A- Introduction and Business Problem

A company who sells chocolate wants to enter a new market while segmenting coffee shops. This company wants to know the most recommended places in Canada to start a social media marketing campaign. The region has to be relatively small with a high number of coffee shops with good ratings.

To provide the best recommendations for the chocolate company, we propose to choose a well-connected city with a relatively big population. Then, we will find the coffee shops with the highest frequencies and choose among them the best places depending on ratings.

For the location, we proposed Toronto for the following reasons:

1- Toronto is the capital of Ontario and is the most populated city in Canada (around 3 million in 2018). Toronto census metropolitan area (CMA) has a population of approximately 6 million. Therefore, it is Canada's most populous metropolis.

2- Toronto is also an international center of “business, finance, arts, and culture, and is recognized as one of the most multicultural and cosmopolitan cities in the world” as per Wikipedia.

3- Toronto area is interspersed with rivers, ravines and forests. Its current area is 630.2 km2.The city has a diverse population and is an important destination for immigrants to Canada.

4- The city is a center for music, theatre, movie productionand television production. It contains cultural institutions like museums, galleries, festival and entertainment districts, national historic sites, and sports centers with over 43 million tourists each year.

5- Toronto Stock Exchange (the headquarters of Canada's five largest banks)and multinational corporations are also located at Toronto. Also as per Wikipedia, “Its economy is highly diversified with strengths in technology, design, financial services, life sciences, education, arts, fashion, aerospace, environmental innovation, food services, and tourism.”

6- Toronto is a great distribution point for the industrial sector. The city has a strategic position along the Quebec City–Windsor Corridor and has well connected infrastructure, roads and rails linking it to the surrounding cities.

Therefore, as part of this project, we will list and visualize all coffee shops that would be our target in the social media marketing strategy for selling new chocolate bars in Toronto City. They will have the highest frequencies in their neighborhoods and good ratings.

B- Data:

For this project we need to get the following data and start exploring it and we will download all the dependencies that we will need in the notebook:

1• Toronto City data that contains lists of neighborhoods.We will rely on the postal codes to represent neighborhoods getting the table from Wikipedia:

- To get their latitudes and longitudes, we will rely on the data source : https://cocl.us/Geospatial_data

- Description: This data set contains the essential columns.
  We will use it to explore various neighborhoods of Toronto city while focusing on coffee shops.

2• Coffee shops in each neighborhood of Toronto city.

- Data source : Foursquare API

- Description: By using this API, we will get all the venues and coffee shops in each neighborhood.
  We can filter these venues to get only the ones with the highest frequencies.

3• Maps:

- We will rely on Folium to get the maps and visualize the locations of the chosen shops.

In [5]:
```
#Getting the data
#Downloading all the dependencies

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 # uncomment this line if you hav
en't completed the Foursquare API lab
from geopy.geocoders import Nominatim # convert an address into latitude an
d longitude values
import requests # library to handle requests
from pandas.io.json import json_normalize # tranform JSON file into a panda
s 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
from sklearn.datasets.samples_generator import make_blobs
#!conda install -c conda-forge folium=0.5.0 --yes # uncomment this line if
 you haven't completed the Foursquare API lab
from bs4 import BeautifulSoup
import lxml
print('Libraries imported.')
```

```
Libraries imported.
```

In [7]:
```
#Getting data and preparing it for analysis
```

In [8]:
```
# download data and parse it:
r = requests.get('https://en.wikipedia.org/wiki/List_of_postal_codes_of_Can
ada:_M')
soup = BeautifulSoup(r.text, 'html.parser')
table=soup.find('table', attrs={'class':'wikitable sortable'})

#get headers:
headers=table.findAll('th')
for i, head in enumerate(headers): headers[i]=str(headers[i]).replace("<th
>","").replace("</th>","").replace("\n","")

#Find all items and skip first one:
rows=table.findAll('tr')
rows=rows[1:len(rows)]

# skip all meta symbols and line feeds between rows:
for i, row in enumerate(rows): rows[i] = str(rows[i]).replace("\n</td></tr
>","").replace("<tr>\n<td>","")

# make dataframe, expand rows and drop the old one:
df=pd.DataFrame(rows)
df[headers] = df[0].str.split("</td>\n<td>", n = 2, expand = True)
df.drop(columns=[0],inplace=True)
```

In [9]:
```
# skip not assigned boroughs:
df = df.drop(df[(df.Borough == "Not assigned")].index)
# give "Not assigned" Neighborhoods same name as Borough:
df.Neighbourhood.replace("Not assigned", df.Borough, inplace=True)

# copy Borough value to Neighborhood if NaN:
df.Neighbourhood.fillna(df.Borough, inplace=True)
# drop duplicate rows:
df=df.drop_duplicates()

# extract titles from columns
df.update(
    df.Neighbourhood.loc[
        lambda x: x.str.contains('title')
    ].str.extract('title=\"([^\"]*)',expand=False))

df.update(
    df.Borough.loc[
        lambda x: x.str.contains('title')
    ].str.extract('title=\"([^\"]*)',expand=False))

# delete Toronto annotation from Neighbourhood:
df.update(
    df.Neighbourhood.loc[
        lambda x: x.str.contains('Toronto')
    ].str.replace(", Toronto",""))
df.update(
    df.Neighbourhood.loc[
        lambda x: x.str.contains('Toronto')
    ].str.replace("\(Toronto\)",""))
```

In [10]:
```
# combine multiple neighborhoods with the same post code
df2 = pd.DataFrame({'Postcode':df.Postcode.unique()})
df2['Borough']=pd.DataFrame(list(set(df['Borough'].loc[df['Postcode'] == x[
'Postcode']])) for i, x in df2.iterrows())
df2['Neighborhood']=pd.Series(list(set(df['Neighbourhood'].loc[df['Postcod
e'] == x['Postcode']])) for i, x in df2.iterrows())
df2['Neighborhood']=df2['Neighborhood'].apply(lambda x: ', '.join(x))
df2.dtypes

df2.head()
```

Out[10]:

	Postcode	Borough	Neighborhood
0	M3A	North York	Parkwoods
1	M4A	North York	Victoria Village
2	M5A	Downtown Toronto	Regent Park
3	M6A	North York	Lawrence Manor, Lawrence Heights
4	M7A	Downtown Toronto	Queen's Park

In [11]:
```
#Getting more data: Geo-spatial data

dfll= pd.read_csv("http://cocl.us/Geospatial_data")
dfll.rename(columns={'Postal Code':'Postcode'}, inplace=True)
dfll.set_index("Postcode")
df2.set_index("Postcode")
toronto_data=pd.merge(df2, dfll)

toronto_data.head()
```

Out[11]:

	Postcode	Borough	Neighborhood	Latitude	Longitude
0	M3A	North York	Parkwoods	43.753259	-79.329656
1	M4A	North York	Victoria Village	43.725882	-79.315572
2	M5A	Downtown Toronto	Regent Park	43.654260	-79.360636
3	M6A	North York	Lawrence Manor, Lawrence Heights	43.718518	-79.464763
4	M7A	Downtown Toronto	Queen's Park	43.662301	-79.389494

In [12]:
```
address = 'Toronto, ON, Canada'

geolocator = Nominatim(user_agent="to_explorer")
location = geolocator.geocode(address)
latitude = location.latitude
longitude = location.longitude
print('Geographical coordinates of Toronto, ON, Canada: {}, {}.'.format(lat
itude, longitude))
```

```
Geographical coordinates of Toronto, ON, Canada: 43.653963, -79.387207.
```

In [18]:
```
#We got the longitude and latitude
!conda install -c conda-forge folium=0.5.0 --yes # uncomment this line if y
ou haven't completed the Foursquare API lab
import folium # map rendering library
```

```
Solving environment: done

## Package Plan ##

  environment location: /opt/conda/envs/Python36

  added / updated specs:
    - folium=0.5.0


The following packages will be downloaded:

    package                    |            build
    ---------------------------|-----------------
    vincent-0.4.4              |             py_1          28 KB  conda-for
ge
    folium-0.5.0               |             py_0          45 KB  conda-for
ge
    certifi-2019.11.28         |           py36_0         149 KB  conda-for
ge
    ca-certificates-2019.11.28 |       hecc5488_0         145 KB  conda-for
ge
    altair-4.0.1               |             py_0         575 KB  conda-for
ge
    branca-0.4.0               |             py_0          26 KB  conda-for
ge
    openssl-1.1.1d             |       h516909a_0         2.1 MB  conda-for
ge
    ------------------------------------------------------------
                                           Total:         3.0 MB

The following NEW packages will be INSTALLED:

    altair:          4.0.1-py_0        conda-forge
    branca:          0.4.0-py_0        conda-forge
    folium:          0.5.0-py_0        conda-forge
    vincent:         0.4.4-py_1        conda-forge

The following packages will be UPDATED:

    ca-certificates: 2019.11.27-0                --> 2019.11.28-hecc5488_
0 conda-forge
    certifi:         2019.11.28-py36_0           --> 2019.11.28-py36_0
conda-forge

The following packages will be DOWNGRADED:

    openssl:         1.1.1d-h7b6447c_3           --> 1.1.1d-h516909a_0
conda-forge


Downloading and Extracting Packages
vincent-0.4.4        | 28 KB     | ##################################### |
100%
folium-0.5.0         | 45 KB     | ##################################### |
100%
certifi-2019.11.28   | 149 KB    | ##################################### |
```

```
100%
ca-certificates-2019 | 145 KB    | ##################################### |
100%
altair-4.0.1          | 575 KB    | ##################################### |
100%
branca-0.4.0          | 26 KB     | ##################################### |
100%
openssl-1.1.1d        | 2.1 MB    | ##################################### |
100%
Preparing transaction: done
Verifying transaction: done
Executing transaction: done
```

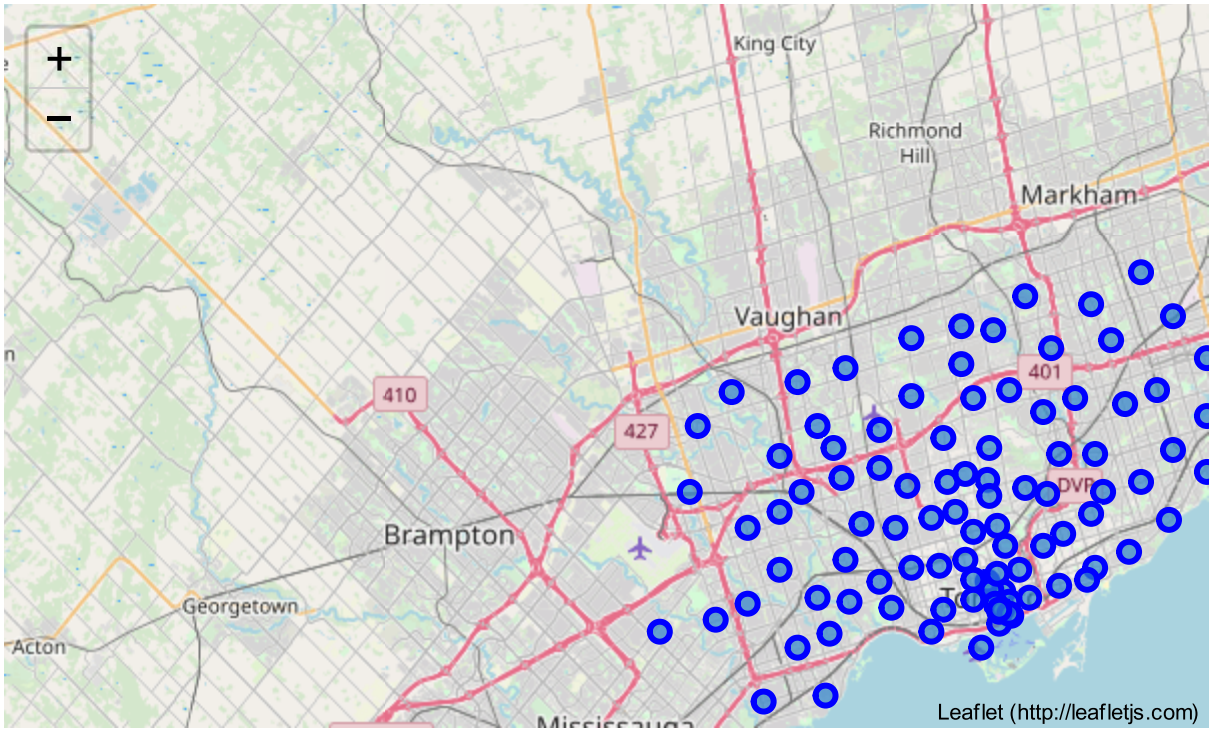
In [19]:

```
# create map of Toronto using latitude and longitude values
map_toronto = folium.Map(location=[latitude, longitude], zoom_start=10)

# add markers to map
for lat, lng, borough, neighborhood in zip(toronto_data['Latitude'], toront
o_data['Longitude'], toronto_data['Borough'], toronto_data['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[19]:



Let's enter credentials for Foursquare to get the remaining data

In [21]:
```
CLIENT_ID = 'KLLVC0JYMWQ30TWJ3CAY0PZRZWLHMVDKOXWUNGAU4K4L1RWF' # my Foursquare ID
CLIENT_SECRET = 'CHSZ2PARKPP441LI333HATNCBUJ5DDFGEGLG3333S2HPZIQC' # your Foursquare Secret
VERSION = '20200301' # Foursquare API version
```

In [29]:
```
toronto_data.loc[0, 'Neighborhood']
neighborhood_latitude = toronto_data.loc[0, 'Latitude'] # neighborhood latitude value
neighborhood_longitude = toronto_data.loc[0, 'Longitude'] # neighborhood longitude value
neighborhood_name = toronto_data.loc[0, 'Neighborhood'] # neighborhood name
```

Here, we will make a query for coffee shops in a radius of 2000m

In [37]:
```
LIMIT = 100 # limit of number of venues returned by Foursquare API
radius = 2000 # define radius
url = 'https://api.foursquare.com/v2/venues/explore?&client_id={}&client_secret={}&v={}&ll={},{}&radius={}&limit={}&query=coffee'.format(
    CLIENT_ID,
    CLIENT_SECRET,
    VERSION,
    neighborhood_latitude,
    neighborhood_longitude,
    radius,
    LIMIT)
url # display URL
```

Out[37]:
```
'https://api.foursquare.com/v2/venues/explore?&client_id=KLLVC0JYMWQ30TWJ3CAY0PZRZWLHMVDKOXWUNGAU4K4L1RWF&client_secret=CHSZ2PARKPP441LI333HATNCBUJ5DDFGEGLG3333S2HPZIQC&v=20200301&ll=43.7532586,-79.3296565&radius=2000&limit=100&query=coffee'
```

In [38]:
```
results = requests.get(url).json()
results
```

Out[38]:

```
{'meta': {'code': 200, 'requestId': '5e5d4cbc0de0d9001b8c8f3a'},
 'response': {'suggestedFilters': {'header': 'Tap to show:',
   'filters': [{'name': 'Open now', 'key': 'openNow'}]},
  'headerLocation': 'Parkwoods - Donalda',
  'headerFullLocation': 'Parkwoods - Donalda, Toronto',
  'headerLocationGranularity': 'neighborhood',
  'query': 'coffee',
  'totalResults': 16,
  'suggestedBounds': {'ne': {'lat': 43.77125861800002,
    'lng': -79.30478345939711},
   'sw': {'lat': 43.735258581999986, 'lng': -79.35452954060288}},
  'groups': [{'type': 'Recommended Places',
    'name': 'recommended',
    'items': [{'reasons': {'count': 0,
       'items': [{'summary': 'This spot is popular',
         'type': 'general',
         'reasonName': 'globalInteractionReason'}]},
      'venue': {'id': '57e286f2498e43d84d92d34a',
       'name': 'Tim Hortons',
       'location': {'address': '215 Brookbanks',
        'crossStreet': 'York Miils Rd',
        'lat': 43.76066827030228,
        'lng': -79.32636763515987,
        'labeledLatLngs': [{'label': 'display',
          'lat': 43.76066827030228,
          'lng': -79.32636763515987}],
        'distance': 866,
        'postalCode': 'M3A 1Z5',
        'cc': 'CA',
        'city': 'Toronto',
        'state': 'ON',
        'country': 'Canada',
        'formattedAddress': ['215 Brookbanks (York Miils Rd)',
         'Toronto ON M3A 1Z5',
         'Canada']},
       'categories': [{'id': '4bf58dd8d48988d16d941735',
         'name': 'Café',
         'pluralName': 'Cafés',
         'shortName': 'Café',
         'icon': {'prefix': 'https://ss3.4sqi.net/img/categories_v2/food/ca
fe_',
          'suffix': '.png'},
         'primary': True}],
       'photos': {'count': 0, 'groups': []}},
      'referralId': 'e-0-57e286f2498e43d84d92d34a-0'},
     {'reasons': {'count': 0,
       'items': [{'summary': 'This spot is popular',
         'type': 'general',
         'reasonName': 'globalInteractionReason'}]},
      'venue': {'id': '50c3ae15e4b08c3b596c6069',
       'name': 'Baretto Caffé',
       'location': {'address': '1262 Don Mills Rd',
        'lat': 43.74445646349851,
        'lng': -79.34645978471785,
        'labeledLatLngs': [{'label': 'display',
          'lat': 43.74445646349851,
          'lng': -79.34645978471785}],
```

```
        'distance': 1669,
        'cc': 'CA',
        'city': 'Toronto',
        'state': 'ON',
        'country': 'Canada',
        'formattedAddress': ['1262 Don Mills Rd', 'Toronto ON', 'Canada']},
       'categories': [{'id': '4bf58dd8d48988d16d941735',
         'name': 'Café',
         'pluralName': 'Cafés',
         'shortName': 'Café',
         'icon': {'prefix': 'https://ss3.4sqi.net/img/categories_v2/food/ca
fe_',
          'suffix': '.png'},
         'primary': True}],
       'photos': {'count': 0, 'groups': []}},
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       'items': [{'summary': 'This spot is popular',
         'type': 'general',
         'reasonName': 'globalInteractionReason'}]},
      'venue': {'id': '4ae0e2a7f964a5205f8321e3',
       'name': 'Starbucks',
       'location': {'address': '861 York Mills Rd,York Mills & Lesmill',
        'crossStreet': 'at Lesmill Rd',
        'lat': 43.754199,
        'lng': -79.351382,
        'labeledLatLngs': [{'label': 'display',
          'lat': 43.754199,
          'lng': -79.351382}],
        'distance': 1750,
        'postalCode': 'M3B 1Y2',
        'cc': 'CA',
        'city': 'North York',
        'state': 'ON',
        'country': 'Canada',
        'formattedAddress': ['861 York Mills Rd,York Mills & Lesmill (at Le
smill Rd)',
         'North York ON M3B 1Y2',
         'Canada']},
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         'name': 'Coffee Shop',
         'pluralName': 'Coffee Shops',
         'shortName': 'Coffee Shop',
         'icon': {'prefix': 'https://ss3.4sqi.net/img/categories_v2/food/co
ffeeshop_',
          'suffix': '.png'},
         'primary': True}],
       'photos': {'count': 0, 'groups': []}},
      'referralId': 'e-0-4ae0e2a7f964a5205f8321e3-2'},
     {'reasons': {'count': 0,
       'items': [{'summary': 'This spot is popular',
         'type': 'general',
         'reasonName': 'globalInteractionReason'}]},
      'venue': {'id': '5a8478c1f427de78ff32023e',
       'name': 'Aroma Espresso Bar',
       'location': {'lat': 43.77088,
        'lng': -79.331775,
```

```
        'labeledLatLngs': [{'label': 'display',
          'lat': 43.77088,
          'lng': -79.331775}],
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        'postalCode': 'M2M 4R3',
        'cc': 'CA',
        'city': 'Toronto',
        'state': 'ON',
        'country': 'Canada',
        'formattedAddress': ['Toronto ON M2M 4R3', 'Canada']},
       'categories': [{'id': '4bf58dd8d48988d1e0931735',
         'name': 'Coffee Shop',
         'pluralName': 'Coffee Shops',
         'shortName': 'Coffee Shop',
         'icon': {'prefix': 'https://ss3.4sqi.net/img/categories_v2/food/co
ffeeshop_',
          'suffix': '.png'},
         'primary': True}],
       'photos': {'count': 0, 'groups': []}},
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     {'reasons': {'count': 0,
       'items': [{'summary': 'This spot is popular',
         'type': 'general',
         'reasonName': 'globalInteractionReason'}]},
      'venue': {'id': '4b378dedf964a520234225e3',
       'name': 'Tim Hortons',
       'location': {'address': '1244 Lawrence Ave East',
        'crossStreet': 'Curlew',
        'lat': 43.74157865703848,
        'lng': -79.3189662694931,
        'labeledLatLngs': [{'label': 'display',
          'lat': 43.74157865703848,
          'lng': -79.3189662694931}],
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        'postalCode': 'M3A 1B9',
        'cc': 'CA',
        'city': 'North York',
        'state': 'ON',
        'country': 'Canada',
        'formattedAddress': ['1244 Lawrence Ave East (Curlew)',
         'North York ON M3A 1B9',
         'Canada']},
       'categories': [{'id': '4bf58dd8d48988d1e0931735',
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ffeeshop_',
          'suffix': '.png'},
         'primary': True}],
       'photos': {'count': 0, 'groups': []}},
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         'type': 'general',
         'reasonName': 'globalInteractionReason'}]},
      'venue': {'id': '4c16d772cd4bc9b6b51a4feb',
```

```
       'name': 'Tim Hortons',
       'location': {'address': '75 Ellesmere Rd, Unit 4b',
        'lat': 43.75829469411578,
        'lng': -79.31230985443108,
        'labeledLatLngs': [{'label': 'display',
          'lat': 43.75829469411578,
          'lng': -79.31230985443108}],
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        'cc': 'CA',
        'city': 'Scarborough',
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        'country': 'Canada',
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         'Canada']},
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         'shortName': 'Coffee Shop',
         'icon': {'prefix': 'https://ss3.4sqi.net/img/categories_v2/food/co
ffeeshop_',
          'suffix': '.png'},
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       'photos': {'count': 0, 'groups': []}},
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       'items': [{'summary': 'This spot is popular',
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         'reasonName': 'globalInteractionReason'}]},
      'venue': {'id': '4d8b9b3137c6a143040bae0c',
       'name': 'Tim Hortons',
       'location': {'address': '2050 Victoria Park Ave',
        'crossStreet': 'btwn Cassandra Blvd. & Rowena Dr.',
        'lat': 43.75281395751706,
        'lng': -79.3140672147274,
        'labeledLatLngs': [{'label': 'display',
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          'lng': -79.3140672147274}],
        'distance': 1254,
        'postalCode': 'M1R 1V2',
        'cc': 'CA',
        'city': 'North York',
        'state': 'ON',
        'country': 'Canada',
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& Rowena Dr.)',
         'North York ON M1R 1V2',
         'Canada']},
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         'pluralName': 'Coffee Shops',
         'shortName': 'Coffee Shop',
         'icon': {'prefix': 'https://ss3.4sqi.net/img/categories_v2/food/co
ffeeshop_',
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         'primary': True}],
```

```
        'photos': {'count': 0, 'groups': []}},
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          'reasonName': 'globalInteractionReason'}]},
       'venue': {'id': '4b72c633f964a520f7872de3',
        'name': 'Second Cup',
        'location': {'address': '85 Ellesmere Rd',
         'crossStreet': 'Parkway Mall',
         'lat': 43.757482276690645,
         'lng': -79.31169510099224,
         'labeledLatLngs': [{'label': 'display',
           'lat': 43.757482276690645,
           'lng': -79.31169510099224}],
         'distance': 1518,
         'cc': 'CA',
         'city': 'Toronto',
         'state': 'ON',
         'country': 'Canada',
         'formattedAddress': ['85 Ellesmere Rd (Parkway Mall)',
          'Toronto ON',
          'Canada']},
        'categories': [{'id': '4bf58dd8d48988d1e0931735',
          'name': 'Coffee Shop',
          'pluralName': 'Coffee Shops',
          'shortName': 'Coffee Shop',
          'icon': {'prefix': 'https://ss3.4sqi.net/img/categories_v2/food/co
ffeeshop_',
           'suffix': '.png'},
          'primary': True}],
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        'items': [{'summary': 'This spot is popular',
          'type': 'general',
          'reasonName': 'globalInteractionReason'}]},
       'venue': {'id': '4c99ebed78fc236ad5ad3097',
        'name': 'Tim Hortons',
        'location': {'address': '1309 Lawrence Ave East',
         'lat': 43.740555487928134,
         'lng': -79.32365275919437,
         'labeledLatLngs': [{'label': 'display',
           'lat': 43.740555487928134,
           'lng': -79.32365275919437}],
         'distance': 1494,
         'postalCode': 'M3A 1C6',
         'cc': 'CA',
         'city': 'North York',
         'state': 'ON',
         'country': 'Canada',
         'formattedAddress': ['1309 Lawrence Ave East',
          'North York ON M3A 1C6',
          'Canada']},
        'categories': [{'id': '4bf58dd8d48988d1e0931735',
          'name': 'Coffee Shop',
          'pluralName': 'Coffee Shops',
```

```
          'shortName': 'Coffee Shop',
          'icon': {'prefix': 'https://ss3.4sqi.net/img/categories_v2/food/co
ffeeshop_',
           'suffix': '.png'},
          'primary': True}],
        'photos': {'count': 0, 'groups': []}},
       'referralId': 'e-0-4c99ebed78fc236ad5ad3097-8'},
      {'reasons': {'count': 0,
        'items': [{'summary': 'This spot is popular',
          'type': 'general',
          'reasonName': 'globalInteractionReason'}]},
       'venue': {'id': '4ae0e136f964a520518321e3',
        'name': 'Tim Hortons',
        'location': {'address': '860 York Mills',
         'crossStreet': 'Lesmill Rd.',
         'lat': 43.75504487813417,
         'lng': -79.35164093971247,
         'labeledLatLngs': [{'label': 'display',
           'lat': 43.75504487813417,
           'lng': -79.35164093971247}],
         'distance': 1778,
         'postalCode': 'M3B 1Y4',
         'cc': 'CA',
         'city': 'North York',
         'state': 'ON',
         'country': 'Canada',
         'formattedAddress': ['860 York Mills (Lesmill Rd.)',
          'North York ON M3B 1Y4',
          'Canada']},
        'categories': [{'id': '4bf58dd8d48988d1e0931735',
          'name': 'Coffee Shop',
          'pluralName': 'Coffee Shops',
          'shortName': 'Coffee Shop',
          'icon': {'prefix': 'https://ss3.4sqi.net/img/categories_v2/food/co
ffeeshop_',
           'suffix': '.png'},
          'primary': True}],
        'photos': {'count': 0, 'groups': []}},
       'referralId': 'e-0-4ae0e136f964a520518321e3-9'},
      {'reasons': {'count': 0,
        'items': [{'summary': 'This spot is popular',
          'type': 'general',
          'reasonName': 'globalInteractionReason'}]},
       'venue': {'id': '4b87107cf964a5207fae31e3',
        'name': 'La Notre',
        'location': {'address': '1277 York Mills Rd',
         'lat': 43.76070416249771,
         'lng': -79.32539551954271,
         'labeledLatLngs': [{'label': 'display',
           'lat': 43.76070416249771,
           'lng': -79.32539551954271}],
         'distance': 896,
         'postalCode': 'M3A',
         'cc': 'CA',
         'city': 'Toronto',
         'state': 'ON',
         'country': 'Canada',
```

```
        'formattedAddress': ['1277 York Mills Rd',
         'Toronto ON M3A',
         'Canada']},
       'categories': [{'id': '4bf58dd8d48988d1e0931735',
         'name': 'Coffee Shop',
         'pluralName': 'Coffee Shops',
         'shortName': 'Coffee Shop',
         'icon': {'prefix': 'https://ss3.4sqi.net/img/categories_v2/food/co
ffeeshop_',
          'suffix': '.png'},
         'primary': True}],
       'photos': {'count': 0, 'groups': []}},
      'referralId': 'e-0-4b87107cf964a5207fae31e3-10'},
     {'reasons': {'count': 0,
       'items': [{'summary': 'This spot is popular',
         'type': 'general',
         'reasonName': 'globalInteractionReason'}]},
      'venue': {'id': '4d64085f1a83f04d001c7a2b',
       'name': 'Postmedia Cafeteria',
       'location': {'address': '1450 Don Mills Rd.',
        'crossStreet': 'Don Mills & York Mills',
        'lat': 43.75255721877985,
        'lng': -79.34786928794301,
        'labeledLatLngs': [{'label': 'display',
          'lat': 43.75255721877985,
          'lng': -79.34786928794301}],
        'distance': 1466,
        'postalCode': 'M3B 2X7',
        'cc': 'CA',
        'city': 'Toronto',
        'state': 'ON',
        'country': 'Canada',
        'formattedAddress': ['1450 Don Mills Rd. (Don Mills & York Mills)',
         'Toronto ON M3B 2X7',
         'Canada']},
       'categories': [{'id': '4bf58dd8d48988d1e0931735',
         'name': 'Coffee Shop',
         'pluralName': 'Coffee Shops',
         'shortName': 'Coffee Shop',
         'icon': {'prefix': 'https://ss3.4sqi.net/img/categories_v2/food/co
ffeeshop_',
          'suffix': '.png'},
         'primary': True}],
       'photos': {'count': 0, 'groups': []}},
      'referralId': 'e-0-4d64085f1a83f04d001c7a2b-11'},
     {'reasons': {'count': 0,
       'items': [{'summary': 'This spot is popular',
         'type': 'general',
         'reasonName': 'globalInteractionReason'}]},
      'venue': {'id': '4bb9ef191261d13a56ffe998',
       'name': 'Tim Hortons / Esso',
       'location': {'address': 'Lawrence',
        'lat': 43.740446973170236,
        'lng': -79.32416861639062,
        'labeledLatLngs': [{'label': 'display',
          'lat': 43.740446973170236,
          'lng': -79.32416861639062}],
```

```
         'distance': 1492,
         'cc': 'CA',
         'city': 'Toronto',
         'state': 'ON',
         'country': 'Canada',
         'formattedAddress': ['Lawrence', 'Toronto ON', 'Canada']},
        'categories': [{'id': '4bf58dd8d48988d1e0931735',
          'name': 'Coffee Shop',
          'pluralName': 'Coffee Shops',
          'shortName': 'Coffee Shop',
          'icon': {'prefix': 'https://ss3.4sqi.net/img/categories_v2/food/co
ffeeshop_',
           'suffix': '.png'},
          'primary': True}],
        'photos': {'count': 0, 'groups': []}},
       'referralId': 'e-0-4bb9ef191261d13a56ffe998-12'},
      {'reasons': {'count': 0,
        'items': [{'summary': 'This spot is popular',
          'type': 'general',
          'reasonName': 'globalInteractionReason'}]},
       'venue': {'id': '4b1fc74df964a520f82824e3',
        'name': "Timothy's World Coffee",
        'location': {'address': '245 Consumers Rd,Parkway Place',
         'lat': 43.76961,
         'lng': -79.330904,
         'labeledLatLngs': [{'label': 'display',
           'lat': 43.76961,
           'lng': -79.330904}],
         'distance': 1822,
         'postalCode': 'M2J 1R3',
         'cc': 'CA',
         'city': 'Toronto',
         'state': 'ON',
         'country': 'Canada',
         'formattedAddress': ['245 Consumers Rd,Parkway Place',
          'Toronto ON M2J 1R3',
          'Canada']},
        'categories': [{'id': '4bf58dd8d48988d1e0931735',
          'name': 'Coffee Shop',
          'pluralName': 'Coffee Shops',
          'shortName': 'Coffee Shop',
          'icon': {'prefix': 'https://ss3.4sqi.net/img/categories_v2/food/co
ffeeshop_',
           'suffix': '.png'},
          'primary': True}],
        'photos': {'count': 0, 'groups': []}},
       'referralId': 'e-0-4b1fc74df964a520f82824e3-13'},
      {'reasons': {'count': 0,
        'items': [{'summary': 'This spot is popular',
          'type': 'general',
          'reasonName': 'globalInteractionReason'}]},
       'venue': {'id': '4c069382cf8c76b0b8b43a65',
        'name': 'Atrium Cafe And Juice Bar',
        'location': {'address': '255 Consumers Rd.',
         'lat': 43.77017445789965,
         'lng': -79.33017348621118,
         'labeledLatLngs': [{'label': 'display',
```

```
          'lat': 43.77017445789965,
          'lng': -79.33017348621118}],
        'distance': 1883,
        'cc': 'CA',
        'city': 'Toronto',
        'state': 'ON',
        'country': 'Canada',
        'formattedAddress': ['255 Consumers Rd.', 'Toronto ON', 'Canada']},
       'categories': [{'id': '4bf58dd8d48988d16d941735',
         'name': 'Café',
         'pluralName': 'Cafés',
         'shortName': 'Café',
         'icon': {'prefix': 'https://ss3.4sqi.net/img/categories_v2/food/ca
fe_',
          'suffix': '.png'},
         'primary': True}],
       'photos': {'count': 0, 'groups': []}},
      'referralId': 'e-0-4c069382cf8c76b0b8b43a65-14'},
     {'reasons': {'count': 0,
       'items': [{'summary': 'This spot is popular',
         'type': 'general',
         'reasonName': 'globalInteractionReason'}]},
      'venue': {'id': '4cadd92d8c48a09385536f2c',
       'name': "Chris's Coffee Shop",
       'location': {'lat': 43.757879541150714,
        'lng': -79.35343015742156,
        'labeledLatLngs': [{'label': 'display',
          'lat': 43.757879541150714,
          'lng': -79.35343015742156}],
        'distance': 1979,
        'cc': 'CA',
        'country': 'Canada',
        'formattedAddress': ['Canada']},
       'categories': [{'id': '4bf58dd8d48988d1e0931735',
         'name': 'Coffee Shop',
         'pluralName': 'Coffee Shops',
         'shortName': 'Coffee Shop',
         'icon': {'prefix': 'https://ss3.4sqi.net/img/categories_v2/food/co
ffeeshop_',
          'suffix': '.png'},
         'primary': True}],
       'photos': {'count': 0, 'groups': []}},
      'referralId': 'e-0-4cadd92d8c48a09385536f2c-15'}]}]}}
```


In [39]:
```python
# function that extracts the category of the venue
def get_category_type(row):
    try:
        categories_list = row['categories']
    except:
        categories_list = row['venue.categories']

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

In [40]:
```
venues = results['response']['groups'][0]['items']

nearby_venues = json_normalize(venues) # flatten JSON

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

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

# clean columns
nearby_venues.columns = [col.split(".")[-1] for col in nearby_venues.column
s]

nearby_venues.head()
```

Out[40]:

	name	categories	lat	lng
0	Tim Hortons	Café	43.760668	-79.326368
1	Baretto Caffé	Café	43.744456	-79.346460
2	Starbucks	Coffee Shop	43.754199	-79.351382
3	Aroma Espresso Bar	Coffee Shop	43.770880	-79.331775
4	Tim Hortons	Coffee Shop	43.741579	-79.318966

As we can see in the table above, all categories are Café, Coffee shop, Coffee shops...

In [41]:
```
print('{} venues were returned by Foursquare.'.format(nearby_venues.shape[0
]))
```

```
16 venues were returned by Foursquare.
```

Below, we will do the same to the others venues to get all coffee shops in the provided radius by Foursquare.

In [45]:

```
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={}&c
lient_secret={}&v={}&ll={},{}&radius={}&limit={}&query=coffee'.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 it
em in venue_list])
    nearby_venues.columns = ['Neighborhood',
                  'Neighborhood Latitude',
                  'Neighborhood Longitude',
                  'Venue',
                  'Venue Latitude',
                  'Venue Longitude',
                  'Venue Category']

    return(nearby_venues)
```

In [46]:
```
toronto_venues = getNearbyVenues(names=toronto_data['Neighborhood'],
                                 latitudes=toronto_data['Latitude'],
                                 longitudes=toronto_data['Longitude']
                                )
```

Parkwoods
Victoria Village
Regent Park
Lawrence Manor, Lawrence Heights
Queen's Park
Islington Avenue
Malvern, Rouge
Don Mills North
Parkview Hill, Woodbine Gardens
Ryerson, Garden District
Glencairn
West Deane Park, Cloverdale, Princess Gardens, Martin Grove, Islington
Rouge Hill, Highland Creek , Port Union
Flemingdon Park, Don Mills South
Woodbine Heights
St. James Town
Humewood-Cedarvale
Bloordale Gardens, Eringate, Old Burnhamthorpe, Markland Wood
Morningside, Guildwood, West Hill
The Beaches
Berczy Park
Caledonia-Fairbanks
Woburn
Leaside
Central Bay Street
Christie
Cedarbrae
Hillcrest Village
Bathurst Manor, Downsview North, Wilson Heights
Thorncliffe Park
King, Richmond, Adelaide
Dovercourt Village, Dufferin
Scarborough Village
Henry Farm, Oriole, Fairview
Northwood Park, York University
East Toronto
Union Station , Toronto Islands, Harbourfront East
Little Portugal, Trinity–Bellwoods
East Birchmount Park, Ionview, Kennedy Park
Bayview Village
CFB Toronto, Downsview East
Riverdale, The Danforth West
Design Exchange, Toronto Dominion Centre
Brockton, Parkdale Village, Exhibition Place
Golden Mile, Clairlea, Oakridge
York Mills, Silver Hills
Downsview
Gerrard Street , The Beaches West
Commerce Court, Victoria Hotel
Upwood Park, North Park, Downsview
Humber Summit
Cliffcrest, Scarborough Village West, Cliffside
Willowdale, Newtonbrook
Downsview Central
Studio District
Bedford Park, Lawrence Manor East
Silverthorn, Mount Dennis, Keelesdale, Del Ray

Humberlea, Emery
Cliffside West, Birch Cliff
Willowdale South
Downsview Northwest
Lawrence Park
Roselawn
The Junction North, Runnymede
Weston
Wexford Heights, Scarborough Town Centre, Dorset Park
York Mills West
Davisville North
Forest Hill West, Forest Hill North
The Junction South, High Park
Westmount
Maryvale, Wexford
Willowdale West
North Toronto West
The Annex, North Midtown, Yorkville
Parkdale, Roncesvalles
Canada Post Gateway Processing Centre
Richview Gardens, Martin Grove Gardens, St. Phillips, Kingsview Village
Agincourt
Davisville
University of Toronto, Harbord
Runnymede, Swansea
Sullivan, Clarks Corners, Tam O'Shanter – Sullivan
Moore Park, Summerhill East
Grange Park , Kensington Market, Chinatown
Milliken, Ontario, Steeles East, L'Amoreaux East, Agincourt North
Deer Park, South Hill, Summerhill West, Forest Hill SE, Rathnelly
South Niagara, Railway Lands, Bathurst Quay, Island airport, King and Spadi
na, Harbourfront West, CN Tower
New Toronto, Mimico South, Humber Bay Shores
Humbergate, Beaumond Heights, South Steeles, Mount Olive-Silverstone-Jamest
own, Thistletown, Albion Gardens, Silverstone
L'Amoreaux West
Rosedale
Stn A PO Boxes 25 The Esplanade
Alderwood, Long Branch
Northwest
Upper Rouge
St. James Town, Cabbagetown
Underground city, First Canadian Place
The Kingsway, Montgomery Road, Old Mill North
Church and Wellesley
Business Reply Mail Processing Centre 969 Eastern
Kingsway Park South East, Mimico, King's Mill Park, Humber Bay, Sunnylea, F
airmont Royal York Hotel, The Queensway, Old Mill
Royal York South West, Mimico, Kingsway Park South West, South of Bloor, Th
e Queensway

In [49]:
```
print(toronto_venues.shape)
toronto_venues.head(2)
```

```
(944, 7)
```

Out[49]:

	Neighborhood	Neighborhood Latitude	Neighborhood Longitude	Venue	Venue Latitude	Venue Longitude	Venue Category
0	Victoria Village	43.725882	-79.315572	Tim Hortons	43.725517	-79.313103	Coffee Shop
1	Regent Park	43.654260	-79.360636	Tandem Coffee	43.653559	-79.361809	Coffee Shop

The size of the resulting dataframe is (944, 7)

In [50]:
```
toronto_venues.groupby('Neighborhood').count()
```

Out[50]:

Neighborhood	Neighborhood Latitude	Neighborhood Longitude	Venue	Venue Latitude	Venue Longitude	Venue Category
Agincourt	2	2	2	2	2	2
Alderwood, Long Branch	4	4	4	4	4	4
Bathurst Manor, Downsview North, Wilson Heights	2	2	2	2	2	2
Bayview Village	1	1	1	1	1	1
Bedford Park, Lawrence Manor East	4	4	4	4	4	4
Berczy Park	23	23	23	23	23	23
Bloordale Gardens, Eringate, Old Burnhamthorpe, Markland Wood	2	2	2	2	2	2
Brockton, Parkdale Village, Exhibition Place	6	6	6	6	6	6
Business Reply Mail Processing Centre 969 Eastern	1	1	1	1	1	1
Caledonia-Fairbanks	1	1	1	1	1	1
Canada Post Gateway Processing Centre	2	2	2	2	2	2
Cedarbrae	1	1	1	1	1	1
Central Bay Street	46	46	46	46	46	46
Christie	6	6	6	6	6	6
Church and Wellesley	35	35	35	35	35	35
Cliffside West, Birch Cliff	1	1	1	1	1	1
Commerce Court, Victoria Hotel	100	100	100	100	100	100
Davisville	8	8	8	8	8	8
Davisville North	3	3	3	3	3	3
Deer Park, South Hill, Summerhill West, Forest Hill SE, Rathnelly	5	5	5	5	5	5
Design Exchange, Toronto Dominion Centre	84	84	84	84	84	84
Don Mills North	1	1	1	1	1	1
Dovercourt Village, Dufferin	4	4	4	4	4	4
Downsview Northwest	1	1	1	1	1	1
East Birchmount Park, Ionview, Kennedy Park	1	1	1	1	1	1

Neighborhood	Neighborhood Latitude	Neighborhood Longitude	Venue	Venue Latitude	Venue Longitude	Venue Category
East Toronto	1	1	1	1	1	1
Flemingdon Park, Don Mills South	4	4	4	4	4	4
Gerrard Street , The Beaches West	2	2	2	2	2	2
Glencairn	2	2	2	2	2	2
Grange Park , Kensington Market, Chinatown	34	34	34	34	34	34
Henry Farm, Oriole, Fairview	10	10	10	10	10	10
Humbergate, Beaumond Heights, South Steeles, Mount Olive-Silverstone-Jamestown, Thistletown, Albion Gardens, Silverstone	1	1	1	1	1	1
King, Richmond, Adelaide	66	66	66	66	66	66
L'Amoreaux West	2	2	2	2	2	2
Lawrence Manor, Lawrence Heights	1	1	1	1	1	1
Leaside	4	4	4	4	4	4
Little Portugal, Trinity–Bellwoods	15	15	15	15	15	15
Maryvale, Wexford	1	1	1	1	1	1
Milliken, Ontario, Steeles East, L'Amoreaux East, Agincourt North	1	1	1	1	1	1
New Toronto, Mimico South, Humber Bay Shores	4	4	4	4	4	4
North Toronto West	3	3	3	3	3	3
Northwood Park, York University	3	3	3	3	3	3
Parkdale, Roncesvalles	3	3	3	3	3	3
Parkview Hill, Woodbine Gardens	5	5	5	5	5	5
Queen's Park	26	26	26	26	26	26
Regent Park	16	16	16	16	16	16
Riverdale, The Danforth West	11	11	11	11	11	11
Royal York South West, Mimico, Kingsway Park South West, South of Bloor, The Queensway	1	1	1	1	1	1
Runnymede, Swansea	10	10	10	10	10	10

Neighborhood	Neighborhood Latitude	Neighborhood Longitude	Venue	Venue Latitude	Venue Longitude	Venue Category
Ryerson, Garden District	59	59	59	59	59	59
Silverthorn, Mount Dennis, Keelesdale, Del Ray	1	1	1	1	1	1
South Niagara, Railway Lands, Bathurst Quay, Island airport, King and Spadina, Harbourfront West, CN Tower	2	2	2	2	2	2
St. James Town	55	55	55	55	55	55
St. James Town, Cabbagetown	9	9	9	9	9	9
Stn A PO Boxes 25 The Esplanade	45	45	45	45	45	45
Studio District	13	13	13	13	13	13
Sullivan, Clarks Corners, Tam O'Shanter – Sullivan	2	2	2	2	2	2
The Annex, North Midtown, Yorkville	8	8	8	8	8	8
The Beaches	1	1	1	1	1	1
The Junction South, High Park	4	4	4	4	4	4
Thorncliffe Park	4	4	4	4	4	4
Underground city, First Canadian Place	100	100	100	100	100	100
Union Station , Toronto Islands, Harbourfront East	33	33	33	33	33	33
University of Toronto, Harbord	21	21	21	21	21	21
Victoria Village	1	1	1	1	1	1
Westmount	1	1	1	1	1	1
Willowdale South	10	10	10	10	10	10
Willowdale West	1	1	1	1	1	1
Woburn	2	2	2	2	2	2
Woodbine Heights	2	2	2	2	2	2

In [51]:
```
print('There are {} uniques categories.'.format(len(toronto_venues['Venue Category'].unique())))
```

```
There are 31 uniques categories.
```

Now that we got our data, we will start the analysis in week 2 with one hot encoding, get dummies, frequencies and, finally, maps.

In [52]:
```
# one hot encoding
toronto_onehot = pd.get_dummies(toronto_venues[['Venue Category']], prefix=
"", prefix_sep="")

# add neighborhood column back to dataframe
toronto_onehot['Neighborhood'] = toronto_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]

toronto_onehot.head()
```

Out[52]:

	Neighborhood	Arts & Crafts Store	Bakery	Bank	Bar	Bookstore	Breakfast Spot	Bubble Tea Shop	Cafeteria	Café	Ch Resta
0	Victoria Village	0	0	0	0	0	0	0	0	0	
1	Regent Park	0	0	0	0	0	0	0	0	0	
2	Regent Park	0	0	0	0	0	1	0	0	0	
3	Regent Park	0	0	0	0	0	0	0	0	0	
4	Regent Park	0	0	0	0	0	0	0	0	0	

Group rows by neighborhood and by taking the mean of the frequency of occurrence of each category

In [ ]:
```
toronto_grouped = toronto_onehot.groupby('Neighborhood').mean().reset_index
()
toronto_grouped
```

In [55]:

```
num_top_venues = 3

for hood in toronto_grouped['Neighborhood']:
    print("----"+hood+"----")
    temp = toronto_grouped[toronto_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')
```

```
----Agincourt----
                 venue  freq
0          Coffee Shop   1.0
1  Arts & Crafts Store   0.0
2         Deli / Bodega   0.0


----Alderwood, Long Branch----
                 venue  freq
0                 Café   0.5
1          Coffee Shop   0.5
2  Arts & Crafts Store   0.0


----Bathurst Manor, Downsview North, Wilson Heights----
                 venue  freq
0          Coffee Shop   1.0
1  Arts & Crafts Store   0.0
2         Deli / Bodega   0.0


----Bayview Village----
                 venue  freq
0                 Café   1.0
1  Arts & Crafts Store   0.0
2         Deli / Bodega   0.0


----Bedford Park, Lawrence Manor East----
                 venue  freq
0                 Café   0.5
1          Coffee Shop   0.5
2  Arts & Crafts Store   0.0


----Berczy Park----
          venue  freq
0  Coffee Shop  0.74
1         Café  0.17
2     Creperie  0.04


----Bloordale Gardens, Eringate, Old Burnhamthorpe, Markland Wood----
                 venue  freq
0                 Café   0.5
1          Coffee Shop   0.5
2  Arts & Crafts Store   0.0


----Brockton, Parkdale Village, Exhibition Place----
                 venue  freq
0                 Café  0.67
1          Coffee Shop  0.33
2  Arts & Crafts Store  0.00


----Business Reply Mail Processing Centre 969 Eastern----
```

```
                venue  freq
0           Comic Shop   1.0
1  Arts & Crafts Store   0.0
2        Deli / Bodega   0.0


----Caledonia-Fairbanks----
                venue  freq
0                Café   1.0
1  Arts & Crafts Store   0.0
2        Deli / Bodega   0.0


----Canada Post Gateway Processing Centre----
                venue  freq
0          Coffee Shop   1.0
1  Arts & Crafts Store   0.0
2        Deli / Bodega   0.0


----Cedarbrae----
                venue  freq
0                Café   1.0
1  Arts & Crafts Store   0.0
2        Deli / Bodega   0.0


----Central Bay Street----
         venue  freq
0  Coffee Shop  0.54
1         Café  0.33
2     Tea Room  0.07


----Christie----
                venue  freq
0                Café  0.67
1          Coffee Shop  0.33
2  Arts & Crafts Store  0.00


----Church and Wellesley----
                venue  freq
0         Coffee Shop  0.60
1                Café  0.20
2  Chinese Restaurant  0.03


----Cliffside West, Birch Cliff----
                venue  freq
0                Café   1.0
1  Arts & Crafts Store   0.0
2        Deli / Bodega   0.0


----Commerce Court, Victoria Hotel----
         venue  freq
```

```
0  Coffee Shop  0.64
1         Café  0.21
2     Tea Room  0.05


----Davisville----
          venue  freq
0          Café  0.38
1   Coffee Shop  0.38
2  Dessert Shop  0.25


----Davisville North----
         venue  freq
0     Tea Room  0.33
1         Café  0.33
2  Coffee Shop  0.33


----Deer Park, South Hill, Summerhill West, Forest Hill SE, Rathnelly----
         venue  freq
0  Coffee Shop   0.6
1   Restaurant   0.2
2         Café   0.2


----Design Exchange, Toronto Dominion Centre----
         venue  freq
0  Coffee Shop  0.64
1         Café  0.20
2     Tea Room  0.05


----Don Mills North----
                 venue  freq
0                 Café   1.0
1  Arts & Crafts Store   0.0
2        Deli / Bodega   0.0


----Dovercourt Village, Dufferin----
                 venue  freq
0                 Café   0.5
1          Coffee Shop   0.5
2  Arts & Crafts Store   0.0


----Downsview Northwest----
                 venue  freq
0          Coffee Shop   1.0
1  Arts & Crafts Store   0.0
2        Deli / Bodega   0.0


----East Birchmount Park, Ionview, Kennedy Park----
                 venue  freq
0          Coffee Shop   1.0
```

```
1  Arts & Crafts Store   0.0
2        Deli / Bodega   0.0


----East Toronto----
                 venue  freq
0          Coffee Shop   1.0
1  Arts & Crafts Store   0.0
2        Deli / Bodega   0.0


----Flemingdon Park, Don Mills South----
                 venue  freq
0                 Café   0.5
1          Coffee Shop   0.5
2  Arts & Crafts Store   0.0


----Gerrard Street , The Beaches West----
                 venue  freq
0          Coffee Shop   1.0
1  Arts & Crafts Store   0.0
2        Deli / Bodega   0.0


----Glencairn----
                 venue  freq
0                 Café   0.5
1          Coffee Shop   0.5
2  Arts & Crafts Store   0.0


----Grange Park , Kensington Market, Chinatown----
         venue  freq
0         Café  0.53
1  Coffee Shop  0.18
2     Tea Room  0.15


----Henry Farm, Oriole, Fairview----
         venue  freq
0  Coffee Shop   0.6
1     Tea Room   0.3
2    Juice Bar   0.1


----Humbergate, Beaumond Heights, South Steeles, Mount Olive-Silverstone-Ja
mestown, Thistletown, Albion Gardens, Silverstone----
                 venue  freq
0          Coffee Shop   1.0
1  Arts & Crafts Store   0.0
2        Deli / Bodega   0.0


----King, Richmond, Adelaide----
         venue  freq
0  Coffee Shop  0.62
```

```
1         Café  0.27
2     Tea Room  0.03


----L'Amoreaux West----
                 venue  freq
0          Coffee Shop   1.0
1  Arts & Crafts Store   0.0
2        Deli / Bodega   0.0


----Lawrence Manor, Lawrence Heights----
                 venue  freq
0          Coffee Shop   1.0
1  Arts & Crafts Store   0.0
2        Deli / Bodega   0.0


----Leaside----
                 venue  freq
0          Coffee Shop   1.0
1  Arts & Crafts Store   0.0
2        Deli / Bodega   0.0


----Little Portugal, Trinity–Bellwoods----
               venue  freq
0        Coffee Shop  0.60
1               Café  0.27
2  Convenience Store  0.07


----Maryvale, Wexford----
                 venue  freq
0          Coffee Shop   1.0
1  Arts & Crafts Store   0.0
2        Deli / Bodega   0.0


----Milliken, Ontario, Steeles East, L'Amoreaux East, Agincourt North----
                 venue  freq
0          Coffee Shop   1.0
1  Arts & Crafts Store   0.0
2        Deli / Bodega   0.0


----New Toronto, Mimico South, Humber Bay Shores----
                 venue  freq
0                Café   0.5
1          Coffee Shop   0.5
2  Arts & Crafts Store   0.0


----North Toronto West----
                 venue  freq
0          Coffee Shop  0.67
1                Café   0.33
```

```
2  Arts & Crafts Store  0.00


----Northwood Park, York University----
         venue  freq
0    Pool Hall  0.33
1         Café  0.33
2  Coffee Shop  0.33


----Parkdale, Roncesvalles----
                 venue  freq
0          Coffee Shop  0.67
1             Tea Room  0.33
2  Arts & Crafts Store  0.00


----Parkview Hill, Woodbine Gardens----
                 venue  freq
0                 Café   0.6
1          Coffee Shop   0.4
2  Arts & Crafts Store   0.0


----Queen's Park ----
                 venue  freq
0          Coffee Shop  0.81
1                 Café  0.19
2  Arts & Crafts Store  0.00


----Regent Park----
         venue  freq
0  Coffee Shop  0.62
1         Café  0.19
2       Bakery  0.06


----Riverdale, The Danforth West----
             venue  freq
0      Coffee Shop  0.55
1             Café  0.27
2  Bubble Tea Shop  0.09


----Royal York South West, Mimico, Kingsway Park South West, South of Bloo
r, The Queensway----
                 venue  freq
0    Convenience Store   1.0
1  Arts & Crafts Store   0.0
2        Deli / Bodega   0.0


----Runnymede, Swansea----
         venue  freq
0  Coffee Shop   0.5
1         Café   0.3
```

```
2     Tea Room   0.2


----Ryerson, Garden District----
         venue  freq
0  Coffee Shop  0.75
1         Café  0.20
2     Tea Room  0.03


----Silverthorn, Mount Dennis, Keelesdale, Del Ray----
                 venue  freq
0          Coffee Shop   1.0
1  Arts & Crafts Store   0.0
2        Deli / Bodega   0.0


----South Niagara, Railway Lands, Bathurst Quay, Island airport, King and S
padina, Harbourfront West, CN Tower----
                 venue  freq
0                  Bar   0.5
1          Coffee Shop   0.5
2  Arts & Crafts Store   0.0


----St. James Town----
         venue  freq
0  Coffee Shop  0.67
1         Café  0.18
2   Restaurant  0.04


----St. James Town, Cabbagetown----
                 venue  freq
0          Coffee Shop  0.67
1                Café  0.33
2  Arts & Crafts Store  0.00


----Stn A PO Boxes 25 The Esplanade----
         venue  freq
0  Coffee Shop  0.60
1         Café  0.24
2     Tea Room  0.04


----Studio District----
             venue  freq
0      Coffee Shop  0.46
1             Café  0.38
2  Coworking Space  0.08


----Sullivan, Clarks Corners, Tam O'Shanter – Sullivan----
                 venue  freq
0                 Café   0.5
1          Coffee Shop   0.5
```

```
2  Arts & Crafts Store   0.0


----The Annex, North Midtown, Yorkville----
         venue  freq
0  Coffee Shop  0.50
1         Café  0.38
2   Donut Shop  0.12


----The Beaches----
                 venue  freq
0          Coffee Shop   1.0
1  Arts & Crafts Store   0.0
2        Deli / Bodega   0.0


----The Junction South, High Park----
                 venue  freq
0                 Café  0.75
1          Coffee Shop  0.25
2  Arts & Crafts Store  0.00


----Thorncliffe Park----
                 venue  freq
0          Coffee Shop  0.75
1                 Café  0.25
2  Arts & Crafts Store  0.00


----Underground city, First Canadian Place----
         venue  freq
0  Coffee Shop  0.63
1         Café  0.23
2     Tea Room  0.04


----Union Station , Toronto Islands, Harbourfront East----
         venue  freq
0  Coffee Shop  0.73
1         Café  0.24
2     Tea Room  0.03


----University of Toronto, Harbord----
         venue  freq
0         Café  0.43
1  Coffee Shop  0.43
2       Bakery  0.05


----Victoria Village----
                 venue  freq
0          Coffee Shop   1.0
1  Arts & Crafts Store   0.0
2        Deli / Bodega   0.0
```

```
----Westmount----
                 venue  freq
0          Coffee Shop   1.0
1  Arts & Crafts Store   0.0
2        Deli / Bodega   0.0


----Willowdale South----
              venue  freq
0             Café   0.4
1      Coffee Shop   0.4
2  Bubble Tea Shop   0.2


----Willowdale West----
                 venue  freq
0          Coffee Shop   1.0
1  Arts & Crafts Store   0.0
2        Deli / Bodega   0.0


----Woburn----
                 venue  freq
0          Coffee Shop   1.0
1  Arts & Crafts Store   0.0
2        Deli / Bodega   0.0


----Woodbine Heights----
                 venue  freq
0                Café   1.0
1  Arts & Crafts Store   0.0
2        Deli / Bodega   0.0
```

So, we got the frequencies mainly for Coffee Shop types and Café

We put them in a pandas dataframe

First, we sort the venues in descending order.

In [56]:
```
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]
```

In [57]:
```
num_top_venues = 3

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

# create columns according to number of top venues
columns = ['Neighborhood']
for ind in np.arange(num_top_venues):
    try:
        columns.append('{}{} Most Common Venue'.format(ind+1, indicators[in
d]))
    except:
        columns.append('{}th Most Common Venue'.format(ind+1))

# create a new dataframe
neighborhoods_venues_sorted = pd.DataFrame(columns=columns)
neighborhoods_venues_sorted['Neighborhood'] = toronto_grouped['Neighborhoo
d']

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

neighborhoods_venues_sorted.head()
```

Out[57]:

	Neighborhood	1st Most Common Venue	2nd Most Common Venue	3rd Most Common Venue
0	Agincourt	Coffee Shop	Vegetarian / Vegan Restaurant	Coworking Space
1	Alderwood, Long Branch	Café	Coffee Shop	Vegetarian / Vegan Restaurant
2	Bathurst Manor, Downsview North, Wilson Heights	Coffee Shop	Vegetarian / Vegan Restaurant	Coworking Space
3	Bayview Village	Café	Vegetarian / Vegan Restaurant	Coworking Space
4	Bedford Park, Lawrence Manor East	Café	Coffee Shop	Vegetarian / Vegan Restaurant

As we see in the table above, we found the neighborhoods with "Coffee Shop" and "Café" as the most common venues.

Now we will cluster the Neighborhoods.

k-means to cluster the neighborhood into 5 clusters.

In [58]:
```
# set number of clusters
kclusters = 5

toronto_grouped_clustering = toronto_grouped.drop('Neighborhood', 1)

# run k-means clustering
kmeans = KMeans(n_clusters=kclusters, random_state=0).fit(toronto_grouped_c
lustering)

# check cluster labels generated for each row in the dataframe
kmeans.labels_[0:10]
```

Out[58]:
```
array([4, 2, 4, 3, 2, 0, 2, 2, 1, 3], dtype=int32)
```

In [59]:
```
# add clustering labels
neighborhoods_venues_sorted.insert(0, 'Cluster Labels', kmeans.labels_)

toronto_merged = toronto_data

# merge toronto_grouped with toronto_data to add latitude/longitude for eac
h neighborhood
toronto_merged = toronto_merged.join(neighborhoods_venues_sorted.set_index(
'Neighborhood'), on='Neighborhood')

toronto_merged.head()
```

Out[59]:

	Postcode	Borough	Neighborhood	Latitude	Longitude	Cluster Labels	1st Most Common Venue	2nd Most Common Venue	3r Co
0	M3A	North York	Parkwoods	43.753259	-79.329656	NaN	NaN	NaN	
1	M4A	North York	Victoria Village	43.725882	-79.315572	4.0	Coffee Shop	Vegetarian / Vegan Restaurant	Cov
2	M5A	Downtown Toronto	Regent Park	43.654260	-79.360636	0.0	Coffee Shop	Café	
3	M6A	North York	Lawrence Manor, Lawrence Heights	43.718518	-79.464763	4.0	Coffee Shop	Vegetarian / Vegan Restaurant	Cov
4	M7A	Downtown Toronto	Queen's Park	43.662301	-79.389494	0.0	Coffee Shop	Café	Veg / Res

Visualize the resulting clusters on map

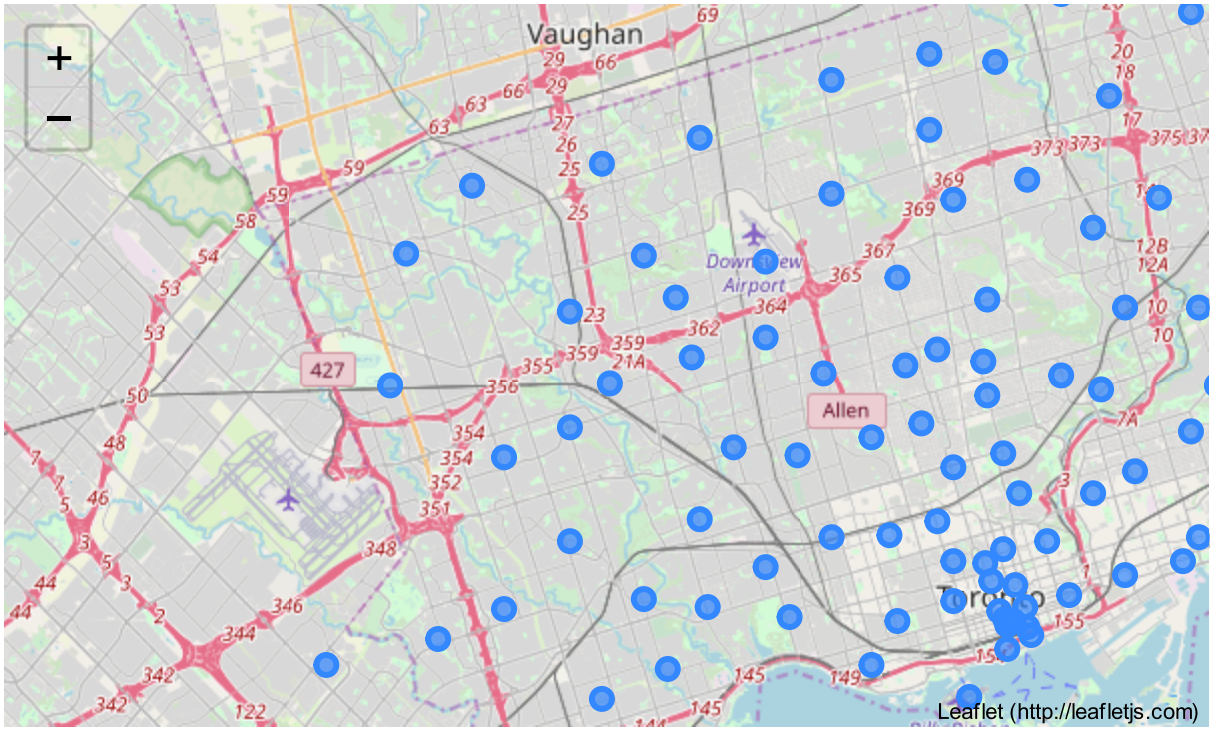
In [60]:
```
# create map
map_clusters = folium.Map(location=[latitude, longitude], zoom_start=11)

# set color scheme for the clusters
x = np.arange(kclusters)
ys = [i + x + (i*x)**2 for i in range(kclusters)]
colors_array = cm.rainbow(np.linspace(0, 1, len(ys)))
rainbow = [colors.rgb2hex(i) for i in colors_array]

# add markers to the map
markers_colors = []
for lat, lon, poi, cluster in zip(toronto_merged['Latitude'], toronto_merge
d['Longitude'], toronto_merged['Neighborhood'], toronto_merged['Cluster Lab
els']):
    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[60]:



Examining each cluster and determining the discriminating venue categories that distinguish each cluster.

Cluster 1

In [61]:
```
toronto_merged.loc[toronto_merged['Cluster Labels'] == 0, toronto_merged.co
lumns[[1] + list(range(5, toronto_merged.shape[1]))]]
```

Out[61]:

	Borough	Cluster Labels	1st Most Common Venue	2nd Most Common Venue	3rd Most Common Venue
2	Downtown Toronto	0.0	Coffee Shop	Café	Bakery
4	Downtown Toronto	0.0	Coffee Shop	Café	Vegetarian / Vegan Restaurant
9	Downtown Toronto	0.0	Coffee Shop	Café	Tea Room
15	Downtown Toronto	0.0	Coffee Shop	Café	Restaurant
20	Downtown Toronto	0.0	Coffee Shop	Café	Creperie
24	Downtown Toronto	0.0	Coffee Shop	Café	Tea Room
29	East York	0.0	Coffee Shop	Café	Vegetarian / Vegan Restaurant
30	Downtown Toronto	0.0	Coffee Shop	Café	Tea Room
33	North York	0.0	Coffee Shop	Tea Room	Juice Bar
36	Downtown Toronto	0.0	Coffee Shop	Café	Tea Room
37	West Toronto	0.0	Coffee Shop	Café	Arts & Crafts Store
41	East Toronto	0.0	Coffee Shop	Café	Bubble Tea Shop
42	Downtown Toronto	0.0	Coffee Shop	Café	Tea Room
48	Downtown Toronto	0.0	Coffee Shop	Café	Tea Room
73	Central Toronto	0.0	Coffee Shop	Café	Vegetarian / Vegan Restaurant
75	West Toronto	0.0	Coffee Shop	Tea Room	Vegetarian / Vegan Restaurant
81	West Toronto	0.0	Coffee Shop	Café	Tea Room
86	Central Toronto	0.0	Coffee Shop	Restaurant	Café
87	Downtown Toronto	0.0	Bar	Coffee Shop	Vegetarian / Vegan Restaurant
92	Downtown Toronto	0.0	Coffee Shop	Café	Tea Room
96	Downtown Toronto	0.0	Coffee Shop	Café	Vegetarian / Vegan Restaurant
97	Downtown Toronto	0.0	Coffee Shop	Café	Tea Room
99	Downtown Toronto	0.0	Coffee Shop	Café	Restaurant

So, the first cluster is for Borough with Coffee Shop as the most common venue and Café as the second most common venue.

Cluster 2

In [62]:
```
toronto_merged.loc[toronto_merged['Cluster Labels'] == 1, toronto_merged.columns[[1] + list(range(5, toronto_merged.shape[1]))]]
```

Out[62]:

	Borough	Cluster Labels	1st Most Common Venue	2nd Most Common Venue	3rd Most Common Venue
100	East Toronto	1.0	Comic Shop	Vegetarian / Vegan Restaurant	Coworking Space
102	Etobicoke	1.0	Convenience Store	Vegetarian / Vegan Restaurant	Coworking Space

The second cluster is of no use from our chocolate company who is interested only in Coffee Shops and Cafés.

Cluster 3

In [63]:
```
toronto_merged.loc[toronto_merged['Cluster Labels'] == 2, toronto_merged.columns[[1] + list(range(5, toronto_merged.shape[1]))]]
```

Out[63]:

	Borough	Cluster Labels	1st Most Common Venue	2nd Most Common Venue	3rd Most Common Venue
8	East York	2.0	Café	Coffee Shop	Vegetarian / Vegan Restaurant
10	North York	2.0	Café	Coffee Shop	Vegetarian / Vegan Restaurant
13	North York	2.0	Café	Coffee Shop	Vegetarian / Vegan Restaurant
17	Etobicoke	2.0	Café	Coffee Shop	Vegetarian / Vegan Restaurant
25	Downtown Toronto	2.0	Café	Coffee Shop	Vegetarian / Vegan Restaurant
31	West Toronto	2.0	Café	Coffee Shop	Vegetarian / Vegan Restaurant
34	North York	2.0	Pool Hall	Café	Coffee Shop
43	West Toronto	2.0	Café	Coffee Shop	Vegetarian / Vegan Restaurant
54	East Toronto	2.0	Coffee Shop	Café	Coworking Space
55	North York	2.0	Café	Coffee Shop	Vegetarian / Vegan Restaurant
59	North York	2.0	Café	Coffee Shop	Bubble Tea Shop
67	Central Toronto	2.0	Café	Coffee Shop	Tea Room
69	West Toronto	2.0	Café	Coffee Shop	Vegetarian / Vegan Restaurant
74	Central Toronto	2.0	Coffee Shop	Café	Donut Shop
79	Central Toronto	2.0	Café	Coffee Shop	Dessert Shop
80	Downtown Toronto	2.0	Café	Coffee Shop	Bakery
82	Scarborough, Toronto	2.0	Café	Coffee Shop	Vegetarian / Vegan Restaurant
84	Downtown Toronto	2.0	Café	Coffee Shop	Tea Room
88	Etobicoke	2.0	Café	Coffee Shop	Vegetarian / Vegan Restaurant
93	Etobicoke	2.0	Café	Coffee Shop	Vegetarian / Vegan Restaurant

So, the third cluster is for Borough with Café as the most common venue and Coffee Shop as the second most common venue.

This cluster is also important for our quest.

Cluster 4

In [64]:
```
toronto_merged.loc[toronto_merged['Cluster Labels'] == 3, toronto_merged.columns[[1] + list(range(5, toronto_merged.shape[1]))]]
```

Out[64]:

	Borough	Cluster Labels	1st Most Common Venue	2nd Most Common Venue	3rd Most Common Venue
7	North York	3.0	Café	Vegetarian / Vegan Restaurant	Coworking Space
14	East York	3.0	Café	Vegetarian / Vegan Restaurant	Coworking Space
21	York	3.0	Café	Vegetarian / Vegan Restaurant	Coworking Space
26	Scarborough, Toronto	3.0	Café	Vegetarian / Vegan Restaurant	Coworking Space
39	North York	3.0	Café	Vegetarian / Vegan Restaurant	Coworking Space
58	Scarborough, Toronto	3.0	Café	Vegetarian / Vegan Restaurant	Coworking Space

So, the fourth cluster is for Borough with Café as the most common venue and no Coffee Shop in the top 3.

Cluster 5

In [65]:
```
toronto_merged.loc[toronto_merged['Cluster Labels'] == 4, toronto_merged.columns[[1] + list(range(5, toronto_merged.shape[1]))]]
```

Out[65]:

	Borough	Cluster Labels	1st Most Common Venue	2nd Most Common Venue	3rd Most Common Venue
1	North York	4.0	Coffee Shop	Vegetarian / Vegan Restaurant	Coworking Space
3	North York	4.0	Coffee Shop	Vegetarian / Vegan Restaurant	Coworking Space
19	East Toronto	4.0	Coffee Shop	Vegetarian / Vegan Restaurant	Coworking Space
22	Scarborough, Toronto	4.0	Coffee Shop	Vegetarian / Vegan Restaurant	Coworking Space
23	East York	4.0	Coffee Shop	Vegetarian / Vegan Restaurant	Coworking Space
28	North York	4.0	Coffee Shop	Vegetarian / Vegan Restaurant	Coworking Space
35	East York	4.0	Coffee Shop	Vegetarian / Vegan Restaurant	Coworking Space
38	Scarborough, Toronto	4.0	Coffee Shop	Vegetarian / Vegan Restaurant	Coworking Space
47	East Toronto	4.0	Coffee Shop	Vegetarian / Vegan Restaurant	Coworking Space
56	York, Toronto	4.0	Coffee Shop	Vegetarian / Vegan Restaurant	Coworking Space
60	North York	4.0	Coffee Shop	Vegetarian / Vegan Restaurant	Coworking Space
70	Etobicoke	4.0	Coffee Shop	Vegetarian / Vegan Restaurant	Coworking Space
71	Scarborough, Toronto	4.0	Coffee Shop	Vegetarian / Vegan Restaurant	Coworking Space
72	North York	4.0	Coffee Shop	Vegetarian / Vegan Restaurant	Coworking Space
76	Mississauga	4.0	Coffee Shop	Vegetarian / Vegan Restaurant	Coworking Space
78	Scarborough, Toronto	4.0	Coffee Shop	Vegetarian / Vegan Restaurant	Coworking Space
85	Scarborough, Toronto	4.0	Coffee Shop	Vegetarian / Vegan Restaurant	Coworking Space
89	Etobicoke	4.0	Coffee Shop	Vegetarian / Vegan Restaurant	Coworking Space
90	Scarborough, Toronto	4.0	Coffee Shop	Vegetarian / Vegan Restaurant	Coworking Space

So, the fifth cluster is for Borough with Coffee Shop as the most common venue and no Café in the top 3.

In [136]:
```
def get_rating(row):
    try:
        rating = row['rating']
    except:
        rating = None
    return rating

def get_likes(row):
    try:
        likes = row['likes']['count']
    except:
        likes = None
    return likes


def get_venue_details(Venue_ID):
    venues_list=[]
    for venue_id in Venue_ID:
        print('. ')
               # create the API request URL
        url = 'https://api.foursquare.com/v2/venues/{}?client_id={}&client_
secret={}&v={}'.format(venue_id, CLIENT_ID, CLIENT_SECRET, VERSION)

        # make the GET request
        results = requests.get(url).json()
        results ['response']

        # return only relevant information for each nearby venue
        venues_list.append([(

            get_rating(results),
            get_likes(results))])

    venues_details = pd.DataFrame([item for venue_list in venues_list for i
tem in venue_list])
    venues_details.columns = [
                              'Rating',
                              'Likes']


    return(venues_details)
```

In [138]:
```
Toronto_Merged_2 = pd.DataFrame({})

#Cluster 1
#Toronto_Merged_2 = toronto_merged.loc[toronto_merged['Cluster Labels'] ==
 0, toronto_merged.columns[[1] + list(range(5, toronto_merged.shape[1]))]]
#Toronto_Merged_2 = Toronto_Merged_2.append(get_venue_details(Toronto_Merge
d_2 ['Borough'].iloc[1:10])).reset_index(drop=True)
```

In [139]:
```
Toronto_Merged_2.head(11)
```

Out[139]:

_

Explore Trending Venues

In [140]:
```
# define URL
url = 'https://api.foursquare.com/v2/venues/trending?client_id={}&client_secret={}&ll={},{}&v={}'.format(CLIENT_ID, CLIENT_SECRET, latitude, longitude, VERSION)

# send GET request and get trending venues
results = requests.get(url).json()
results
```

Out[140]:
```
{'meta': {'code': 200, 'requestId': '5e5d8df50be7b4002914b9e9'},
 'response': {'venues': []}}
```

In [141]:
```
if len(results['response']['venues']) == 0:
    trending_venues_df = 'No trending venues are available at the moment!'

else:
    trending_venues = results['response']['venues']
    trending_venues_df = json_normalize(trending_venues)

    # filter columns
    columns_filtered = ['name', 'categories'] + ['location.distance', 'location.city', 'location.postalCode', 'location.state', 'location.country', 'location.lat', 'location.lng']
    trending_venues_df = trending_venues_df.loc[:, columns_filtered]

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

In [142]:
```
# display trending venues
trending_venues_df
```

Out[142]:
```
'No trending venues are available at the moment!'
```

As a result, in the studied boroughs, no trending venues are available at the moment.

C- Methodology and Data Analysis:

We converted the addresses of the coffee shops into their equivalent latitude and longitude values. Then, we used the Foursquare API to find their locations in the neighborhoods in Toronto City. We used the explore function to get the most common venue categories and the trending coffee shops in neighborhoods where the frequency is at its highest.

Finally, you will use the Folium library to visualize the most trending coffee shops in the neighborhoods with the highest frequencies for these shops in Toronto City:

• We will get the postal codes to represent the neighborhoods we need from Wikipedia table: https://en.wikipedia.org/wiki/List_of_postal_codes_in_Canada (https://en.wikipedia.org/wiki/List_of_postal_codes_in_Canada)

• We will collect the Toronto city data from https://cocl.us/Geospatial_data (https://cocl.us/Geospatial_data)

• Then, we use Foursquare API to find all venues for each neighborhood.

• We filter out all venues to get the coffee shops with the highest frequencies.

• Using rating for each coffee shop, we will sort the data.

• We will finally visualize the best coffee shops for our project on maps using folium library(Jupiter Notebook with Python as a kettle).

Questions to be answered using the above dataset:

• What are the locations with the highest frequencies in Toronto City for coffee shops?

• Which areas have a highest rated coffee shops based on ratings in Foursquare?

• What are the best places to choose as targets for the chocolate company marketing strategy?

Conclusion

As a conclusion, we found that venues in cluster 1 and 3 are the most interesting ones.

In fact, they contain Coffee Shops and Cafés as the first and second most common places.

Based on the frequencies of the places, targeting those venues would be the most profitable since the company would be targeting the maximum number of customers.

For cafés, the best places to start the marketing campaign are East York and North York (Café maximum frequencies).

For Coffee shops, the best places to start the marketing campaign are DownTown Toronto and also East York (Coffee Shop maximum frequencies).

--

Limitations:

• The ranking is only based on the frequencies in a neighborhood and the ratings of coffee shops and cafés.

• The pertinence of our decision can be improved by making a survey to get deeper insights from the locations chosen before implementing the marketing plan. In fact, relying only on the Foursquare data is not enough but constitutes a good first step to know where to start.

In [ ]: