

# 1. Data requirement

## Retrieving data and forming dataset

We retrieve the URL from wikipedia [https://en.wikipedia.org/wiki/List\\_of\\_postal\\_codes\\_of\\_Canada:\\_M](https://en.wikipedia.org/wiki/List_of_postal_codes_of_Canada:_M) and create a **Beautiful soup** object which help us extract the table and table data containing postal code, boroughs and neighborhoods of Toronto.

Then convert it to dataframe and using **geopy.geocoders** find geographical locations of boroughs and neighborhoods.

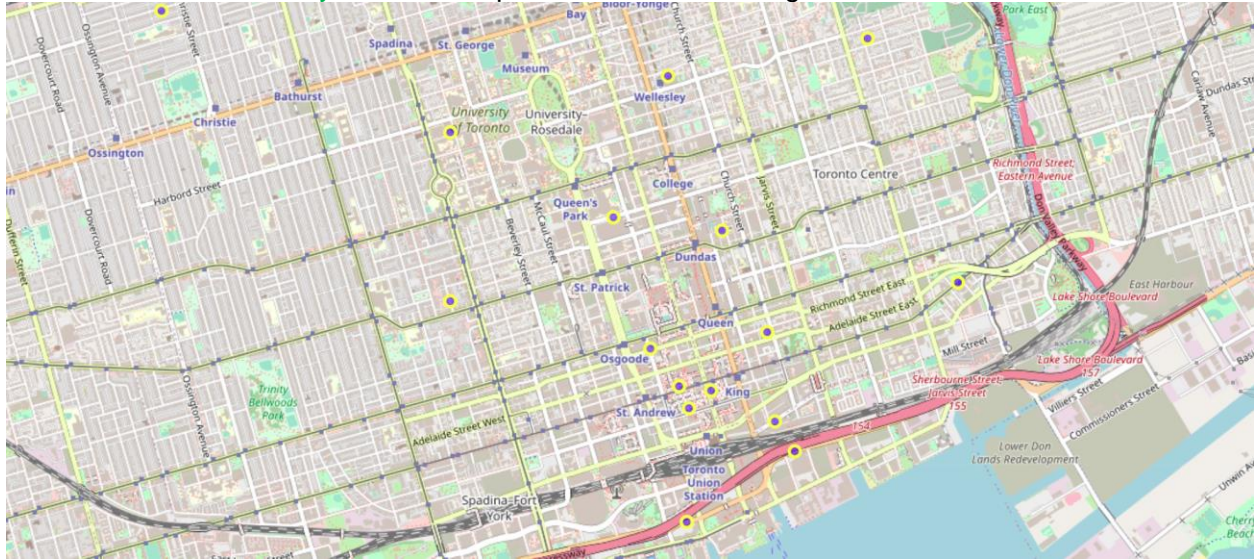
	PostalCode	Borough	Neighborhood	Latitude	Longitude
0	M3A	North York	Parkwoods	43.753259	-79.329656
1	M4A	North York	Victoria Village	43.725882	-79.315572
2	M5A	Downtown Toronto	Regent Park, Harbourfront	43.654260	-79.360636
3	M6A	North York	Lawrence Manor, Lawrence Heights	43.718518	-79.464763
4	M7A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

## Dataset

We work with only boroughs that contain the word 'DowntownToronto' in its name.

	PostalCode	Borough	Neighborhood	Latitude	Longitude
0	M5A	Downtown Toronto	Regent Park, Harbourfront	43.654260	-79.360636
1	M5B	Downtown Toronto	Garden District, Ryerson	43.657162	-79.378937
2	M5C	Downtown Toronto	St. James Town	43.651494	-79.375418
3	M5E	Downtown Toronto	Berczy Park	43.644771	-79.373306
4	M5G	Downtown Toronto	Central Bay Street	43.657952	-79.387383
5	M6G	Downtown Toronto	Christie	43.669542	-79.422564
6	M5H	Downtown Toronto	Richmond, Adelaide, King	43.650571	-79.384568
7	M5J	Downtown Toronto	Harbourfront East, Union Station, Toronto Islands	43.640816	-79.381752
8	M5K	Downtown Toronto	Toronto Dominion Centre, Design Exchange	43.647177	-79.381576
9	M5L	Downtown Toronto	Commerce Court, Victoria Hotel	43.648198	-79.379817
10	M5S	Downtown Toronto	University of Toronto, Harbord	43.662696	-79.400049
11	M5T	Downtown Toronto	Kensington Market, Chinatown, Grange Park	43.653206	-79.400049
12	M5V	Downtown Toronto	CN Tower, King and Spadina, Railway Lands, Har...	43.628947	-79.394420
13	M4W	Downtown Toronto	Rosedale	43.679563	-79.377529
14	M5W	Downtown Toronto Stn A	Enclave of M5E	43.646435	-79.374846
15	M4X	Downtown Toronto	St. James Town, Cabbagetown	43.667967	-79.367675
16	M5X	Downtown Toronto	First Canadian Place, Underground city	43.648429	-79.382280
17	M4Y	Downtown Toronto	Church and Wellesley	43.665860	-79.383160

Then we use **foilum library** to create map of Toronto with all neighborhoods in Downtown Toronto.



## 2. Foursquare API Data in exploring venues in Downtown Toronto

Now we apply to **Foursquare API Data which is** location data provider and provide information about venue names, locations, reviews. In order to do this we need to obtain account and appropriate credentials.

```
CLIENT_ID = 'JQ5MTMI2KD4L5A0ZMGPSNM5IFLLKJXMLW3NWKZHY2BLDDCY' # your Foursquare ID
CLIENT_SECRET = 'VDOGGQZHGHNICON2W0INR1ITG32N2ZR2WFKWMTXGFD3HYWSD' # your Foursquare Secret
ACCESS_TOKEN = 'JBZIHJ2Q4NKN2XC2VRCNGCSLN0XRLKHKQVBEANML3UWM10IY' # your FourSquare Access Token
VERSION = '20180604'
LIMIT = 30
print('Your credentails:')
print('CLIENT_ID: ' + CLIENT_ID)
print('CLIENT_SECRET: ' + CLIENT_SECRET)
```

```
Your credentails:
CLIENT_ID: JQ5MTMI2KD4L5A0ZMGPSNM5IFLLKJXMLW3NWKZHY2BLDDCY
CLIENT_SECRET: VDOGGQZHGHNICON2W0INR1ITG32N2ZR2WFKWMTXGFD3HYWSD
```

So we can receive information about all venues located in Downtown Toronto neighborhoods. The information obtained per venue contain:

1. Neighborhood
2. Neighborhood Latitude
3. Neighborhood Longitude
4. Venue
5. Name of the venue
6. Venue Latitude
7. Venue Longitude
8. Venue Category

Extract 5 first rows below:

toronto\_downtown\_venues.head()

6]:

	Neighborhood	Neighborhood Latitude	Neighborhood Longitude	Venue	Venue Latitude	Venue Longitude	Venue Category
0	Regent Park, Harbourfront	43.65426	-79.360636	Roselle Desserts	43.653447	-79.362017	Bakery
1	Regent Park, Harbourfront	43.65426	-79.360636	Tandem Coffee	43.653559	-79.361809	Coffee Shop
2	Regent Park, Harbourfront	43.65426	-79.360636	Cooper Koo Family YMCA	43.653249	-79.358008	Distribution Center
3	Regent Park, Harbourfront	43.65426	-79.360636	Body Blitz Spa East	43.654735	-79.359874	Spa
4	Regent Park, Harbourfront	43.65426	-79.360636	Impact Kitchen	43.656369	-79.356980	Restaurant

We define f.e. top 10 categories of venues:

Out[18]:

Café	46
Coffee Shop	38
Restaurant	17
Park	15
Japanese Restaurant	14
Bakery	14
Hotel	11
Gastropub	11
Seafood Restaurant	10
Farmers Market	8
Art Gallery	8
Beer Bar	8
Pizza Place	7
Thai Restaurant	7
Italian Restaurant	7
American Restaurant	6
Pub	6
Dessert Shop	6
Sandwich Place	6
Vegetarian / Vegan Restaurant	6
Cocktail Bar	6
Concert Hall	5
Grocery Store	5
Comfort Food Restaurant	5
Creperie	5
Mexican Restaurant	5
Theater	5
Gym / Fitness Center	5

And most common venues in each neighborhood (fragment below)

	Neighborhood	1st Most Common Venue	2nd Most Common Venue	3rd Most Common Venue	4th Most Common Venue	5th Most Common Venue	6th Most Common Venue	7th Most Common Venue	8th Most Common Venue	9th Most Common Venue	10th Most Common Venue
0	Berczy Park	Seafood Restaurant	Farmers Market	Coffee Shop	Cocktail Bar	Fountain	Bakery	French Restaurant	Park	Cheese Shop	Museum
1	CN Tower, King and Spadina, Railway Lands, Har...	Airport Service	Airport Lounge	Airport Terminal	Sculpture Garden	Coffee Shop	Airport	Airport Food Court	Airport Gate	Boat or Ferry	Harbor / Marina
2	Central Bay Street	Coffee Shop	Café	Italian Restaurant	Yoga Studio	Dessert Shop	Park	Modern European Restaurant	Pizza Place	Middle Eastern Restaurant	Poke Place
3	Christie	Grocery Store	Café	Park	Coffee Shop	Candy Store	Nightclub	Italian Restaurant	Restaurant	Baby Store	Athletics & Sports
4	Church and Wellesley	Sushi Restaurant	Pub	Dessert Shop	Juice Bar	Burger Joint	Salon / Barbershop	Beer Bar	Breakfast Spot	Japanese Restaurant	Pizza Place
5	Commerce Court, Victoria Hotel	Café	Hotel	Gastropub	Coffee Shop	Restaurant	American Restaurant	Japanese Restaurant	Museum	Pub	Deli / Bodega
6	Enclave of M5E	Seafood Restaurant	Farmers Market	Café	Creperie	Beer Bar	Cocktail Bar	Fountain	Museum	Restaurant	Vegetarian / Vegan Restaurant
7	First Canadian Place, Underground city	Café	Restaurant	Coffee Shop	Seafood Restaurant	Steakhouse	Gym / Fitness Center	Concert Hall	Japanese Restaurant	Sandwich Place	Bakery

Now we can conduct clustering of Downtown Toronto and see how differ clusters.

	PostalCode	Borough	Neighborhood	Latitude	Longitude	cluster	1st Most Common Venue	2nd Most Common Venue	3rd Most Common Venue	4th Most Common Venue	5th Most Common Venue	6th Most Common Venue	7th Most Common Venue	8th Most Common Venue	9th Most Common Venue	10th Most Common Venue
0	M5A	Downtown Toronto	Regent Park, Harbourfront	43.654260	-79.360636	5	Coffee Shop	Park	Bakery	Café	Breakfast Spot	Distribution Center	Performing Arts Venue	Pub	Restaurant	Mexican Restaurant
1	M5B	Downtown Toronto	Garden District, Ryerson	43.657162	-79.378937	3	Café	Theater	Burrito Place	Ramen Restaurant	Comic Shop	Japanese Restaurant	Coffee Shop	Sandwich Place	Music Venue	Plaza
2	M5C	Downtown Toronto	St. James Town	43.651494	-79.375418	0	Gastropub	Café	Coffee Shop	Farmers Market	BBQ Joint	Park	New American Restaurant	Middle Eastern Restaurant	Cosmetics Shop	Restaurant
3	M5E	Downtown Toronto	Berczy Park	43.644771	-79.373306	0	Seafood Restaurant	Farmers Market	Coffee Shop	Cocktail Bar	Fountain	Bakery	French Restaurant	Park	Cheese Shop	Museum
4	M5G	Downtown Toronto	Central Bay Street	43.657952	-79.387383	5	Coffee Shop	Café	Italian Restaurant	Yoga Studio	Dessert Shop	Park	Modern European Restaurant	Pizza Place	Middle Eastern Restaurant	Poke Place
5	M6G	Downtown Toronto	Christie	43.669542	-79.422564	2	Grocery Store	Café	Park	Coffee Shop	Candy Store	Nightclub	Italian Restaurant	Restaurant	Baby Store	Athletics & Sports

Then we can explore all sport venues in Downtown Toronto and using folium again find their location. The same we do with vegetarian restaurants.

List of sport venues already existing in Downtown Toronto.

Out[35]:

	Neighborhood	Venue Category
24	Regent Park, Harbourfront	Yoga Studio
145	Central Bay Street	Yoga Studio
291	University of Toronto, Harbord	Yoga Studio
69	St. James Town	Gym
227	Toronto Dominion Centre, Design Exchange	Gym
258	Commerce Court, Victoria Hotel	Gym
426	First Canadian Place, Underground city	Gym
7	Regent Park, Harbourfront	Gym / Fitness Center
178	Richmond, Adelaide, King	Gym / Fitness Center
234	Toronto Dominion Centre, Design Exchange	Gym / Fitness Center
260	Commerce Court, Victoria Hotel	Gym / Fitness Center
427	First Canadian Place, Underground city	Gym / Fitness Center

List of vegan restaurants already existing in Downtown Toronto.

	Neighborhood	Venue Category_x	Venue Category_y
0	Central Bay Street	Yoga Studio	Vegetarian / Vegan Restaurant
1	First Canadian Place, Underground city	Gym	Vegetarian / Vegan Restaurant
2	First Canadian Place, Underground city	Gym / Fitness Center	Vegetarian / Vegan Restaurant
3	Richmond, Adelaide, King	Gym / Fitness Center	Vegetarian / Vegan Restaurant

Using idea that placing a yoga studios next to a vegetarian restaurant will allow us to attract this target audience we can define place for our 2 yoga studios near of vegan restaurants in locations where lack of yoga studios at present.