

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

## Introduction & Problem Statement

The city of Toronto supports one of the large urban settings in the world. With the likes of Financial District - Toronto Stock Exchange (3<sup>rd</sup> largest in North America), Canadian Film & TV Industry, The Digital Corridor and more, the need for coffee is boundless around the city. We will look to explore which neighborhoods in Toronto are closest to coffee shops to residents. This can influence the decision to stay/rent/buy housing in those neighborhoods for coffee lovers.

1. Find neighborhoods cluster(s) with the most coffee shops near them
2. Identify a few desirable neighborhoods to stay that have access to most coffee shops
3. Find the neighborhoods cluster with the lowest coffee shops near them
4. This presents a business opportunity for entrepreneurs to invest in or open new coffee shops near those neighborhoods.

## Data Section

1. We will source Toronto neighborhood data 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)
2. Get geolocation data from cocl.us (used in previous labs)  
[http://cocl.us/Geospatial\\_data](http://cocl.us/Geospatial_data)
3. Using FourSquare API, get the venues data for the neighborhood latitude/longitudes  
[https://api.foursquare.com/v2/venues/explore?&client\\_id={}&client\\_secret={}&v={}&ll={},{}&radius={}&limit={}'](https://api.foursquare.com/v2/venues/explore?&client_id={}&client_secret={}&v={}&ll={},{}&radius={}&limit={}')  
Format -> CLIENT\_ID, CLIENT\_SECRET, VERSION, lat, lng, radius, LIMIT

## Methodology Section

1. Source Toronto neighborhood data from Wikipedia

	Postal Code	Borough	Neighborhood
0	M1A	NaN	NaN
1	M2A	NaN	NaN
2	M3A	North York	Parkwoods
3	M4A	North York	Victoria Village
4	M5A	Downtown Toronto	Regent Park, Harbourfront

2. Cleanup empty and NaN cells

	Postal Code	Borough	Neighborhood
0	M1B	Scarborough	Malvern, Rouge
1	M1C	Scarborough	Rouge Hill, Port Union, Highland Creek
2	M1E	Scarborough	Guildwood, Morningside, West Hill
3	M1G	Scarborough	Woburn
4	M1H	Scarborough	Cedarbrae
5	M1J	Scarborough	Scarborough Village
6	M1K	Scarborough	Kennedy Park, Ionview, East Birchmount Park
7	M1L	Scarborough	Golden Mile, Clairlea, Oakridge
8	M1M	Scarborough	Cliffside, Cliffcrest, Scarborough Village West
9	M1N	Scarborough	Birch Cliff, Cliffside West

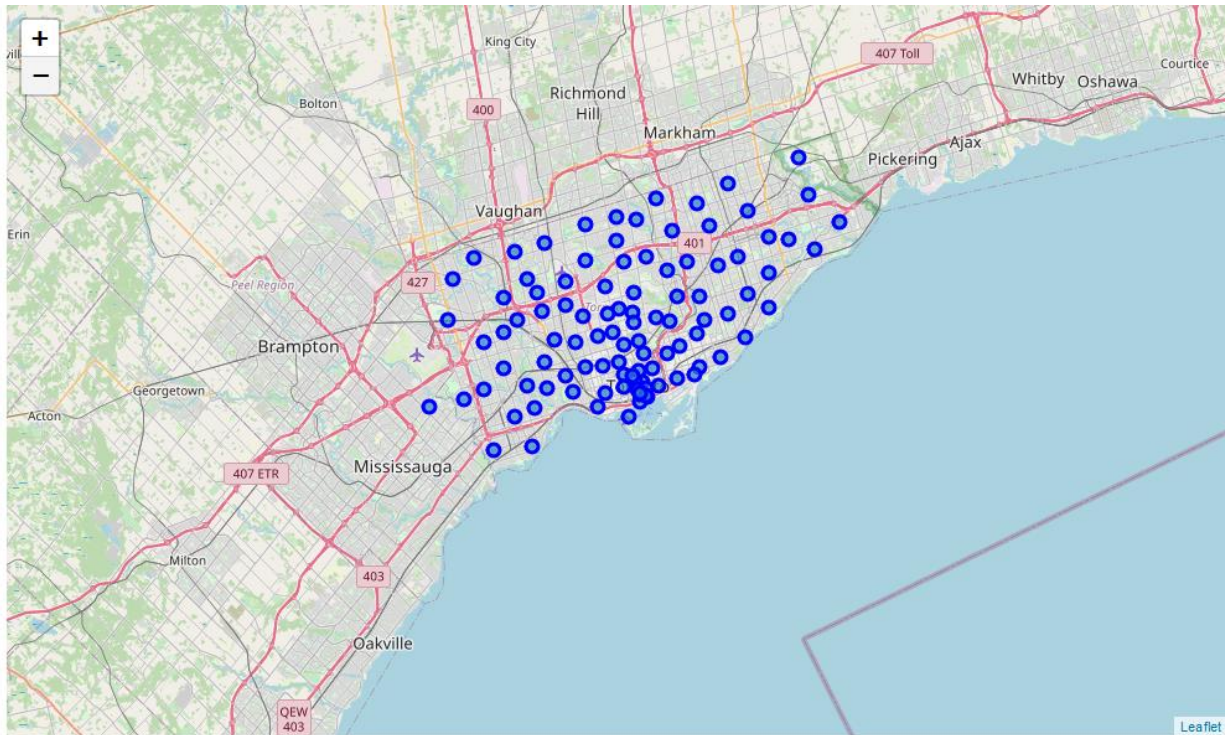
3. Get geolocation data from cocl.us (used in previous labs)

	Postal Code	Latitude	Longitude
0	M1B	43.806686	-79.194353
1	M1C	43.784535	-79.160497
2	M1E	43.763573	-79.188711
3	M1G	43.770992	-79.216917
4	M1H	43.773136	-79.239476

4. Merge the two data to obtain latitude and longitude for the neighborhoods

	Postal Code	Borough	Neighborhood	Latitude	Longitude
0	M1B	Scarborough	Malvern, Rouge	43.806686	-79.194353
1	M1C	Scarborough	Rouge Hill, Port Union, Highland Creek	43.784535	-79.160497
2	M1E	Scarborough	Guildwood, Morningside, West Hill	43.763573	-79.188711
3	M1G	Scarborough	Woburn	43.770992	-79.216917
4	M1H	Scarborough	Cedarbrae	43.773136	-79.239476

5. Plot the data on a map



6. Using FourSquare API, get the venues data for the neighborhood latitude/longitudes

	Neighborhood	Neighborhood Latitude	Neighborhood Longitude	Venue	Venue Latitude	Venue Longitude	Venue Category
0	Malvern, Rouge	43.806686	-79.194353	Wendy's	43.807448	-79.199056	Fast Food Restaurant
1	Malvern, Rouge	43.806686	-79.194353	Interprovincial Group	43.805630	-79.200378	Print Shop
2	Rouge Hill, Port Union, Highland Creek	43.784535	-79.160497	Royal Canadian Legion	43.782533	-79.163085	Bar
3	Guildwood, Morningside, West Hill	43.763573	-79.188711	RBC Royal Bank	43.766790	-79.191151	Bank
4	Guildwood, Morningside, West Hill	43.763573	-79.188711	G & G Electronics	43.765309	-79.191537	Electronics Store

7. Filter venues to use data for Coffee Shops

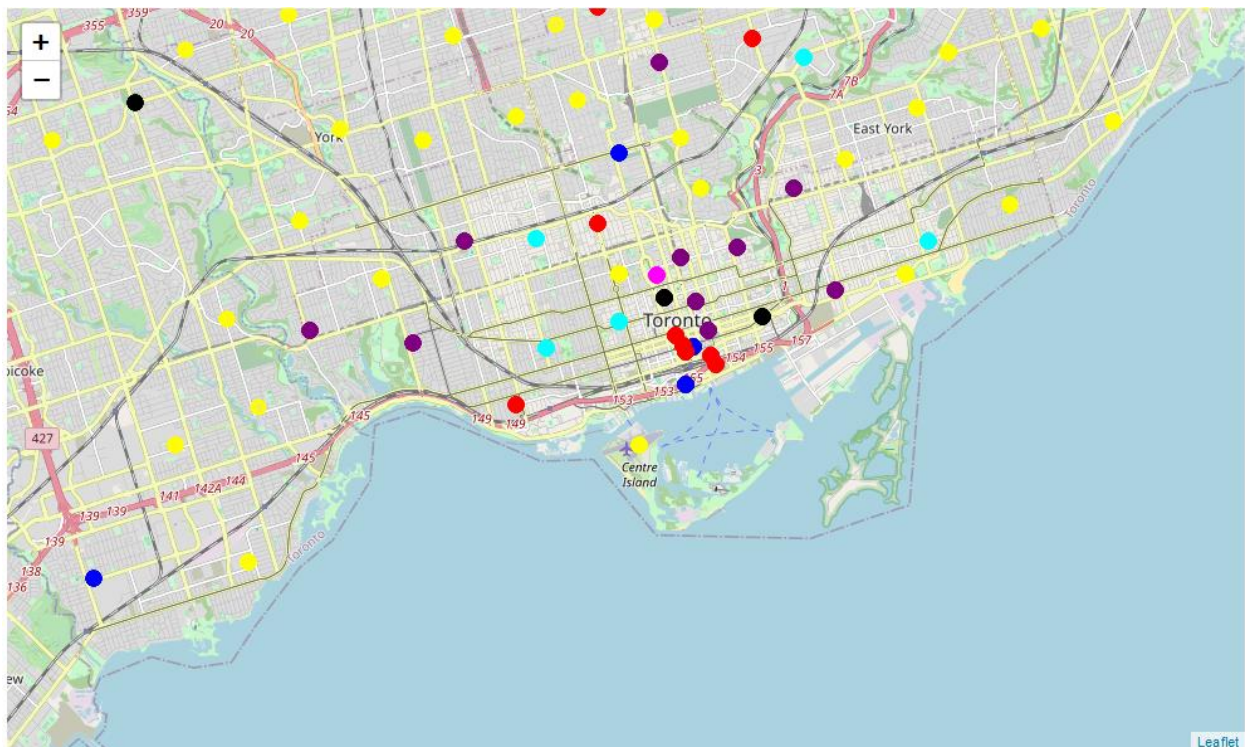
	Neighborhood	Coffee Shop
0	Agincourt	0.000000
1	Alderwood, Long Branch	0.142857
2	Bathurst Manor, Wilson Heights, Downsview North	0.200000
3	Bayview Village	0.000000
4	Bedford Park, Lawrence Manor East	0.100000

8. Run KMeans clustering

	Neighborhood	Coffee Shop	Cluster Labels
0	Agincourt	0.000000	1
1	Alderwood, Long Branch	0.142857	5
2	Bathurst Manor, Wilson Heights, Downsview North	0.200000	4
3	Bayview Village	0.000000	1
4	Bedford Park, Lawrence Manor East	0.100000	0

## Results Section

9. Plot the cluster data on a map



10. Analyze and deduce best clusters/neighborhoods for coffee lovers

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Cluster 0 shape : (0, 9)
Cluster 1 shape : (29, 9)
Cluster 2 shape : (2, 9)
Cluster 3 shape : (3, 9)
Cluster 4 shape : (43, 9)
Cluster 5 shape : (22, 9)
Cluster 6 shape : (10, 9)
Cluster 7 shape : (57, 9)
Cluster 8 shape : (8, 9)

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## Discussion Section

11. Analyze and deduce neighborhoods where there are low or now coffee shops

Lets view cluster 7 as it has the most coffee shops

Out[34]:

	Neighborhood	Coffee Shop	Cluster Labels	Neighborhood Latitude	Neighborhood Longitude	Venue	Venue Latitude	Venue Longitude	Venue Category
17	Bathurst Manor, Wilson Heights, Downsview North	0.100000	7	43.754328	-79.442259	Tim Hortons	43.754767	-79.443250	Coffee Shop
19	Bathurst Manor, Wilson Heights, Downsview North	0.100000	7	43.754328	-79.442259	Starbucks	43.755797	-79.440471	Coffee Shop
43	Bedford Park, Lawrence Manor East	0.086957	7	43.733283	-79.419750	Tim Hortons	43.735356	-79.419605	Coffee Shop
47	Bedford Park, Lawrence Manor East	0.086957	7	43.733283	-79.419750	Starbucks	43.732604	-79.419136	Coffee Shop
72	Berczy Park	0.089286	7	43.644771	-79.373306	Starbucks	43.644489	-79.368639	Coffee Shop
87	Berczy Park	0.089286	7	43.644771	-79.373306	Everyday Gourmet (Teas & Coffees)	43.648757	-79.371645	Coffee Shop
95	Berczy Park	0.089286	7	43.644771	-79.373306	Moe's Mns	43.641640	-79.377552	Coffee

Lets view cluster 4 Neighborhoods as this has the next most coffee shops

	Neighborhood	Coffee Shop	Cluster Labels	Neighborhood Latitude	Neighborhood Longitude	Venue	Venue Latitude	Venue Longitude	Venue Category
298	Church and Wellesley	0.066667	4	43.665860	-79.383160	Starbucks	43.664980	-79.380510	Coffee Shop
319	Church and Wellesley	0.066667	4	43.665860	-79.383160	Piedmont Coffee Bar	43.668286	-79.382520	Coffee Shop
326	Church and Wellesley	0.066667	4	43.665860	-79.383160	Rooster Coffee House	43.669654	-79.379871	Coffee Shop
352	Church and Wellesley	0.066667	4	43.665860	-79.383160	The Drink	43.664167	-79.380149	Coffee Shop
356	Church and Wellesley	0.066667	4	43.665860	-79.383160	Croissant Tree	43.669575	-79.382331	Coffee Shop
482	Davisville	0.060606	4	43.704324	-79.388790	Starbucks	43.705923	-79.389548	Coffee Shop
496	Davisville	0.060606	4	43.704324	-79.388790	Second Cup	43.704344	-79.388659	Coffee Shop
534	Don Mills	0.076923	4	43.725900	-79.340923	Tim Hortons	43.722897	-79.339117	Coffee Shop
546	Don Mills	0.076923	4	43.725900	-79.340923	Delimark Cafe	43.727536	-79.339547	Coffee Shop
586	Dufferin, Dovercourt Village	0.062500	4	43.669005	-79.442259	Coffee Time	43.666837	-79.446197	Coffee Shop
610	Fairview, Henry Farm, Oriole	0.075758	4	43.778517	-79.346556	Aroma Espresso Bar	43.777700	-79.344652	Coffee Shop
614	Fairview, Henry Farm, Oriole	0.075758	4	43.778517	-79.346556	Starbucks	43.777990	-79.344091	Coffee Shop
622	Fairview, Henry Farm, Oriole	0.075758	4	43.778517	-79.346556	Tim Hortons	43.777964	-79.344715	Coffee Shop
623	Fairview, Henry Farm, Oriole	0.075758	4	43.778517	-79.346556	Tim Hortons	43.774993	-79.346303	Coffee Shop

Lets view cluster 0 Neighborhoods as this has no Coffee Shops

Out[38]:

	Neighborhood	Coffee Shop	Cluster Labels	Neighborhood Latitude	Neighborhood Longitude	Venue	Venue Latitude	Venue Longitude	Venue Category
0	Agincourt	0.0	0	43.794200	-79.262029	Panagio's Breakfast & Lunch	43.792370	-79.260203	Breakfast Spot
1	Agincourt	0.0	0	43.794200	-79.262029	Twilight	43.791999	-79.258584	Lounge
2	Agincourt	0.0	0	43.794200	-79.262029	El Pulgarcito	43.792648	-79.259208	Latin American Restaurant
3	Agincourt	0.0	0	43.794200	-79.262029	Mark's	43.791179	-79.259714	Clothing Store
4	Agincourt	0.0	0	43.794200	-79.262029	Commander Arena	43.794867	-79.267989	Skating Rink
33	Bayview Village	0.0	0	43.786947	-79.385975	Sun Star Chinese Cuisine 華星小炒	43.787914	-79.381234	Chinese Restaurant
34	Bayview Village	0.0	0	43.786947	-79.385975	TD Canada Trust	43.788074	-79.380367	Bank
35	Bayview Village	0.0	0	43.786947	-79.385975	Maxim's Cafe and Patisserie	43.787863	-79.380751	Café

## Conclusion Section

### Conclusion

1. Cluster 7 Neighborhoods has the maximum coffee shops to live around, in Neighborhoods like Berczy Park, First Canadian Place, Underground city and Richmond, Adelaide, King.
2. Cluster 4 Neighborhood has the second most coffee shops to live around, in Neighborhoods like Church and Wellesley, Garden District, Ryerson & St. James Town.
3. Cluster 0 can do with some coffee shops, around Neighborhoods like Agincourt & Bayview Village.