

Bank Expansion

Final Capstone Project

OBJECTIVE

- ▶ An integrated business group “Alpha Group” based in Toronto is looking forward to expand its banking business by opening more branches
- ▶ They opened first branch in North York borough in Toronto back in 2017 in the neighborhood of Glencairn
- ▶ Now they are planning to open 03 more bank branches in the same borough North York
- ▶ The objective of this project is to identify 03 neighborhoods based on identical commercial structure

DATA AQUISITION

- ▶ List of all borough and their associated neighborhoods
- ▶ Locations of all neighborhoods in terms of Longitude and Latitude
- ▶ Commercial venues of each neighborhood accessed via Foursquare

METHODOLOGY

Data Collection:

- Lists of borough along with neighborhood and postal codes

	PostalCode	Borough	Neighbourhood
0	M1A	Not assigned	Not assigned
1	M2A	Not assigned	Not assigned
2	M3A	North York	Parkwoods
3	M4A	North York	Victoria Village
4	M5A	Downtown Toronto	Regent Park, Harbourfront
...
175	M5Z	Not assigned	Not assigned
176	M6Z	Not assigned	Not assigned
177	M7Z	Not assigned	Not assigned
178	M8Z	Etobicoke	Mimico NW, The Queensway West, South of Bloor,...
179	M9Z	Not assigned	Not assigned

METHODOLOGY

Data Cleansing:

- All rows with 'not assigned' values were removed

	PostalCode	Borough	Neighbourhood
0	M3A	North York	Parkwoods
1	M4A	North York	Victoria Village
2	M5A	Downtown Toronto	Regent Park, Harbourfront
3	M6A	North York	Lawrence Manor, Lawrence Heights
4	M7A	Downtown Toronto	Queen's Park, Ontario Provincial Government
...
98	M8X	Etobicoke	The Kingsway, Montgomery Road, Old Mill North
99	M4Y	Downtown Toronto	Church and Wellesley
100	M7Y	East Toronto	Business reply mail Processing Centre, South C...
101	M8Y	Etobicoke	Old Mill South, King's Mill Park, Sunnylea, Hu...
102	M8Z	Etobicoke	Mimico NW, The Queensway West, South of Bloor,...

METHODOLOGY

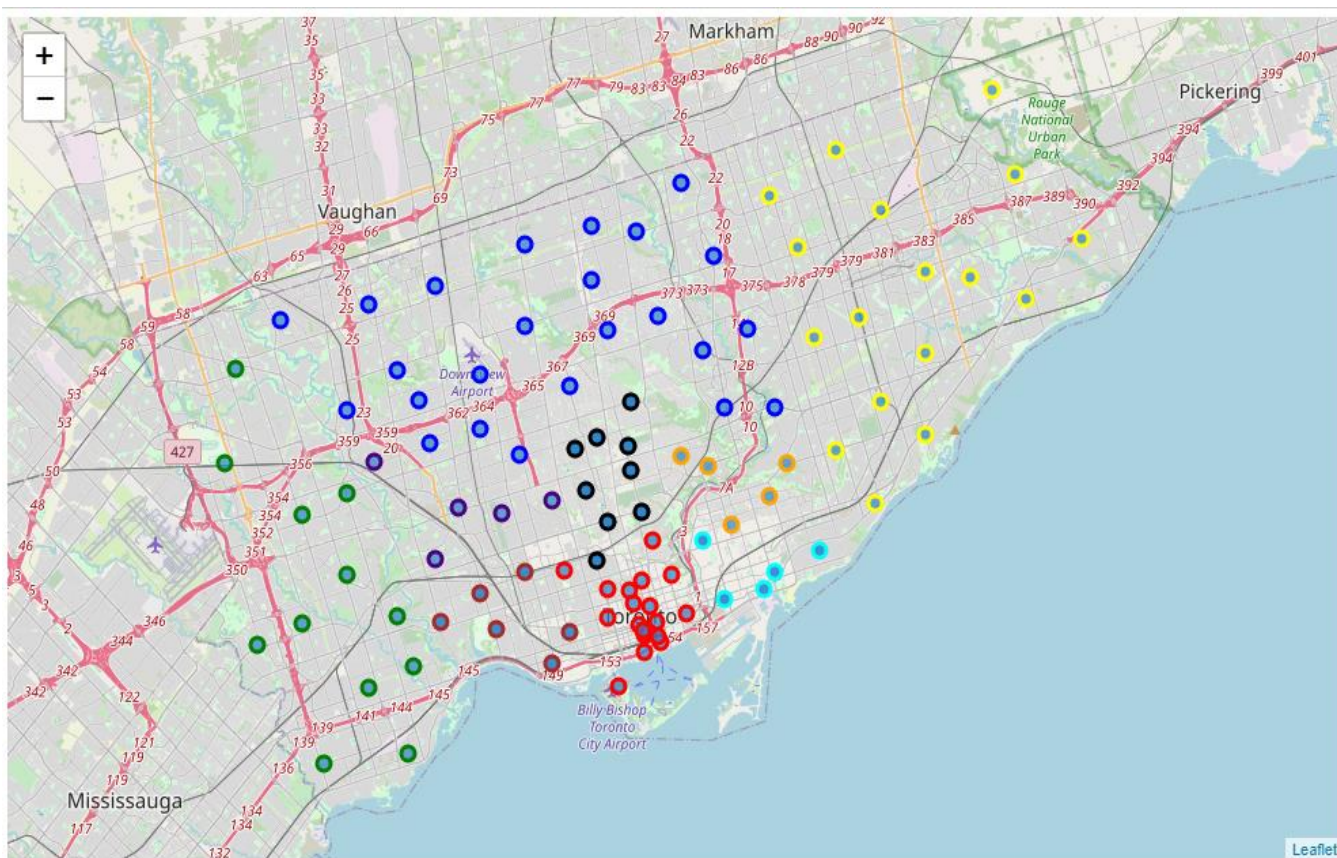
Data Refinement:

- Longitude and latitude data was added to allow locations visualization

	PostalCode	Borough	Neighbourhood	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	Downtown Toronto	Queen's Park, Ontario Provincial Government	43.662301	-79.389494
...
98	M8X	Etobicoke	The Kingsway, Montgomery Road, Old Mill North	43.653654	-79.506944
99	M4Y	Downtown Toronto	Church and Wellesley	43.665860	-79.383160
100	M7Y	East Toronto	Business reply mail Processing Centre, South C...	43.662744	-79.321558
101	M8Y	Etobicoke	Old Mill South, King's Mill Park, Sunnylea, Hu...	43.636258	-79.498509
102	M8Z	Etobicoke	Mimico NW, The Queensway West, South of Bloor,...	43.628841	-79.520999

METHODOLOGY

Visualization:



Borough	Count
North York	24
Downtown Toronto	19
Scarborough	17
Etobicoke	12
Central Toronto	9
West Toronto	6
East York	5
York	5
East Toronto	5
Mississauga	1

METHODOLOGY

Data Extraction:

- Data pertaining to North York borough was extracted for further evaluation

	PostalCode	Borough	Neighbourhood	Latitude	Longitude
0	M3A	North York	Parkwoods	43.753259	-79.329656
1	M4A	North York	Victoria Village	43.725882	-79.315572
2	M6A	North York	Lawrence Manor, Lawrence Heights	43.718518	-79.464763
3	M3B	North York	Don Mills	43.745906	-79.352188
4	M6B	North York	Glencairn	43.709577	-79.445073
5	M3C	North York	Don Mills	43.725900	-79.340923
6	M2H	North York	Hillcrest Village	43.803762	-79.363452
7	M3H	North York	Bathurst Manor, Wilson Heights, Downsview North	43.754328	-79.442259
8	M2J	North York	Fairview, Henry Farm, Oriole	43.778517	-79.346556
9	M3J	North York	Northwood Park, York University	43.767980	-79.487262
10	M2K	North York	Bayview Village	43.786947	-79.385975
11	M3K	North York	Downsview	43.737473	-79.464763
12	M2L	North York	York Mills, Silver Hills	43.757490	-79.374714
13	M3L	North York	Downsview	43.739015	-79.506944
14	M6L	North York	North Park, Maple Leaf Park, Upwood Park	43.713756	-79.490074
15	M9L	North York	Humber Summit	43.756303	-79.565963
16	M2M	North York	Willowdale, Newtonbrook	43.789053	-79.408493
17	M3M	North York	Downsview	43.728496	-79.495697
18	M5M	North York	Bedford Park, Lawrence Manor East	43.733283	-79.419750
19	M9M	North York	Humberlea, Emery	43.724766	-79.532242
20	M2N	North York	Willowdale, Willowdale East	43.770120	-79.408493
21	M3N	North York	Downsview	43.761631	-79.520999
22	M2P	North York	York Mills West	43.752758	-79.400049
23	M2R	North York	Willowdale, Willowdale West	43.782736	-79.442259

METHODOLOGY

Data Extraction:

- All commercial venues within radius of 1500m of each neighborhood was accessed via Foursquare

Neighbourhood	Neighbourhood Latitude	Neighbourhood Longitude	Venue	Venue Latitude	Venue Longitude	Venue Category
Bathurst Manor, Wilson Heights, Downsview North	40	40	40	40	40	40
Bayview Village	16	16	16	16	16	16
Bedford Park, Lawrence Manor East	75	75	75	75	75	75
Don Mills	175	175	175	175	175	175
Downsview	105	105	105	105	105	105
Fairview, Henry Farm, Oriole	63	63	63	63	63	63
Glencairn	56	56	56	56	56	56
Hillcrest Village	46	46	46	46	46	46
Humber Summit	20	20	20	20	20	20
Humberlea, Emery	19	19	19	19	19	19
Lawrence Manor, Lawrence Heights	100	100	100	100	100	100
North Park, Maple Leaf Park, Upwood Park	33	33	33	33	33	33
Northwood Park, York University	45	45	45	45	45	45
Parkwoods	35	35	35	35	35	35
Victoria Village	53	53	53	53	53	53
Willowdale, Newtonbrook	75	75	75	75	75	75
Willowdale, Willowdale East	100	100	100	100	100	100
Willowdale, Willowdale West	37	37	37	37	37	37
York Mills West	88	88	88	88	88	88
York Mills, Silver Hills	66	66	66	66	66	66

METHODOLOGY

- The venues were then segregated against each neighborhood and transformed in terms of their mean values of occurrence

	Neighbourhood	Accessories Store	Airport	American Restaurant	Argentinian Restaurant	Art Gallery	Arts & Crafts Store	Asian Restaurant	Athletics & Sports	BBQ Joint	...	Turkish Restaurant	Udon Restaurant	Video Game Store
0	Bathurst Manor, Wilson Heights, Downsview North	0.00	0.000000	0.025000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	...	0.000000	0.00	0.000000
1	Bayview Village	0.00	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.062500	0.000000	...	0.000000	0.00	0.000000
2	Bedford Park, Lawrence Manor East	0.00	0.000000	0.013333	0.000000	0.000000	0.000000	0.026667	0.000000	0.013333	...	0.000000	0.00	0.000000
3	Don Mills	0.00	0.000000	0.011429	0.000000	0.005714	0.000000	0.017143	0.000000	0.000000	...	0.000000	0.00	0.000000
4	Downsview	0.00	0.009524	0.009524	0.000000	0.000000	0.009524	0.000000	0.028571	0.000000	...	0.028571	0.00	0.000000
5	Fairview, Henry Farm, Oriole	0.00	0.000000	0.015873	0.000000	0.000000	0.000000	0.015873	0.000000	0.000000	...	0.000000	0.00	0.015873
6	Glencairn	0.00	0.000000	0.000000	0.017857	0.000000	0.000000	0.000000	0.000000	0.000000	...	0.000000	0.00	0.000000
7	Hillcrest Village	0.00	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	...	0.000000	0.00	0.000000
8	Humber Summit	0.00	0.000000	0.000000	0.000000	0.000000	0.000000	0.100000	0.000000	0.000000	...	0.000000	0.00	0.000000
9	Humberlea, Emery	0.00	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	...	0.000000	0.00	0.000000
10	Lawrence Manor, Lawrence Heights	0.01	0.000000	0.020000	0.000000	0.000000	0.000000	0.000000	0.010000	0.000000	...	0.020000	0.00	0.000000
11	North Park, Maple Leaf Park, Upwood Park	0.00	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.030303	0.000000	...	0.000000	0.00	0.000000
12	Northwood Park, York University	0.00	0.000000	0.044444	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	...	0.000000	0.00	0.000000
13	Parkwoods	0.00	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.028571	...	0.000000	0.00	0.000000
14	Victoria Village	0.00	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.018888	...	0.000000	0.00	0.000000
15	Willowdale, Newtonbrook	0.00	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	...	0.000000	0.00	0.000000
16	Willowdale, Willowdale East	0.00	0.000000	0.010000	0.000000	0.000000	0.010000	0.000000	0.000000	0.000000	...	0.000000	0.01	0.000000
17	Willowdale, Willowdale West	0.00	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	...	0.000000	0.00	0.000000
18	York Mills West	0.00	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	...	0.000000	0.00	0.000000
19	York Mills, Silver Hills	0.00	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	...	0.000000	0.00	0.000000

METHODOLOGY

- ▶ The next step includes cluster analysis in order to identify neighborhoods of same commercial nature as of Glencairn based on the type of venues located in each neighborhood. This was achieved through unsupervised learning approach using k-means algorithm. The neighborhoods are characterized in 5 clusters.

RESULTS

- The neighborhoods were divided into 05 clusters (0, 1, 2, 3, 4) based on the similarity of the nature of venues
- Glencairn is related to cluster 0. Overall number of neighborhoods belonging to the same cluster are 06 including Glencairn

		Neighbourhood	Cluster Labels
Ind			
0	Bathurst Manor, Wilson Heights, Downsview North		2
1	Bayview Village		3
2	Bedford Park, Lawrence Manor East		2
3	Don Mills		2
4	Downsview		2
5	Fairview, Henry Farm, Oriole		2
6	Glencairn		0
7	Hillcrest Village		0
8	Humber Summit		1
9	Humberlea, Emery		2
10	Lawrence Manor, Lawrence Heights		2
11	North Park, Maple Leaf Park, Upwood Park		2
12	Northwood Park, York University		0
13	Parkwoods		2
14	Victoria Village		2
15	Willowdale, Newtonbrook		4
16	Willowdale, Willowdale East		4
17	Willowdale, Willowdale West		0
18	York Mills West		0
19	York Mills, Silver Hills		0

	Neighbourhood	Cluster Labels	Neighbourhood Latitude	Neighbourhood Longitude
0	Glencairn	0	43.709577	-79.445073
1	Hillcrest Village	0	43.803762	-79.363452
2	Northwood Park, York University	0	43.767980	-79.487262
3	Willowdale, Willowdale West	0	43.782736	-79.442259
4	York Mills West	0	43.752758	-79.400049
5	York Mills, Silver Hills	0	43.757490	-79.374714

CONCLUSION

- ▶ 05 potential neighborhoods were identified
- ▶ 03 were selected such that they cover maximum territory of North York
- ▶ **Selected neighborhoods are Northwood Park/York University, Hillcrest Village and York Mills/Silver Hills**

