## Coursera Capstone – The Battles of Neighborhoods

#### Introduction:

Toronto is the capital city of the Canadian province of Ontario. With a recorded population of 2,731,571 in 2016, it is the most populous city in Canada and the fourth most populous city in North America.

The city is the anchor of the Golden Horseshoe, an urban agglomeration of 9,245,438 people (as of 2016) surrounding the western end of Lake Ontario, while the Greater Toronto Area (GTA) proper had a 2016 population of 6,417,516. Toronto is an international centre of business, finance, arts, and culture, and is recognized as one of the most multicultural and cosmopolitan cities in the world.

#### **Business Problem:**

The objective of this report is to analyze and select the best location in the city of Toronto, Canada, to open a new shopping mall. This project is mainly focused on geospatial analysis of the Toronto City to understand which would be the best place to open a new mall.

### Source of Data and Methods to Extract Data

Data could be found from here <u>Wikipedia</u>. This link contains a list of neighborhoods in Toronto. The Beautifulsoup package was used to extract the data from the Wikipedia page. Then, the latitude and longitude coordinates of the neighborhoods were gathered using the Geocoder package. After that, Foursquare API was used to get the venue data of these neighborhoods.

# The Neighborhoods in Toronto:

	PostalCode	Borough	Neighborhood
0	МЗА	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	М7А	Queen's Park	Ontario Provincial Government
5	М9А	Etobicoke	Islington Avenue
6	M1B	Scarborough	Malvern, Rouge
7	МЗВ	North York	Don Mills North
8	M4B	East York	Parkview Hill, Woodbine Gardens
9	М5В	Downtown Toronto	Garden District, Ryerson
10	М6В	North York	Glencairn
11	М9В	Etobicoke	West Deane Park, Princess Gardens, Martin Grov
12	M1C	Scarborough	Rouge Hill, Port Union, Highland Creek
13	мзс	North York	Don Mills South
14	M4C	East York	Woodbine Heights
15	M5C	Downtown Toronto	St. James Town
16	М6С	York	Humewood-Cedarvale
17	М9С	Etobicoke	Eringate, Bloordale Gardens, Old Burnhamthorpe
18	M1E	Scarborough	Guildwood, Morningside, West Hill
19	M4E	East Toronto	The Beaches
20	M5E	Downtown Toronto	Berczy Park
21	M6E	York	Caledonia-Fairbanks
22	M1G	Scarborough	Woburn
23	M4G	East York	Leaside
24	M5G	Downtown Toronto	Central Bay Street
25	M6G	Downtown Toronto	Christie
26	М1Н	Scarborough	Cedarbrae
27	М2Н	North York	Hillcrest Village
28	МЗН	North York	Bathurst Manor, Wilson Heights, Downsview North

### With Latitude and Longitude:

	PostalCode	Borough	Neighborhood	Latitude	Longitude
0	МЗА	North York	Parkwoods	43.7545	-79.3300
1	M4A	North York	Victoria Village	43.7276	-79.3148
2	M5A	Downtown Toronto	Regent Park, Harbourfront	43.6555	-79.3626
3	M6A	North York	Lawrence Manor, Lawrence Heights	43.7223	-79.4504
4	М7А	Queen's Park	Ontario Provincial Government	43.6641	-79.3889
5	М9А	Etobicoke	Islington Avenue	43.6662	-79.5282
6	М1В	Scarborough	Malvern, Rouge	43.8113	-79.1930
7	МЗВ	North York	Don Mills North	43.7450	-79.3590
8	M4B	East York	Parkview Hill, Woodbine Gardens	43.7063	-79.3094
9	М5В	Downtown Toronto	Garden District, Ryerson	43.6572	-79.3783
10	М6В	North York	Glencairn	43.7081	-79.4479
11	М9В	Etobicoke	West Deane Park, Princess Gardens, Martin Grov	43.6505	-79.5517
12	M1C	Scarborough	Rouge Hill, Port Union, Highland Creek	43.7878	-79.1564
13	мзс	North York	Don Mills South	43.7334	-79.3329
14	M4C	East York	Woodbine Heights	43.6913	-79.3116
15	M5C	Downtown Toronto	St. James Town	43.6513	-79.3756
16	М6С	York	Humewood-Cedarvale	43.6915	-79.4307
17	М9С	Etobicoke	Eringate, Bloordale Gardens, Old Burnhamthorpe	43.6437	-79.5767
18	M1E	Scarborough	Guildwood, Morningside, West Hill	43.7678	-79.1866
19	M4E	East Toronto	The Beaches	43.6784	-79.2941
20	M5E	Downtown Toronto	Berczy Park	43.6456	-79.3754
21	M6E	York	Caledonia-Fairbanks	43.6889	-79.4507
22	M1G	Scarborough	Woburn	43.7712	-79.2144
23	M4G	East York	Leaside	43.7124	-79.3644
24	M5G	Downtown Toronto	Central Bay Street	43.6564	-79.3860
25	M6G	Downtown Toronto	Christie	43.6683	-79.4205
26	м1Н	Scarborough	Cedarbrae	43.7686	-79.2389
27	М2Н	North York	Hillcrest Village	43.8015	-79.3577
28	мзн	North York	Bathurst Manor, Wilson Heights, Downsview North	43.7535	-79.4472
29	М4Н	East York	Thorncliffe Park	43.7059	-79.3464

### Add Venue Category:

	Neighborhood	Neighborhood Latitude	Neighborhood Longitude	Venue	Venue Latitude	Venue Longitude	Venue Category
0	Regent Park, Harbourfront	43.6555	-79.3626	Tandem Coffee	43.653559	-79.361809	Coffee Shop
1	Regent Park, Harbourfront	43.6555	-79.3626	Roselle Desserts	43.653447	-79.362017	Bakery
2	Regent Park, Harbourfront	43.6555	-79.3626	Souvlaki Express	43.655584	-79.364438	Greek Restaurant
3	Regent Park, Harbourfront	43.6555	-79.3626	Berkeley Church	43.655123	-79.365873	Event Space
4	Regent Park, Harbourfront	43.6555	-79.3626	Figs Breakfast & Lunch	43.655675	-79.364503	Breakfast Spot

	Neighborhood Latitude	Neighborhood Longitude	Venue	Venue Latitude	Venue Longitude	Venue Category
Neighborhood						
Berczy Park	75	75	75	75	75	75
CN Tower, King and Spadina, Railway Lands, Harbourfront West, Bathurst Quay, South Niagara, Island airport	58	58	58	58	58	58
Central Bay Street	57	57	57	57	57	57
Christie	9	9	9	9	9	9
Church and Wellesley	68	68	68	68	68	68
Commerce Court, Victoria Hotel	100	100	100	100	100	100
First Canadian Place, Underground city	100	100	100	100	100	100
Garden District, Ryerson	100	100	100	100	100	100
Harbourfront East, Union Station, Toronto Islands	5	5	5	5	5	5
Kensington Market, Chinatown, Grange Park	51	51	51	51	51	51
Regent Park, Harbourfront	22	22	22	22	22	22
Richmond, Adelaide, King	100	100	100	100	100	100
Rosedale	4	4	4	4	4	4
St. James Town	87	87	87	87	87	87
St. James Town, Cabbagetown	31	31	31	31	31	31
Toronto Dominion Centre, Design Exchange	100	100	100	100	100	100
University of Toronto, Harbord	33	33	33	33	33	33

# Explore:

	- 1	- 1			American Restaurant	Art	Arts & Crafts Store	Asian Restaurant	BBQ Joint	Baby Store	Bagel Shop	Bakery	Bank	Bar	Basketball Stadium	ı		Belgian Restaurant	Bistro	В
(	0	)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	1 0	)	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0
2	2 0	)	0	0	0	0	0	0	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	0	0	0	0	0	0	0
4	<b>1</b> 0	)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

	Neighborhood	Yoga Studio	Adult Boutique	Afghan Restaurant	American Restaurant	Art Gallery	Arts & Crafts Store	Asian Restaurant	BBQ Joint	Baby Store	Bagel Shop	Bakery	Bank	Bar	Bí St
0	Berczy Park	0.000000	0.000000	0.000000	0.000000	0.026667	0.000000	0.000000	0.000000	0.000000	0.013333	0.040000	0.026667	0.000000	0.0
1	CN Tower, King and Spadina, Railway Lands, Har	0.017241	0.000000	0.000000	0.000000	0.000000	0.000000	0.017241	0.000000	0.000000	0.000000	0.034483	0.034483	0.034483	0.0
2	Central Bay Street	0.000000	0.000000	0.000000	0.000000	0.000000	0.017544	0.000000	0.000000	0.000000	0.000000	0.017544	0.017544	0.000000	0.1
3	Christie	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.111111	0.000000	0.000000	0.000000	0.000000	0.0
4	Church and Wellesley	0.014706	0.014706	0.014706	0.014706	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.1
5	Commerce Court, Victoria Hotel	0.000000	0.000000	0.000000	0.020000	0.010000	0.000000	0.040000	0.000000	0.000000	0.010000	0.010000	0.040000	0.010000	0.0
6	First Canadian Place, Underground city	0.000000	0.000000	0.000000	0.020000	0.010000	0.000000	0.040000	0.000000	0.000000	0.010000	0.010000	0.040000	0.010000	0.0
7	Garden District, Ryerson	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.010000	0.030000	0.010000	0.0
8	Harbourfront East, Union Station, Toronto Islands	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.0
9	Kensington Market, Chinatown, Grange Park	0.000000	0.000000	0.000000	0.000000	0.039216	0.039216	0.000000	0.000000	0.000000	0.000000	0.039216	0.000000	0.019608	0.0
10	Regent Park, Harbourfront	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.045455	0.000000	0.000000	0.0

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----Berczy Park----
          venue freq
0 Sandwich Place 0.07
  Coffee Shop 0.05
       Hotel 0.05
   Cocktail Bar 0.05
3
       Beer Bar 0.04
4
----CN Tower, King and Spadina, Railway Lands, Harbourfront West, Bathurst Quay, South Niagara, Island airport----
  venue freq
Coffee Shop 0.09
Italian Restaurant 0.07
0
     Wings Joint 0.03
3 Bakery 0.03
4 French Restaurant 0.03
----Central Bay Street----
         Coffee Shop 0.21
1
      Sandwich Place 0.07
2 Japanese Restaurant 0.05
    Sushi Restaurant 0.05
         Pizza Place 0.05
----Christie----
venue freq
0 Grocery Store 0.33
  Café 0.33
Park 0.11
    Baby Store 0.11
  Coffee Shop 0.11
----Church and Wellesley----
      venue freq
0 Japanese Restaurant 0.07
   Sushi Restaurant 0.07
2
     Restaurant 0.04
3
            Gay Bar 0.04
      Dance Studio 0.03
4
----Commerce Court, Victoria Hotel----
          venue freq
     Coffee Shop 0.12
0
1
       Café 0.08
2 Sandwich Place 0.07
3 Hotel 0.06
   Restaurant 0.04
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	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	Sandwich Place	Hotel	Coffee Shop	Cocktail Bar	Japanese Restaurant	Beer Bar	Café	Bakery	Italian Restaurant	Bank
1	CN Tower, King and Spadina, Railway Lands, Har	Coffee Shop	Italian Restaurant	Wings Joint	Park	Restaurant	Sandwich Place	Speakeasy	Gym / Fitness Center	Pub	French Restaurant
2	Central Bay Street	Coffee Shop	Sandwich Place	Japanese Restaurant	Pizza Place	Sushi Restaurant	Restaurant	Italian Restaurant	Café	Middle Eastern Restaurant	Discount Store
3	Christie	Grocery Store	Café	Park	Coffee Shop	Baby Store	Dessert Shop	Electronics Store	Donut Shop	Doner Restaurant	Distribution Center
4	Church and Wellesley	Sushi Restaurant	Japanese Restaurant	Gay Bar	Restaurant	Burrito Place	Fast Food Restaurant	Indian Restaurant	Mediterranean Restaurant	Dance Studio	Coffee Shop

	PostalCode	Borough	Neig	hborhoo	d Latitude	Longitude	Cluster Labels	1st Mo Comm Venue		Most nmon ue	3rd M Com Venu	mon	4th Mo Comm Venue		non	6th Mos Commo Venue		
0	M5A	Downtown Toronto	_	ent Park, ourfront	43.6555	-79.3626	1	Coffee Shop	Rest	aurant	Beer	Store	Wine Shop	Italian Resta		Event Space	Electror Store	Distribution Center
1	M5B	Downtown Toronto	Gard Distri Ryer	ict,	43.6572	-79.3783	4	Coffee Shop	Sand	dwich e	Cloth	٠ ١	Café	Hotel		Cosmet Shop	ics Pizza Place	Middle Eastern Restaura
2	M5C	Downtown Toronto	St. Ja	ames 1	43.6513	-79.3756	4	Coffee Shop	Italia Rest	in aurant	Café		Cockta Bar	il Resta	urant	Clothing Store	Diner	Bakery
3	M5E	Downtown Toronto	Berc	zy Park	43.6456	-79.3754	4	Sandwi Place	ich	el	Coffe		Cockta Bar	il Japar Resta		Beer Ba	r Café	Bakery
4	M5G	Downtown Toronto	Cent	ral Bay et	43.6564	-79.3860	1	Coffee Shop	Sand	dwich e	Japa Resta		Pizza Place	Sushi Resta		Restaur	ant Restaur	Café
	Borough	Neighborh	ood	Cluster Labels	1st Most Common Venue	2nd Most Common Venue	3rd Mos Commo Venue	- 1	Most mmon	5th M Comi	mon	6th M Comi	mon	7th Most Commor Venue	٠   ١	Bth Most Common Venue	1	10th Most Common Venue
13	Downtown Toronto	Rosedale		0	Grocery Store	Candy Store	Park	Play	yground	Donu Shop		Done Resta		Distribution Center	- 1	Discount Store	Diner	Dessert Shop
	Borough	Neighborho	nod	Cluster Labels	Common	2nd Most Common Venue	3rd Mos Common Venue	n Coi	mmon	5th Mo Commo Venue	- 1	6th Mo Comm Venue	on C	th Most common enue		Most mmon nue	9th Most Common Venue	10th Most Common Venue
0	Downtown Toronto	Regent Park Harbourfror		1 1	Coffee Shop	Restaurant	Beer Sto	re Wir		Italian Restaur	rant	Event Space		lectronics tore		tribution nter	Dance Studio	Pub
4	Downtown Toronto	Central Bay Street		1 1		Sandwich Place	Japanese Restaura			Sushi Restaur	rant	Restau	rant I	alian testaurant	Cat	fé	Middle Eastern Restaurant	Discount Store
10	Downtown Toronto	University o Toronto, Harbord	- 1	1 1	Coffee Shop	Café	Bar	Puk	h 1	Sandwi Place		Japane Restau		akery	Itali Res	ian staurant	Beer Store	Beer Bar
14	Downtown Toronto	St. James Town, Cabbagetov		1 1	Coffee Shop	Restaurant	Pizza Pla	ce Caf	fé	Bakery		Italian Restau	rant	ub	Din	er	Sandwich Place	Plaza
	Borough	Neighborho	od	Cluster Labels	1st Most Common Venue	2nd Most Common Venue		on Co	th Most ommon enue	5th M Comr Venue	mon	6th M Comi	mon	7th Most Common Venue	·  •	8th Most Common Venue	9th Most Common Venue	10th Most Common Venue
7	Downtown Toronto	Harbourfron East, Union Station, Torc Islands		2	Park	Harbor / Marina	Café		usic enue	Donut Shop	t	Done Resta		Distribution Center		Discount Store	Diner	Dessert Shop
	Borough	Neighborho	od	Cluster	Common	2nd Most Common Venue	3rd Most Commor Venue	- 1	nmon	5th Mos Commo Venue	on (	6th Mo Commo Venue	on Co	h Most ommon nue	1	nmon	Oth Most Common Venue	10th Most Common Venue
5	Downtown Toronto	Christie	3		Grocery Store	Café	Park	Coff Shop		Baby Store		Dessert Shop	- 1	ectronics ore	Don Sho		Doner Restaurant	Distribution Center

	Borough	Neighborhood	Cluster Labels	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
1	Downtown Toronto	Garden District, Ryerson	4	Coffee Shop	Sandwich Place	Clothing Store	Café	Hotel	Cosmetics Shop	Pizza Place	Middle Eastern Restaurant	Bank	Japanese Restaurant
2	Downtown Toronto	St. James Town	4	Coffee Shop	Italian Restaurant	Café	Cocktail Bar	Restaurant	Clothing Store	Diner	Bakery	Gastropub	Seafood Restaurant
3	Downtown Toronto	Berczy Park	4	Sandwich Place	Hotel	Coffee Shop	Cocktail Bar	Japanese Restaurant	Beer Bar	Café	Bakery	Italian Restaurant	Bank
6	Downtown Toronto	Richmond, Adelaide, King	4	Coffee Shop	Café	Sandwich Place	Hotel	Restaurant	Gym	Asian Restaurant	Sushi Restaurant	Bank	Deli / Bodega
8	Downtown Toronto	Toronto Dominion Centre, Design Exchange	4	Coffee Shop	Café	Hotel	Sandwich Place	Asian Restaurant	Gym	Pharmacy	Restaurant	Salad Place	Japanese Restaurant
9	Downtown Toronto	Commerce Court, Victoria Hotel	4	Coffee Shop	Café	Sandwich Place	Hotel	Bank	Restaurant	Japanese Restaurant	Asian Restaurant	Gym	Sushi Restaurant
11	Downtown Toronto	Kensington Market, Chinatown, Grange Park	4	Café	Vegetarian / Vegan Restaurant	Burger Joint	Mexican Restaurant	Gaming Cafe	Coffee Shop	Bakery	Art Gallery	Arts & Crafts Store	Park
12	Downtown Toronto	CN Tower, King and Spadina, Railway Lands, Har	4	Coffee Shop	Italian Restaurant	Wings Joint	Park	Restaurant	Sandwich Place	Speakeasy	Gym / Fitness Center	Pub	French Restaurant
15	Downtown Toronto	First Canadian Place, Underground city	4	Coffee Shop	Café	Sandwich Place	Hotel	Bank	Restaurant	Japanese Restaurant	Asian Restaurant	Gym	Sushi Restaurant
16	Downtown Toronto	Church and Wellesley	4	Sushi Restaurant	Japanese Restaurant	Gay Bar	Restaurant	Burrito Place	Fast Food Restaurant	Indian Restaurant	Mediterranean Restaurant	Dance Studio	Coffee Shop