West  
Rosedale  
Stn A PO Boxes  
Alderwood, Long Branch  
Northwest, West Humber - Clairville  
Upper Rouge  
St. James Town, Cabbagetown  
First Canadian Place, Underground city  
The Kingsway, Montgomery Road, Old Mill North  
Church and Wellesley  
Business reply mail Processing Centre, South Central Letter Processing Plant Toronto  
Old Mill South, King's Mill Park, Sunnylea, Humber Bay, Mimico NE, The Queensway East, Ro  
yal York South East, Kingsway Park South East  
Mimico NW, The Queensway West, South of Bloor, Kingsway Park South West, Royal York South  
West

In [18]:

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

(1855, 7)

Out[18]:

	Neighborhood	Neighborhood Latitude	Neighborhood Longitude	Venue	Venue Latitude	Venue Longitude	Venue Category
0	Parkwoods	43.75188	-79.33036	Brookbanks Park	43.751976	-79.332140	Park
1	Parkwoods	43.75188	-79.33036	PetSmart	43.748639	-79.333488	Pet Store
2	Parkwoods	43.75188	-79.33036	Variety Store	43.751974	-79.333114	Food & Drink Shop
3	Victoria Village	43.73042	-79.31282	Memories of Africa	43.726602	-79.312427	Grocery Store
4	Victoria Village	43.73042	-79.31282	The Retreat Nail & Beauty Bar	43.726134	-79.312205	Nail Salon

Number of venues returned for each neighborhood:

In [19]:

```
venues.groupby('Neighborhood', as_index=False).count()
```

Out[19]:

	Neighborhood	Neighborhood Latitude	Neighborhood Longitude	Venue	Venue Latitude	Venue Longitude	Venue Category
0	Agincourt	8	8	8	8	8	8
1	Alderwood, Long Branch	5	5	5	5	5	5
2	Bathurst Manor, Wilson Heights, Downsview North	3	3	3	3	3	3
3	Bayview Village	5	5	5	5	5	5
4	Bedford Park, Lawrence Manor East	20	20	20	20	20	20
5	Berczy Park	50	50	50	50	50	50
6	Birch Cliff, Cliffside West	5	5	5	5	5	5
7	Brockton, Parkdale Village, Exhibition Place	50	50	50	50	50	50
8	Business reply mail Processing Centre, South C...	50	50	50	50	50	50



9	CN Tower, King and Spadina, Railway Neighborhood	Neighborhood Latitude	Neighborhood Longitude	Venue Latitude	Venue Longitude	Venue Category
10	Caledonia-Fairbanks	7	7	7	7	7
11	Canada Post Gateway Processing Centre	50	50	50	50	50
12	Cedarbrae	2	2	2	2	2
13	Central Bay Street	50	50	50	50	50
14	Christie	11	11	11	11	11
15	Church and Wellesley	50	50	50	50	50
16	Clarks Corners, Tam O'Shanter, Sullivan	10	10	10	10	10
17	Cliffside, Cliffcrest, Scarborough Village West	9	9	9	9	9
18	Commerce Court, Victoria Hotel	50	50	50	50	50
19	Davisville	25	25	25	25	25
20	Davisville North	7	7	7	7	7
21	Del Ray, Mount Dennis, Keelsdale and Silverthorn	3	3	3	3	3
22	Don Mills	10	10	10	10	10
23	Dorset Park, Wexford Heights, Scarborough Town...	3	3	3	3	3
24	Downsview	36	36	36	36	36
25	Dufferin, Dovercourt Village	17	17	17	17	17
26	East Toronto, Broadview North (Old East York)	4	4	4	4	4
27	Eringate, Bloordale Gardens, Old Burnhamthorpe...	6	6	6	6	6
28	Fairview, Henry Farm, Oriole	49	49	49	49	49
29	First Canadian Place, Underground city	50	50	50	50	50
...	...	...	...	...	...	...
67	Rouge Hill, Port Union, Highland Creek	1	1	1	1	1
68	Runnymede, Swansea	42	42	42	42	42
69	Runnymede, The Junction North	5	5	5	5	5
70	Scarborough Village	4	4	4	4	4
71	South Steeles, Silverstone, Humbergate, Jamest...	15	15	15	15	15
72	St. James Town	50	50	50	50	50
73	St. James Town, Cabbagetown	46	46	46	46	46
74	Steeles West, L'Amoreaux West	13	13	13	13	13
75	Stn A PO Boxes	50	50	50	50	50
76	Studio District	50	50	50	50	50
77	Summerhill West, Rathnelly, South Hill, Forest...	6	6	6	6	6
78	The Annex, North Midtown, Yorkville	33	33	33	33	33
79	The Beaches	5	5	5	5	5
80	The Danforth West, Riverdale	7	7	7	7	7
81	The Kingsway, Montgomery Road, Old Mill North	3	3	3	3	3
82	Thornccliffe Park	10	10	10	10	10
83	Toronto Dominion Centre, Design	50	50	50	50	50

	Neighborhood	Neighborhood Latitude	Neighborhood Longitude	Venue Latitude	Venue Longitude	Venue Category
84	University of Toronto, Harbord					
85	Victoria Village	3	3	3	3	3
86	West Deane Park, Princess Gardens, Martin Grov...	2	2	2	2	2
87	Westmount	6	6	6	6	6
88	Weston	13	13	13	13	13
89	Wexford, Maryvale	1	1	1	1	1
90	Willowdale, Newtonbrook	19	19	19	19	19
91	Willowdale, Willowdale East	34	34	34	34	34
92	Willowdale, Willowdale West	6	6	6	6	6
93	Woburn	5	5	5	5	5
94	Woodbine Heights	18	18	18	18	18
95	York Mills West	4	4	4	4	4
96	York Mills, Silver Hills	1	1	1	1	1

97 rows x 7 columns

Checking how many unique categories there are:

In [20]:

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

There are 246 uniques categories.

## Analyzing each neighborhood

In [21]:

```
# one hot encoding
venues_onehot = pd.get_dummies(venues[['Venue Category']], prefix="", prefix_sep="")

venues_onehot.head()
```

Out[21]:

	Airport	American Restaurant	Antique Shop	Aquarium	Art Gallery	Art Museum	Arts & Crafts Store	Asian Restaurant	Athletics & Sports	Auto Dealership	...	Train Station	Vegetarian / Vegan Restaurant
0	0	0	0	0	0	0	0	0	0	0	...	0	0
1	0	0	0	0	0	0	0	0	0	0	...	0	0
2	0	0	0	0	0	0	0	0	0	0	...	0	0
3	0	0	0	0	0	0	0	0	0	0	...	0	0
4	0	0	0	0	0	0	0	0	0	0	...	0	0

5 rows x 246 columns



Adding the neighborhood column into venues\_onehot dataframe

In [22]:

```
venues_onehot['Neighborhood'] = venues['Neighborhood']
venues_onehot.head()
```

Out[22]:

Out[22]:

	Airport	American Restaurant	Antique Shop	Aquarium	Art Gallery	Art Museum	Arts & Crafts Store	Asian Restaurant	Athletics & Sports	Auto Dealership	...	Train Station	Vegetarian / Vegan Restaurant
0	0	0	0	0	0	0	0	0	0	0	...	0	0
1	0	0	0	0	0	0	0	0	0	0	...	0	0
2	0	0	0	0	0	0	0	0	0	0	...	0	0
3	0	0	0	0	0	0	0	0	0	0	...	0	0
4	0	0	0	0	0	0	0	0	0	0	...	0	0

5 rows x 246 columns

◀		▶
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## Moving the Neighborhood column to the first column

In [23]:

```
temp = list(venues_onehot.columns)

if 'Neighborhood' in temp:
    temp.remove('Neighborhood')

fixed_columns = ['Neighborhood'] + temp
venues_onehot = venues_onehot[fixed_columns]

venues_onehot.head()
```

Out[23]:

	Neighborhood	Airport	American Restaurant	Antique Shop	Aquarium	Art Gallery	Art Museum	Arts & Crafts Store	Asian Restaurant	Athletics & Sports	...	Train Station	Vegeta / Ve Restau
0	Parkwoods	0	0	0	0	0	0	0	0	0	...	0	
1	Parkwoods	0	0	0	0	0	0	0	0	0	...	0	
2	Parkwoods	0	0	0	0	0	0	0	0	0	...	0	
3	Victoria Village	0	0	0	0	0	0	0	0	0	...	0	
4	Victoria Village	0	0	0	0	0	0	0	0	0	...	0	

5 rows x 246 columns

◀		▶
---	--	---

## Groupby neighborhood and take mean for all categories

In [24]:

```
venues_grouped = venues_onehot.groupby('Neighborhood', sort=False).mean().reset_index()
print(venues_grouped.shape)
venues_grouped.head(10)
```

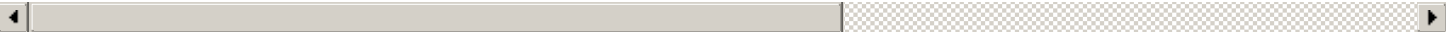
(97, 246)

Out[24]:

	Neighborhood	Airport	American Restaurant	Antique Shop	Aquarium	Art Gallery	Art Museum	Arts & Crafts Store	Asian Restaurant	Athletics & Sports	...	Train Station	Vegeta / Ve Restau
0	Parkwoods	0.0	0.00	0.0	0.0	0.00	0.000000	0.0	0.0	0.000000	...	0.0	

1	Victoria Village	0.0	0.00	0.0	0.0	0.0	0.000000	0.0	0.0	0.000000	...	0.0	Vegeta / Ve
2	Regent Park, Harbourfront	0.0	0.00	0.0	0.0	0.00	0.000000	0.0	0.0	0.000000	...	0.0	Restau
3	Lawrence Manor, Lawrence Heights	0.0	0.04	0.0	0.0	0.00	0.000000	0.0	0.0	0.000000	...	0.0	
4	Queen's Park, Ontario Provincial Government	0.0	0.00	0.0	0.0	0.00	0.032258	0.0	0.0	0.000000	...	0.0	
5	Islington Avenue, Humber Valley Village	0.0	0.00	0.0	0.0	0.00	0.000000	0.0	0.0	0.000000	...	0.0	
6	Malvern, Rouge	0.0	0.00	0.0	0.0	0.00	0.000000	0.0	0.0	0.000000	...	0.0	
7	Don Mills	0.0	0.00	0.0	0.0	0.00	0.000000	0.0	0.0	0.000000	...	0.0	
8	Parkview Hill, Woodbine Gardens	0.0	0.00	0.0	0.0	0.00	0.000000	0.0	0.0	0.071429	...	0.0	
9	Garden District, Ryerson	0.0	0.00	0.0	0.0	0.02	0.000000	0.0	0.0	0.000000	...	0.0	

10 rows x 246 columns



Viewing the top 3 categories in each neighborhood

```
In [25]:

num_top_venues = 3

for hood in venues_grouped['Neighborhood']:
    print("----"+hood+"----")
    temp = venues_grouped[venues_grouped['Neighborhood'] == hood].T.reset_index()
    temp.columns = ['venue', 'freq']
    temp = temp.iloc[1:]
    temp['freq'] = temp['freq'].astype(float)
    temp = temp.round({'freq': 2})
    print(temp.sort_values('freq', ascending=False).reset_index(drop=True).head(num_top_venues))
    print('\n')

----Parkwoods----
      venue  freq
0  Pet Store  0.33
1    Park    0.33
2 Food & Drink Shop  0.33

----Victoria Village----
      venue  freq
0  Nail Salon  0.33
1 Grocery Store  0.33
2 Intersection  0.33

----Regent Park, Harbourfront----
      venue  freq
0  Coffee Shop  0.23
1 Breakfast Spot  0.09
2    Spa       0.05
```

----Lawrence Manor, Lawrence Heights----

	venue	freq
0	Clothing Store	0.22
1	Furniture / Home Store	0.04
2	Restaurant	0.04

----Queen's Park, Ontario Provincial Government----

	venue	freq
0	Coffee Shop	0.16
1	Sandwich Place	0.06
2	Park	0.06

----Islington Avenue, Humber Valley Village----

	venue	freq
0	Pharmacy	0.22
1	Grocery Store	0.11
2	Café	0.11

----Malvern, Rouge----

	venue	freq
0	Zoo Exhibit	0.5
1	Home Service	0.5
2	Yoga Studio	0.0

----Don Mills----

	venue	freq
0	Intersection	0.2
1	Gym	0.1
2	Soccer Field	0.1

----Parkview Hill, Woodbine Gardens----

	venue	freq
0	Pizza Place	0.14
1	Athletics & Sports	0.07
2	Fast Food Restaurant	0.07

----Garden District, Ryerson----

	venue	freq
0	Coffee Shop	0.10
1	Café	0.06
2	Ramen Restaurant	0.04

----Glencairn----

	venue	freq
0	Pizza Place	0.20
1	Latin American Restaurant	0.07
2	Fish Market	0.07

----West Deane Park, Princess Gardens, Martin Grove, Islington, Cloverdale----

	venue	freq
0	Jewelry Store	0.5
1	Movie Theater	0.5
2	Airport	0.0

----Rouge Hill, Port Union, Highland Creek----

	venue	freq
0	Bar	1.0
1	Airport	0.0
2	Music Store	0.0

----Woodbine Heights----

	venue	freq
--	-------	------

0	Grocery Store	0.11
1	Bus Line	0.11
2	Café	0.11

----St. James Town----

	venue	freq
0	Café	0.10
1	Coffee Shop	0.06
2	Restaurant	0.06

----Humewood-Cedarvale----

	venue	freq
0	Hockey Arena	0.17
1	Coffee Shop	0.17
2	Park	0.17

----Eringate, Bloordale Gardens, Old Burnhamthorpe, Markland Wood----

	venue	freq
0	Electronics Store	0.17
1	Carpet Store	0.17
2	Fish & Chips Shop	0.17

----Guildwood, Morningside, West Hill----

	venue	freq
0	Gym / Fitness Center	0.33
1	Construction & Landscaping	0.33
2	Park	0.33

----The Beaches----

	venue	freq
0	Pub	0.2
1	Health Food Store	0.2
2	College Gym	0.2

----Berczy Park----

	venue	freq
0	Coffee Shop	0.06
1	Restaurant	0.06
2	Italian Restaurant	0.04

----Caledonia-Fairbanks----

	venue	freq
0	Sporting Goods Shop	0.14
1	Mexican Restaurant	0.14
2	Bakery	0.14

----Woburn----

	venue	freq
0	Korean Restaurant	0.2
1	Soccer Field	0.2
2	Park	0.2

----Leaside----

	venue	freq
0	Sporting Goods Shop	0.09
1	Coffee Shop	0.09
2	Bank	0.06

----Central Bay Street----

	venue	freq
0	Coffee Shop	0.12
1	Clothing Store	0.06

2 Cosmetics Shop 0.04

----Christie----

	venue	freq
0	Café	0.27
1	Grocery Store	0.18
2	Coffee Shop	0.09

----Cedarbrae----

	venue	freq
0	Playground	0.5
1	Trail	0.5
2	Airport	0.0

----Hillcrest Village----

	venue	freq
0	Residential Building (Apartment / Condo)	0.5
1	Dog Run	0.5
2	Airport	0.0

----Bathurst Manor, Wilson Heights, Downsview North----

	venue	freq
0	Music Venue	0.33
1	Park	0.33
2	IT Services	0.33

----Thorncliffe Park----

	venue	freq
0	Coffee Shop	0.1
1	Yoga Studio	0.1
2	Park	0.1

----Richmond, Adelaide, King----

	venue	freq
0	Coffee Shop	0.10
1	Café	0.10
2	Restaurant	0.06

----Dufferin, Dovercourt Village----

	venue	freq
0	Furniture / Home Store	0.12
1	Park	0.12
2	Grocery Store	0.12

----Scarborough Village----

	venue	freq
0	Ice Cream Shop	0.50
1	Restaurant	0.25
2	Train Station	0.25

----Fairview, Henry Farm, Oriole----

	venue	freq
0	Clothing Store	0.16
1	Fast Food Restaurant	0.06
2	Restaurant	0.06

----Northwood Park, York University----

	venue	freq
0	Furniture / Home Store	0.14
1	Restaurant	0.07
2	Pizza Place	0.07

----East Toronto, Broadview North (Old East York)----

	venue	freq
0	Intersection	0.50
1	Home Service	0.25
2	Park	0.25

----Harbourfront East, Union Station, Toronto Islands----

	venue	freq
0	Coffee Shop	0.18
1	Plaza	0.06
2	Japanese Restaurant	0.06

----Little Portugal, Trinity----

	venue	freq
0	Coffee Shop	0.08
1	Cocktail Bar	0.06
2	Asian Restaurant	0.06

----Kennedy Park, Ionview, East Birchmount Park----

	venue	freq
0	Discount Store	0.2
1	Coffee Shop	0.2
2	Convenience Store	0.1

----Bayview Village----

	venue	freq
0	Golf Driving Range	0.2
1	Construction & Landscaping	0.2
2	Park	0.2

----Downsview----

	venue	freq
0	Shopping Mall	0.08
1	Grocery Store	0.08
2	Pizza Place	0.08

----The Danforth West, Riverdale----

	venue	freq
0	Coffee Shop	0.14
1	Ice Cream Shop	0.14
2	Grocery Store	0.14

----Toronto Dominion Centre, Design Exchange----

	venue	freq
0	Coffee Shop	0.16
1	Café	0.14
2	Restaurant	0.06

----Brockton, Parkdale Village, Exhibition Place----

	venue	freq
0	Coffee Shop	0.08
1	Café	0.06
2	Gift Shop	0.06

----Golden Mile, Clairlea, Oakridge----

	venue	freq
0	Intersection	0.18
1	Bus Line	0.18
2	Bakery	0.18

----York Mills. Silver Hills----



	venue	freq
0	Music Venue	1.0
1	Mediterranean Restaurant	0.0
2	Metro Station	0.0

----India Bazaar, The Beaches West----

	venue	freq
0	Park	0.11
1	Pizza Place	0.06
2	Sushi Restaurant	0.06

----Commerce Court, Victoria Hotel----

	venue	freq
0	Coffee Shop	0.12
1	Café	0.10
2	Hotel	0.08

----North Park, Maple Leaf Park, Upwood Park----

	venue	freq
0	Bakery	0.5
1	Park	0.5
2	Music Venue	0.0

----Humber Summit----

	venue	freq
0	Construction & Landscaping	0.33
1	Rental Car Location	0.33
2	BBQ Joint	0.33

----Cliffside, Cliffcrest, Scarborough Village West----

	venue	freq
0	Ice Cream Shop	0.22
1	Pharmacy	0.11
2	Sandwich Place	0.11

----Willowdale, Newtonbrook----

	venue	freq
0	Pizza Place	0.11
1	Café	0.11
2	Middle Eastern Restaurant	0.11

----Studio District----

	venue	freq
0	Diner	0.08
1	Italian Restaurant	0.06
2	Brewery	0.06

----Bedford Park, Lawrence Manor East----

	venue	freq
0	Coffee Shop	0.1
1	Sandwich Place	0.1
2	Italian Restaurant	0.1

----Del Ray, Mount Dennis, Keelsdale and Silverthorn----

	venue	freq
0	Fast Food Restaurant	0.67
1	Coffee Shop	0.33
2	Airport	0.00

----Humberlea, Emery----

	venue	freq
0	Coffee Shop	0.50

1 Nightclub 0.25  
2 Park 0.25

----Birch Cliff, Cliffside West----

	venue	freq
0	Gym	0.2
1	General Entertainment	0.2
2	Skating Rink	0.2

----Willowdale, Willowdale East----

	venue	freq
0	Coffee Shop	0.09
1	Café	0.09
2	Fast Food Restaurant	0.06

----Lawrence Park----

	venue	freq
0	Electronics Store	0.33
1	Park	0.33
2	Dim Sum Restaurant	0.33

----Runnymede, The Junction North----

	venue	freq
0	Brewery	0.6
1	Home Service	0.2
2	Furniture / Home Store	0.2

----Weston----

	venue	freq
0	Train Station	0.15
1	Coffee Shop	0.15
2	Grocery Store	0.08

----Dorset Park, Wexford Heights, Scarborough Town Centre----

	venue	freq
0	Gift Shop	0.33
1	Light Rail Station	0.33
2	Bakery	0.33

----York Mills West----

	venue	freq
0	Speakeasy	0.25
1	Convenience Store	0.25
2	Park	0.25

----Davisville North----

	venue	freq
0	Hotel	0.29
1	Park	0.14
2	Breakfast Spot	0.14

----Forest Hill North & West, Forest Hill Road Park----

	venue	freq
0	Pharmacy	0.5
1	Park	0.5
2	Music Store	0.0

----High Park, The Junction South----

	venue	freq
0	Convenience Store	0.33
1	Park	0.33
2	Bed & Breakfast	0.33

----Westmount----

	venue	freq
0	Pizza Place	0.33
1	Middle Eastern Restaurant	0.17
2	Sandwich Place	0.17

----Wexford, Maryvale----

	venue	freq
0	Auto Garage	1.0
1	Airport	0.0
2	Music Venue	0.0

----Willowdale, Willowdale West----

	venue	freq
0	Pizza Place	0.17
1	Park	0.17
2	Coffee Shop	0.17

----North Toronto West, Lawrence Park----

	venue	freq
0	Playground	0.25
1	Park	0.25
2	Garden	0.25

----The Annex, North Midtown, Yorkville----

	venue	freq
0	Italian Restaurant	0.09
1	Mexican Restaurant	0.06
2	Vegetarian / Vegan Restaurant	0.06

----Parkdale, Roncesvalles----

	venue	freq
0	Coffee Shop	0.06
1	Eastern European Restaurant	0.06
2	Grocery Store	0.04

----Canada Post Gateway Processing Centre----

	venue	freq
0	Coffee Shop	0.12
1	Hotel	0.06
2	Café	0.06

----Kingsview Village, St. Phillips, Martin Grove Gardens, Richview Gardens----

	venue	freq
0	Pizza Place	0.25
1	Music Venue	0.25
2	Bus Line	0.25

----Agincourt----

	venue	freq
0	Shopping Mall	0.12
1	Supermarket	0.12
2	Park	0.12

----Davisville----

	venue	freq
0	Dessert Shop	0.12
1	Café	0.08
2	Sandwich Place	0.08

----University of Toronto, Harbord----

	venue	freq
0	Café	0.10
1	Bakery	0.06
2	Restaurant	0.06

----Runnymede, Swansea----

	venue	freq
0	Café	0.10
1	Coffee Shop	0.10
2	Bakery	0.07

----Clarks Corners, Tam O'Shanter, Sullivan----

	venue	freq
0	Pharmacy	0.1
1	Thai Restaurant	0.1
2	Shopping Mall	0.1

----Moore Park, Summerhill East----

	venue	freq
0	Gym	0.25
1	Playground	0.25
2	Trail	0.25

----Kensington Market, Chinatown, Grange Park----

	venue	freq
0	Café	0.08
1	Coffee Shop	0.06
2	Vegetarian / Vegan Restaurant	0.06

----Milliken, Agincourt North, Steeles East, L'Amoreaux East----

	venue	freq
0	Pharmacy	1.0
1	Mediterranean Restaurant	0.0
2	Metro Station	0.0

----Summerhill West, Rathnelly, South Hill, Forest Hill SE, Deer Park----

	venue	freq
0	Light Rail Station	0.33
1	Coffee Shop	0.33
2	Liquor Store	0.17

----CN Tower, King and Spadina, Railway Lands, Harbourfront West, Bathurst Quay, South Niagara, Island airport----

	venue	freq
0	Coffee Shop	0.10
1	Italian Restaurant	0.08
2	Bar	0.06

----New Toronto, Mimico South, Humber Bay Shores----

	venue	freq
0	Park	0.33
1	Tennis Court	0.17
2	Grocery Store	0.17

----South Steeles, Silverstone, Humbergate, Jamestown, Mount Olive, Beaumont Heights, Thistletown, Albion Gardens----

	venue	freq
0	Grocery Store	0.13
1	Pizza Place	0.07
2	Japanese Restaurant	0.07

----Steeles West, L'Amoreaux West----

	venue	freq
0	Chinese Restaurant	0.15
1	Fast Food Restaurant	0.15
2	Coffee Shop	0.08

----Rosedale----

	venue	freq
0	Tennis Court	0.25
1	Park	0.25
2	Playground	0.25

----Stn A PO Boxes----

	venue	freq
0	Coffee Shop	0.12
1	Hotel	0.06
2	Café	0.06

----Alderwood, Long Branch----

	venue	freq
0	Pizza Place	0.2
1	Gym	0.2
2	Convenience Store	0.2

----Northwest, West Humber - Clairville----

	venue	freq
0	Auto Dealership	0.12
1	Gym	0.12
2	Middle Eastern Restaurant	0.12

----St. James Town, Cabbagetown----

	venue	freq
0	Pizza Place	0.09
1	Bakery	0.07
2	Coffee Shop	0.07

----First Canadian Place, Underground city----

	venue	freq
0	Café	0.14
1	Coffee Shop	0.10
2	Restaurant	0.06

----The Kingsway, Montgomery Road, Old Mill North----

	venue	freq
0	Park	0.33
1	Pool	0.33
2	Lounge	0.33

----Church and Wellesley----

	venue	freq
0	Coffee Shop	0.08
1	Japanese Restaurant	0.06
2	Restaurant	0.06

----Business reply mail Processing Centre, South Central Letter Processing Plant Toronto----

	venue	freq
0	Coffee Shop	0.12
1	Hotel	0.06
2	Café	0.06

----Old Mill South. King's Mill Park. Sunnylea. Humber Bay. Mimico NE. The Queensway East

, Royal York South East, Kingsway Park South East----

	venue	freq
0	Bank	0.14
1	Sushi Restaurant	0.14
2	Coffee Shop	0.14

----Mimico NW, The Queensway West, South of Bloor, Kingsway Park South West, Royal York South West----

	venue	freq
0	Bank	0.17
1	Pet Store	0.08
2	Gym / Fitness Center	0.08

## Creating a dataframe with most common venues

### First defining a function to sort venues

In [26]:

```
def return_most_common_venues(row, num_top_venues):
    row_categories = row.iloc[1:]
    row_categories_sorted = row_categories.sort_values(ascending=False)

    return row_categories_sorted.index.values[0:num_top_venues]
```

### Creating the dataframe and displaying the top 5 venues for each neighborhood

In [27]:

```
num_top_venues = 5

indicators = ['st', 'nd', 'rd']

columns = ['Neighborhood']
for ind in np.arange(num_top_venues):
    try:
        columns.append('{}{} Most Common Venue'.format(ind+1, indicators[ind]))
    except:
        columns.append('{}th Most Common Venue'.format(ind+1))

neighborhoods_venues_sorted = pd.DataFrame(columns=columns)
neighborhoods_venues_sorted['Neighborhood'] = venues_grouped['Neighborhood']

for ind in np.arange(venues_grouped.shape[0]):
    neighborhoods_venues_sorted.iloc[ind, 1:] = return_most_common_venues(venues_grouped
    .iloc[ind, :], num_top_venues)

neighborhoods_venues_sorted
```

Out[27]:

	Neighborhood	1st Most Common Venue	2nd Most Common Venue	3rd Most Common Venue	4th Most Common Venue	5th Most Common Venue
0	Parkwoods	Pet Store	Park	Food & Drink Shop	Donut Shop	Fish & Chips Shop
1	Victoria Village	Nail Salon	Intersection	Grocery Store	Zoo Exhibit	Event Space
2	Regent Park, Harbourfront	Coffee Shop	Breakfast Spot	Theater	Event Space	Spa
3	Lawrence Manor, Lawrence Heights	Clothing Store	Restaurant	Men's Store	Food Court	Toy / Game Store
4	Queen's Park, Ontario Provincial Government	Coffee Shop	Café	Park	Sandwich Place	Persian Restaurant

5	Islington Avenue, Humber Valley Village Neighbourhood	1st Most Common Venue	2nd Most Common Venue	3rd Most Common Venue	4th Most Common Venue	5th Most Common Venue
6	Malvern, Rouge	Zoo Exhibit	Home Service	Dumpling Restaurant	Flea Market	Fish Market
7	Don Mills	Intersection	Coffee Shop	Soccer Field	Park	Gas Station
8	Parkview Hill, Woodbine Gardens	Pizza Place	Pet Store	Gastropub	Rock Climbing Spot	Bank
9	Garden District, Ryerson	Coffee Shop	Café	Ramen Restaurant	Clothing Store	Bookstore
10	Glencairn	Pizza Place	Mediterranean Restaurant	Latin American Restaurant	Rental Car Location	Japanese Restaurant
11	West Deane Park, Princess Gardens, Martin Grove	Movie Theater	Jewelry Store	Zoo Exhibit	Eastern European Restaurant	Fish Market
12	Rouge Hill, Port Union, Highland Creek	Bar	Zoo Exhibit	Eastern European Restaurant	Flea Market	Fish Market
13	Woodbine Heights	Bus Line	Café	Grocery Store	Doctor's Office	Fast Food Restaurant
14	St. James Town	Café	Cosmetics Shop	Coffee Shop	Restaurant	Creperie
15	Humewood-Cedarvale	Park	Hockey Arena	Field	Grocery Store	Coffee Shop
16	Eringate, Bloordale Gardens, Old Burnhamthorpe	Grocery Store	Fish & Chips Shop	Carpet Store	Electronics Store	Shopping Mall
17	Guildwood, Morningside, West Hill	Construction & Landscaping	Park	Gym / Fitness Center	Zoo Exhibit	Falafel Restaurant
18	The Beaches	Health Food Store	Trail	Pub	College Gym	Fast Food Restaurant
19	Berczy Park	Coffee Shop	Restaurant	Seafood Restaurant	Beer Bar	Italian Restaurant
20	Caledonia-Fairbanks	Park	Gym	Bakery	Beer Store	Mexican Restaurant
21	Woburn	Park	Coffee Shop	Business Service	Korean Restaurant	Soccer Field
22	Leaside	Coffee Shop	Sporting Goods Shop	Bank	Burger Joint	Shopping Mall
23	Central Bay Street	Coffee Shop	Clothing Store	Plaza	Cosmetics Shop	Bubble Tea Shop
24	Christie	Café	Grocery Store	Italian Restaurant	Coffee Shop	Baby Store
25	Cedarbrae	Playground	Trail	Zoo Exhibit	Donut Shop	Fish & Chips Shop
26	Hillcrest Village	Dog Run	Residential Building (Apartment / Condo)	Donut Shop	Fish Market	Fish & Chips Shop
27	Bathurst Manor, Wilson Heights, Downsview North	IT Services	Park	Music Venue	Zoo Exhibit	Eastern European Restaurant
28	Thornccliffe Park	Housing Development	Sandwich Place	Supermarket	Coffee Shop	Indian Restaurant
29	Richmond, Adelaide, King	Café	Coffee Shop	Restaurant	American Restaurant	Asian Restaurant
...	...	...	...	...	...	...
67	Willowdale, Willowdale West	Park	Bank	Pizza Place	Coffee Shop	Grocery Store
68	North Toronto West, Lawrence Park	Garden	Park	Gym Pool	Playground	Event Space
69	The Annex, North Midtown, Yorkville	Italian Restaurant	Park	Sandwich Place	Café	Coffee Shop
70	Parkdale, Roncesvalles	Coffee Shop	Eastern European Restaurant	Restaurant	Gift Shop	Bakery

		Restaurant				
		1st Most Common Venue	2nd Most Common Venue	3rd Most Common Venue	4th Most Common Venue	5th Most Common Venue
71	Canada Post, Highway Processing Centre	Coffee Shop		Café		
72	Kingsview Village, St. Phillips, Martin Grove ...	Music Venue		Pizza Place	Bus Line	Arts & Crafts Store
73	Agincourt	Park		Skating Rink	Shopping Mall	Discount Store
74	Davisville	Dessert Shop		Coffee Shop	Italian Restaurant	Sandwich Place
75	University of Toronto, Harbord	Café		Restaurant	Bakery	Gym
76	Runnymede, Swansea	Coffee Shop		Café	Bakery	Pizza Place
77	Clarks Corners, Tam O'Shanter, Sullivan	Golf Course		Pizza Place	Fast Food Restaurant	Fried Chicken Joint
78	Moore Park, Summerhill East	Tennis Court		Trail	Gym	Playground
79	Kensington Market, Chinatown, Grange Park	Café		Vegetarian / Vegan Restaurant	Coffee Shop	Grocery Store
80	Milliken, Agincourt North, Steeles East, L'Amo...	Pharmacy		Flower Shop	Fish Market	Fish & Chips Shop
81	Summerhill West, Rathnelly, South Hill, Forest...	Light Rail Station		Coffee Shop	Supermarket	Liquor Store
82	CN Tower, King and Spadina, Railway Lands, Har...	Coffee Shop		Italian Restaurant	Bar	Restaurant
83	New Toronto, Mimico South, Humber Bay Shores	Park		Tennis Court	Yoga Studio	Skating Rink
84	South Steeles, Silverstone, Humbergate, Jamest...	Grocery Store		Hardware Store	Japanese Restaurant	Pharmacy
85	Steeles West, L'Amoreaux West	Fast Food Restaurant		Chinese Restaurant	Pizza Place	Breakfast Spot
86	Rosedale	Tennis Court		Park	Gym / Fitness Center	Playground
87	Stn A PO Boxes	Coffee Shop		Café	Hotel	Concert Hall
88	Alderwood, Long Branch	Convenience Store		Pizza Place	Sandwich Place	Gym
89	Northwest, West Humber - Clairville	Sandwich Place		Middle Eastern Restaurant	Storage Facility	Coffee Shop
90	St. James Town, Cabbagetown	Pizza Place		Bakery	Coffee Shop	Restaurant
91	First Canadian Place, Underground city	Café		Coffee Shop	Restaurant	Hotel
92	The Kingsway, Montgomery Road, Old Mill North	Park		Lounge	Pool	Zoo Exhibit
93	Church and Wellesley	Coffee Shop		Japanese Restaurant	Restaurant	Dance Studio
94	Business reply mail Processing Centre, South C...	Coffee Shop		Café	Hotel	Concert Hall
95	Old Mill South, King's Mill Park, Sunnylea, Hu...	Chinese Restaurant		Bank	Flower Shop	Italian Restaurant
96	Mimico NW, The Queensway West, South of Bloor,...	Bank		Pet Store	Thai Restaurant	Burrito Place

97 rows x 6 columns

## KMeans Clustering to cluster neighborhoods

In [28]:



```
from sklearn.cluster import KMeans
```

Running KMeans algorithm with 5 clusters

In [29]:

```
k = 5
venues_grouped_clustering = venues_grouped.drop('Neighborhood', axis=1)
kmeans = KMeans(n_clusters=k, random_state=67).fit(venues_grouped_clustering)
kmeans.labels_
```

Out[29]:

```
array([0, 0, 2, 2, 2, 0, 0, 2, 2, 2, 2, 2, 0, 2, 2, 0, 2, 0, 0, 2, 0, 2,
       2, 2, 2, 0, 0, 3, 2, 2, 0, 2, 2, 2, 0, 2, 2, 2, 0, 2, 2, 2, 2, 2,
       3, 2, 2, 0, 0, 2, 2, 2, 2, 2, 2, 2, 2, 0, 0, 2, 0, 0, 0, 1, 0, 2,
       4, 2, 0, 2, 2, 2, 2, 0, 2, 2, 2, 2, 0, 2, 1, 2, 2, 0, 2, 2, 0, 2,
       2, 2, 2, 2, 0, 2, 2, 2, 2], dtype=int32)
```

Create a new dataframe that includes cluster labels and the top 5 venues

In [30]:

```
neighborhoods_venues_sorted.insert(0, 'Cluster Labels', kmeans.labels_)
venues_merged = df_new
venues_merged = venues_merged.join(neighborhoods_venues_sorted.set_index('Neighborhood'),
on='Neighborhood')
venues_merged.dropna(inplace=True)
```

Viewing the newly created dataframe

In [31]:

```
print(venues_merged.shape)
venues_merged['Cluster Labels'] = venues_merged['Cluster Labels'].astype(int)
venues_merged
```

(101, 11)

Out[31]:

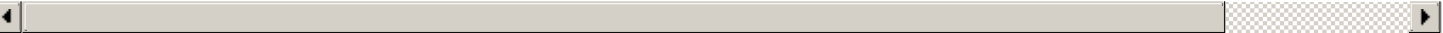
	Postal Code	Borough	Neighborhood	Latitude	Longitude	Cluster Labels	1st Most Common Venue	2nd Most Common Venue	3rd Most Common Venue	4th Most Common Venue
0	M3A	North York	Parkwoods	43.7519	-79.3304	0	Pet Store	Park	Food & Drink Shop	De S
1	M4A	North York	Victoria Village	43.7304	-79.3128	0	Nail Salon	Intersection	Grocery Store	Zoo Exh
2	M5A	Downtown Toronto	Regent Park, Harbourfront	43.6551	-79.3626	2	Coffee Shop	Breakfast Spot	Theater	Ev Sp
3	M6A	North York	Lawrence Manor, Lawrence Heights	43.7232	-79.4514	2	Clothing Store	Restaurant	Men's Store	Food Co
4	M7A	Downtown Toronto	Queen's Park, Ontario Provincial Government	43.6645	-79.393	2	Coffee Shop	Café	Park	Sandv Pl
5	M9A	Etobicoke	Islington Avenue, Humber Valley Village	43.6628	-79.5283	0	Pharmacy	Bank	Park	Ska F
6	M1B	Scarborough	Malvern, Rouge	43.8115	-79.1955	0	Zoo Exhibit	Home Service	Dumpling Restaurant	I Ma
7	M3B	North York	Don Mills	43.7493	-79.3617	2	Intersection	Coffee Shop	Soccer Field	F

ID	Postal Code	Borough	Neighborhood	Latitude	Longitude	Cluster Labels	1st Most Common Venue	2nd Most Common Venue	3rd Most Common Venue	4th Most Common Venue
8	M4B	East York	Woodbine Gardens	43.7079	-79.3116	2	Pizza Place	Pet Store	Gastropub	Convenience Store
9	M5B	Downtown Toronto	Garden District, Ryerson	43.6574	-79.3782	2	Coffee Shop	Café	Ramen Restaurant	Clothing Store
10	M6B	North York	Glencairn	43.708	-79.4484	2	Pizza Place	Mediterranean Restaurant	Latin American Restaurant	Rental Location
11	M9B	Etobicoke	West Deane Park, Princess Gardens, Martin Grove	43.6528	-79.5541	2	Movie Theater	Jewelry Store	Zoo Exhibit	European Restaurant
12	M1C	Scarborough	Rouge Hill, Port Union, Highland Creek	43.7856	-79.1587	0	Bar	Zoo Exhibit	Eastern European Restaurant	Market
13	M3C	North York	Don Mills	43.7218	-79.3434	2	Intersection	Coffee Shop	Soccer Field	Fast Food
14	M4C	East York	Woodbine Heights	43.6897	-79.3068	2	Bus Line	Café	Grocery Store	Doctor's Office
15	M5C	Downtown Toronto	St. James Town	43.6514	-79.3756	2	Café	Cosmetics Shop	Coffee Shop	Restaurant
16	M6C	York	Humewood-Cedarvale	43.6921	-79.4304	0	Park	Hockey Arena	Field	Grocery Store
17	M9C	Etobicoke	Eringate, Bloordale Gardens, Old Burnhamthorpe	43.6489	-79.5782	2	Grocery Store	Fish & Chips Shop	Carpet Store	Electronics Store
18	M1E	Scarborough	Guildwood, Morningside, West Hill	43.7658	-79.1752	0	Construction & Landscaping	Park	Gym / Fitness Center	Zoo Exhibit
19	M4E	East Toronto	The Beaches	43.677	-79.2954	0	Health Food Store	Trail	Pub	College
20	M5E	Downtown Toronto	Berczy Park	43.6453	-79.3737	2	Coffee Shop	Restaurant	Seafood Restaurant	Beer
21	M6E	York	Caledonia-Fairbanks	43.6878	-79.4505	0	Park	Gym	Bakery	Beer Store
22	M1G	Scarborough	Woburn	43.7682	-79.2176	2	Park	Coffee Shop	Business Service	Korean Restaurant
23	M4G	East York	Leaside	43.7091	-79.3641	2	Coffee Shop	Sporting Goods Shop	Bank	Butcher / Jeweler
24	M5G	Downtown Toronto	Central Bay Street	43.6561	-79.3849	2	Coffee Shop	Clothing Store	Plaza	Cosmetics Store
25	M6G	Downtown Toronto	Christie	43.6688	-79.4207	2	Café	Grocery Store	Italian Restaurant	Coffee Shop
26	M1H	Scarborough	Cedarbrae	43.7697	-79.2394	0	Playground	Trail	Zoo Exhibit	Doctor's Office
27	M2H	North York	Hillcrest Village	43.8029	-79.3562	0	Dog Run	Residential Building (Apartment / Condo)	Donut Shop	Market
28	M3H	North York	Bathurst Manor, Wilson Heights, Downsview North	43.7481	-79.444	3	IT Services	Park	Music Venue	Zoo Exhibit
29	M4H	East York	Thorncliffe Park	43.7013	-79.3498	2	Housing Development	Sandwich Place	Supermarket	Coffee Shop
...	...	...	...	...	...	...	...	...	...	...
72	M2R	North York	Willowdale,	43.7799	-79.4468	2	Park	Bank	Pizza Place	Coffee Shop

ID	Name	Location Data		Neighborhood	Latitude	Longitude	Cluster Labels	Top 3 Common Venues		4th Most Common
		Postal Code	Borough/City					1st Most Common	2nd Most Common	
73	M4R	Central Toronto	Willowdale West	North York West, Lawrence Park	43.7145	-79.407	0	Italian Restaurant	Park	Gym
74	M5R	Central Toronto	The Annex, North Midtown, Yorkville		43.6748	-79.4018	2	Italian Restaurant	Park	Sandwich Place
75	M6R	West Toronto	Parkdale, Roncesvalles		43.6479	-79.4502	2	Coffee Shop	Eastern European Restaurant	Restaurant
76	M7R	Mississauga	Canada Post Gateway Processing Centre		43.6487	-79.3854	2	Coffee Shop	Café	Hotel
77	M9R	Etobicoke	Kingsview Village, St. Phillips, Martin Grove ...		43.6867	-79.5573	2	Music Venue	Pizza Place	Bus Line
78	M1S	Scarborough	Agincourt		43.7939	-79.2671	0	Park	Skating Rink	Shopping Mall
79	M4S	Central Toronto	Davisville		43.7034	-79.386	2	Dessert Shop	Coffee Shop	Italian Restaurant
80	M5S	Downtown Toronto	University of Toronto, Harbord		43.6631	-79.4018	2	Café	Restaurant	Bakery
81	M6S	West Toronto	Runnymede, Swansea		43.6503	-79.4757	2	Coffee Shop	Café	Bakery
82	M1T	Scarborough	Clarks Corners, Tam O'Shanter, Sullivan		43.7847	-79.2994	2	Golf Course	Pizza Place	Fast Food Restaurant
83	M4T	Central Toronto	Moore Park, Summerhill East		43.6907	-79.3836	0	Tennis Court	Trail	Gym
84	M5T	Downtown Toronto	Kensington Market, Chinatown, Grange Park		43.6535	-79.3972	2	Café	Vegetarian / Vegan Restaurant	Coffee Shop
85	M1V	Scarborough	Milliken, Agincourt North, Steeles East, L'Amo...		43.8178	-79.2802	1	Pharmacy	Flower Shop	Fish Market
86	M4V	Central Toronto	Summerhill West, Rathnelly, South Hill, Forest...		43.6857	-79.4023	2	Light Rail Station	Coffee Shop	Supermarket
87	M5V	Downtown Toronto	CN Tower, King and Spadina, Railway Lands, Har...		43.6408	-79.3996	2	Coffee Shop	Italian Restaurant	Bar
88	M8V	Etobicoke	New Toronto, Mimico South, Humber Bay Shores		43.6099	-79.4969	0	Park	Tennis Court	Yoga Studio
89	M9V	Etobicoke	South Steeles, Silverstone, Humbergate, Jamest...		43.7445	-79.5862	2	Grocery Store	Hardware Store	Japanese Restaurant
90	M1W	Scarborough	Steeles West, L'Amoreaux West		43.8005	-79.3207	2	Fast Food Restaurant	Chinese Restaurant	Pizza Place
91	M4W	Downtown Toronto	Rosedale		43.6819	-79.3785	0	Tennis Court	Park	Gym / Fitness Center
92	M5W	Downtown Toronto	Stn A PO Boxes		43.6487	-79.3854	2	Coffee Shop	Café	Hotel

93	Postal MW Code	Etobicoke Borough	Alderwood, Long Neighborhood Branch	43.6011 Latitude	-79.5389 Longitude	Cluster Labels 2	Convenience Store Venue	1st Most Common Venue	2nd Most Common Venue	3rd Most Common Venue	4th Most Common Venue
94	M9W	Etobicoke	Northwest, West Humber - Clairville	43.7117	-79.5792	2	Sandwich Place	Middle Eastern Restaurant	Pizza Place	Storage Facility	Co S
96	M4X	Downtown Toronto	St. James Town, Cabbagetown	43.6679	-79.3665	2	Pizza Place	Bakery	Coffee Shop	Restaurant	Restau
97	M5X	Downtown Toronto	First Canadian Place, Underground city	43.6483	-79.3815	2	Café	Coffee Shop	Restaurant		H
98	M8X	Etobicoke	The Kingsway, Montgomery Road, Old Mill North	43.6537	-79.5111	0	Park	Lounge		Pool	Zoo Ext
99	M4Y	Downtown Toronto	Church and Wellesley	43.6666	-79.3813	2	Coffee Shop	Japanese Restaurant	Restaurant		Da Stu
100	M7Y	East Toronto	Business reply mail Processing Centre, South C...	43.6487	-79.3854	2	Coffee Shop	Café		Hotel	Con
101	M8Y	Etobicoke	Old Mill South, King's Mill Park, Sunnylea, Hu...	43.6329	-79.4895	2	Chinese Restaurant	Bank	Flower Shop		Ita Restau
102	M8Z	Etobicoke	Mimico NW, The Queensway West, South of Bloor,...	43.6246	-79.5283	2	Bank	Pet Store		Thai Restaurant	Bui Pi

101 rows x 11 columns



Creating a map to visualize clustering

In [32]:

```
import matplotlib.cm as cm
import matplotlib.colors as colors

map_clusters = folium.Map(location=[latitude, longitude], zoom_start=12)

x = np.arange(k)
ys = [i + x + (i*x)**2 for i in range(k)]
colors_array = cm.rainbow(np.linspace(0, 1, len(ys)))
rainbow = [colors.rgb2hex(i) for i in colors_array]

markers_colors = []
for lat, lon, poi, cluster in zip(venues_merged['Latitude'], venues_merged['Longitude'],
venues_merged['Neighborhood'], venues_merged['Cluster Labels']):
    label = folium.Popup(str(poi) + ' Cluster ' + str(cluster), parse_html=True)
    folium.CircleMarker(
        [lat, lon],
        radius=5,
        popup=label,
        color=rainbow[cluster-1],
        fill=True,
        fill_color=rainbow[cluster-1],
        fill_opacity=0.7).add_to(map_clusters)

map_clusters
```

Out [32]:

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

## Viewing members of each cluster

In [33]:

```
venues_merged.loc[venues_merged['Cluster Labels'] == 0, venues_merged.columns[[1] + list(
range(5, venues_merged.shape[1]))]]
```

Out[33]:

	Borough	Cluster Labels	1st Most Common Venue	2nd Most Common Venue	3rd Most Common Venue	4th Most Common Venue	5th Most Common Venue
0	North York	0	Pet Store	Park	Food & Drink Shop	Donut Shop	Fish & Chips Shop
1	North York	0	Nail Salon	Intersection	Grocery Store	Zoo Exhibit	Event Space
5	Etobicoke	0	Pharmacy	Bank	Park	Skating Rink	Home Service
6	Scarborough	0	Zoo Exhibit	Home Service	Dumpling Restaurant	Flea Market	Fish Market
12	Scarborough	0	Bar	Zoo Exhibit	Eastern European Restaurant	Flea Market	Fish Market
16	York	0	Park	Hockey Arena	Field	Grocery Store	Coffee Shop
18	Scarborough	0	Construction & Landscaping	Park	Gym / Fitness Center	Zoo Exhibit	Falafel Restaurant
19	East Toronto	0	Health Food Store	Trail	Pub	College Gym	Fast Food Restaurant
21	York	0	Park	Gym	Bakery	Beer Store	Mexican Restaurant
26	Scarborough	0	Playground	Trail	Zoo Exhibit	Donut Shop	Fish & Chips Shop
27	North York	0	Dog Run	Residential Building (Apartment / Condo)	Donut Shop	Fish Market	Fish & Chips Shop
31	West Toronto	0	Park	Grocery Store	Furniture / Home Store	Bus Line	Café
35	East York	0	Intersection	Park	Home Service	Zoo Exhibit	Falafel Restaurant
39	North York	0	Construction & Landscaping	Trail	Golf Driving Range	Dog Run	Park
49	North York	0	Bakery	Park	Zoo Exhibit	Fish Market	Fish & Chips Shop

50	Borough	Cluster Labels	1st Most Common Venue	2nd Most Common Venue	3rd Most Common Venue	4th Most Common Venue	5th Most Common Venue
61	Central Toronto	0	Park	Dim Sum Restaurant	Electronics Store	Zoo Exhibit	Dumpling Restaurant
63	York	0	Brewery	Home Service	Furniture / Home Store	Eastern European Restaurant	Flea Market
65	Scarborough	0	Bakery	Light Rail Station	Gift Shop	Dumpling Restaurant	Fish Market
66	North York	0	Convenience Store	Park	Speakeasy	Korean Restaurant	Eastern European Restaurant
67	Central Toronto	0	Hotel	Department Store	Park	Breakfast Spot	Gym / Fitness Center
69	West Toronto	0	Convenience Store	Park	Bed & Breakfast	Dumpling Restaurant	Fish Market
73	Central Toronto	0	Garden	Park	Gym Pool	Playground	Event Space
78	Scarborough	0	Park	Skating Rink	Shopping Mall	Discount Store	Badminton Court
83	Central Toronto	0	Tennis Court	Trail	Gym	Playground	Dumpling Restaurant
88	Etobicoke	0	Park	Tennis Court	Yoga Studio	Skating Rink	Grocery Store
91	Downtown Toronto	0	Tennis Court	Park	Gym / Fitness Center	Playground	Event Space
98	Etobicoke	0	Park	Lounge	Pool	Zoo Exhibit	Dumpling Restaurant

In [34]:

```
venues_merged.loc[venues_merged['Cluster Labels'] == 1, venues_merged.columns[[1] + list(range(5, venues_merged.shape[1]))]]
```

Out[34]:

	Borough	Cluster Labels	1st Most Common Venue	2nd Most Common Venue	3rd Most Common Venue	4th Most Common Venue	5th Most Common Venue
68	Central Toronto	1	Pharmacy	Park	Donut Shop	Fish & Chips Shop	Field
85	Scarborough	1	Pharmacy	Flower Shop	Fish Market	Fish & Chips Shop	Field

In [35]:

```
venues_merged.loc[venues_merged['Cluster Labels'] == 2, venues_merged.columns[[1] + list(range(5, venues_merged.shape[1]))]]
```

Out[35]:

	Borough	Cluster Labels	1st Most Common Venue	2nd Most Common Venue	3rd Most Common Venue	4th Most Common Venue	5th Most Common Venue
2	Downtown Toronto	2	Coffee Shop	Breakfast Spot	Theater	Event Space	Spa
3	North York	2	Clothing Store	Restaurant	Men's Store	Food Court	Toy / Game Store
4	Downtown Toronto	2	Coffee Shop	Café	Park	Sandwich Place	Persian Restaurant
7	North York	2	Intersection	Coffee Shop	Soccer Field	Park	Gas Station
8	East York	2	Pizza Place	Pet Store	Gastropub	Rock Climbing Spot	Bank
9	Downtown Toronto	2	Coffee Shop	Café	Ramen Restaurant	Clothing Store	Bookstore

10	Borough	Cluster Labels	1st Most Common Venue	2nd Most Common Venue	3rd Most Common Venue	4th Most Common Venue	5th Most Common Venue
11	Etobicoke	2	Movie Theater	Jewelry Store	Zoo Exhibit	Eastern European Restaurant	Fish Market
13	North York	2	Intersection	Coffee Shop	Soccer Field	Park	Gas Station
14	East York	2	Bus Line	Café	Grocery Store	Doctor's Office	Fast Food Restaurant
15	Downtown Toronto	2	Café	Cosmetics Shop	Coffee Shop	Restaurant	Creperie
17	Etobicoke	2	Grocery Store	Fish & Chips Shop	Carpet Store	Electronics Store	Shopping Mall
20	Downtown Toronto	2	Coffee Shop	Restaurant	Seafood Restaurant	Beer Bar	Italian Restaurant
22	Scarborough	2	Park	Coffee Shop	Business Service	Korean Restaurant	Soccer Field
23	East York	2	Coffee Shop	Sporting Goods Shop	Bank	Burger Joint	Shopping Mall
24	Downtown Toronto	2	Coffee Shop	Clothing Store	Plaza	Cosmetics Shop	Bubble Tea Shop
25	Downtown Toronto	2	Café	Grocery Store	Italian Restaurant	Coffee Shop	Baby Store
29	East York	2	Housing Development	Sandwich Place	Supermarket	Coffee Shop	Indian Restaurant
30	Downtown Toronto	2	Café	Coffee Shop	Restaurant	American Restaurant	Asian Restaurant
32	Scarborough	2	Ice Cream Shop	Train Station	Restaurant	Zoo Exhibit	Dumpling Restaurant
33	North York	2	Clothing Store	Coffee Shop	Fast Food Restaurant	Restaurant	Juice Bar
34	North York	2	Furniture / Home Store	Massage Studio	Pizza Place	Bank	Restaurant
36	Downtown Toronto	2	Coffee Shop	Hotel	Japanese Restaurant	Plaza	Boat or Ferry
37	West Toronto	2	Coffee Shop	Asian Restaurant	Bar	Cocktail Bar	Restaurant
38	Scarborough	2	Discount Store	Coffee Shop	Hobby Shop	Chinese Restaurant	Hockey Arena
40	North York	2	Shopping Mall	Grocery Store	Coffee Shop	Pizza Place	Vietnamese Restaurant
41	East Toronto	2	Discount Store	Park	Bus Line	Coffee Shop	Grocery Store
42	Downtown Toronto	2	Coffee Shop	Café	Restaurant	Seafood Restaurant	Beer Bar
43	West Toronto	2	Coffee Shop	Café	Restaurant	Gift Shop	Breakfast Spot
44	Scarborough	2	Bakery	Bus Line	Intersection	Soccer Field	Bus Station
...	...	...	...	...	...	...	...
56	York	2	Fast Food Restaurant	Coffee Shop	Zoo Exhibit	Dumpling Restaurant	Fish Market
57	North York	2	Coffee Shop	Park	Nightclub	Zoo Exhibit	Event Space
58	Scarborough	2	General Entertainment	Skating Rink	Café	Gym	College Stadium
59	North York	2	Café	Coffee Shop	Fast Food Restaurant	Pizza Place	Shopping Mall
60	North York	2	Shopping Mall	Grocery Store	Coffee Shop	Pizza Place	Vietnamese Restaurant
64	York	2	Coffee Shop	Train Station	Convenience Store	Middle Eastern Restaurant	Bank

70	Etobicoke Borough	2	Pizza Place	1st Most Common Venue	2nd Most Common Venue	3rd Most Common Venue	4th Most Common Venue	5th Most Common Venue
72	North York	2	Park	Bank	Pizza Place	Coffee Shop	Coffee Shop	Grocery Store
74	Central Toronto	2	Italian Restaurant	Park	Sandwich Place	Café	Coffee Shop	
75	West Toronto	2	Coffee Shop	Eastern European Restaurant	Restaurant	Gift Shop	Bakery	
76	Mississauga	2	Coffee Shop	Café	Hotel	Concert Hall	Theater	
77	Etobicoke	2	Music Venue	Pizza Place	Bus Line	Arts & Crafts Store	Zoo Exhibit	
79	Central Toronto	2	Dessert Shop	Coffee Shop	Italian Restaurant	Sandwich Place	Pizza Place	
80	Downtown Toronto	2	Café	Restaurant	Bakery	Gym	Japanese Restaurant	
81	West Toronto	2	Coffee Shop	Café	Bakery	Pizza Place	Bank	
82	Scarborough	2	Golf Course	Pizza Place	Fast Food Restaurant	Fried Chicken Joint	Thai Restaurant	
84	Downtown Toronto	2	Café	Vegetarian / Vegan Restaurant	Coffee Shop	Grocery Store	Ice Cream Shop	
86	Central Toronto	2	Light Rail Station	Coffee Shop	Supermarket	Liquor Store	Zoo Exhibit	
87	Downtown Toronto	2	Coffee Shop	Italian Restaurant	Bar	Restaurant	Bakery	
89	Etobicoke	2	Grocery Store	Hardware Store	Japanese Restaurant	Pharmacy	Pizza Place	
90	Scarborough	2	Fast Food Restaurant	Chinese Restaurant	Pizza Place	Breakfast Spot	Sandwich Place	
92	Downtown Toronto	2	Coffee Shop	Café	Hotel	Concert Hall	Theater	
93	Etobicoke	2	Convenience Store	Pizza Place	Sandwich Place	Gym	Pub	
94	Etobicoke	2	Sandwich Place	Middle Eastern Restaurant	Storage Facility	Coffee Shop	Auto Dealership	
96	Downtown Toronto	2	Pizza Place	Bakery	Coffee Shop	Restaurant	Italian Restaurant	
97	Downtown Toronto	2	Café	Coffee Shop	Restaurant	Hotel	Seafood Restaurant	
99	Downtown Toronto	2	Coffee Shop	Japanese Restaurant	Restaurant	Dance Studio	Men's Store	
100	East Toronto	2	Coffee Shop	Café	Hotel	Concert Hall	Theater	
101	Etobicoke	2	Chinese Restaurant	Bank	Flower Shop	Italian Restaurant	Fast Food Restaurant	
102	Etobicoke	2	Bank	Pet Store	Thai Restaurant	Burrito Place	Mattress Store	

68 rows x 7 columns

In [36]:

```
venues_merged.loc[venues_merged['Cluster Labels'] == 3, venues_merged.columns[[1] + list(range(5, venues_merged.shape[1]))]]
```

Out[36]:

	Borough	Cluster Labels	1st Most Common Venue	2nd Most Common Venue	3rd Most Common Venue	4th Most Common Venue	5th Most Common Venue
28	North York	3	IT Services	Park	Music Venue	Zoo Exhibit	Eastern European Restaurant
45	North	2	Music Venue	Zoo Exhibit	Dumpling	Fish Market	Fish & China Shop



43 York Borough Cluster 5 Music Venue 1st Most Common 2nd Most Common 3rd Most Common 4th Most Common 5th Most Common

In [37]:

```
venues_merged.loc[venues_merged['Cluster Labels'] == 4, venues_merged.columns[[1] + list(range(5, venues_merged.shape[1]))]]
```

Out[37]:

	Borough	Cluster Labels	1st Most Common Venue	2nd Most Common Venue	3rd Most Common Venue	4th Most Common Venue	5th Most Common Venue
71	Scarborough	4	Auto Garage	Zoo Exhibit	Dumpling Restaurant	Flea Market	Fish Market

In [ ]: