IDENTIFY RESIDENTIAL NEIGHBORHOODS IN TORONTO, CANADA

Capstone Project: The Battle of Neighborhoods

Maja Ferle

maja.ferle@coursera.com

Photo by MURUCUTU on Unsplash

February 2019

Table of contents

Introduction/Business problem

As part of Coursera IBM Data Science Professional Certificate Capstone project, we were asked to segment neighborhoods in Toronto. The main purpose of the exercise was to retrieve a list of neighborhoods in Toronto, find their geographical coordinates and use the coordinates as input to the Foursquare API, from where we can find the top venues in each neighborhood. Based on venue categories, we used the k-means clustering algorithm to cluster neighborhoods into segments with similar venues.

After completing the assignment and examining the resulting segments, I noticed that one of my segments probably represents residential areas, and another segment represents a business/downtown area. I want to explore the segmentation further to validate this observation. As a practical outcome of this exploration I want to identify neighborhood segments that are residential in nature and where I would look for a place to live if I were to move to Toronto.

In this exercise I want to introduce additional datasets about public schools and population counts to help me identify residential neighborhoods that are suitable for a family with school age children.

Finally, I want to compare my results with a few blogs that I found online listing the best neighborhoods to live in Toronto to see how my analysis compares with the claims in these blogs.

Data

This section introduces the datasets that will be used and their sources.

Postal codes in Toronto

My initial dataset is the [List of postal codes of Canada: M](#), representing postal codes in Toronto.

Postcode ⬍	Borough ⬍	Neighbourhood ⬍
M1A	Not assigned	Not assigned
M2A	Not assigned	Not assigned
M3A	North York	Parkwoods
M4A	North York	Victoria Village
M5A	Downtown Toronto	Harbourfront
M5A	Downtown Toronto	Regent Park
M6A	North York	Lawrence Heights
M6A	North York	Lawrence Manor
M7A	Queen's Park	Not assigned
M8A	Not assigned	Not assigned
M9A	Etobicoke	Islington Avenue

Figure 1: Postal codes and neighborhoods in Toronto (sample)

Geographical coordinates

The previous dataset will be enriched with geographical coordinates using the [GeoPy](#) library from which I will add latitude and longitude for each postal code.

	Postcode	Borough	Neighbourhood	Latitude	Longitude
0	M1B	Scarborough	Rouge, Malvern	43.806686	-79.194353
1	M1C	Scarborough	Highland Creek, Rouge Hill, Port Union	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	M1J	Scarborough	Scarborough Village	43.744734	-79.239476
6	M1K	Scarborough	East Birchmount Park, Ionview, Kennedy Park	43.727929	-79.262029
7	M1L	Scarborough	Clairlea, Golden Mile, Oakridge	43.711112	-79.284577
8	M1M	Scarborough	Cliffcrest, Cliffside, Scarborough Village West	43.716316	-79.239476
9	M1N	Scarborough	Birch Cliff, Cliffside West	43.692657	-79.264848

Figure 2: Postal codes and neighborhoods in Toronto enriched with latitude and longitude information (sample)

Venue categories

Next, I will use the Foursquare API, using the latitude and longitude of each postal code to retrieve venues in a given radius around each location.

	Neighborhood	Neighborhood Latitude	Neighborhood Longitude	Venue	Venue Latitude	Venue Longitude	Venue Category
0	Rouge, Malvern	43.806686	-79.194353	Wendy's	43.807448	-79.199056	Fast Food Restaurant
1	Highland Creek, Rouge Hill, Port Union	43.784535	-79.160497	Royal Canadian Legion	43.782533	-79.163085	Bar
2	Guildwood, Morningside, West Hill	43.763573	-79.188711	Swiss Chalet Rotisserie & Grill	43.767697	-79.189914	Pizza Place
3	Guildwood, Morningside, West Hill	43.763573	-79.188711	G & G Electronics	43.765309	-79.191537	Electronics Store
4	Guildwood, Morningside, West Hill	43.763573	-79.188711	Big Bite Burrito	43.766299	-79.190720	Mexican Restaurant

Figure 3: Sample Venue Categories returned by Foursquare API per neighborhood in Toronto

Public schools

I will enrich the previous dataset with information about how many Elementary and Secondary schools there are in each neighborhood by postal code. A list of public schools can be found on the Ontario public school contact information web site and this list can be transformed into a table with school counts.

	Postal Code	School Level	Number of Schools
0	M1B	Elementary	16
1	M1B	Secondary	1
2	M1C	Elementary	8
3	M1C	Secondary	2
4	M1E	Elementary	13
5	M1E	Secondary	9
6	M1G	Elementary	10
7	M1G	Secondary	2
8	M1H	Elementary	4
9	M1H	Secondary	1
10	M1J	Elementary	5

Figure 4: Number of elementary and secondary schools in Toronto by postal code (sample)

Population

Finally, I will enrich the dataset by adding population counts for each neighborhood by postal code as published on the Statistics Canada Population and Dwelling Count Highlight Tables, 2016 Census page.

	Geographic code	Population, 2016	Total private dwellings, 2016	Private dwellings occupied by usual residents, 2016
895	M1B	66108	20957	20230
896	M1C	35626	11588	11274
897	M1E	46943	17637	17161
898	M1G	29690	10116	9767
899	M1H	24383	9274	8985
900	M1J	36699	12797	12274
901	M1K	48434	18620	17930
902	M1L	35081	12884	12428
903	M1M	22913	8908	8623
904	M1N	22136	9535	9095
905	M1P	45571	17129	16540

Figure 5: Population in Toronto by postal code (sample)

Source: Statistics Canada. 2017. Population and dwelling counts, for Canada and forward sortation areas© as reported by the respondents, 2016 Census. Population and Dwelling Count Highlight Tables. 2016 Census. Statistics Canada Catalogue no. 98-402-X2016001. Ottawa. Released February 8, 2017.

Lists of best neighborhoods to live in

The final part of my analysis will be an informal comparison between my resulting neighborhood segments to see how they match with neighborhoods that have been listed as the best Toronto neighborhoods to live in on a few blogs that I found online.

Because the content of the blogs is unstructured data, I will have to manually match each neighborhood to its corresponding postal code. This will be feasible because the amount of data is relatively small.

Top 16 Toronto Neighbourhoods for Young Professionals	Top Ten Best Toronto Neighbourhoods To Live In 2018	8 Most Popular Toronto Neighbourhoods
Yonge and Eglinton	Yonge and Eglinton	Yonge-Eglinton
Distillery District	Liberty Village	Liberty Village
Liberty Village	Church and Wellesley	The Harbourfront
Church and Wellesley	The Harbourfront	The Annex
The Fashion District	Cabbagetown	Kensington Market
Toronto's Harbourfront	Yorkville	The Beaches
Cabbagetown	The Annex	Casa Loma
Davisville Village	Kensington Market	High Park
Toronto's Entertainment District	Queen St. West	
Leslieville	The Beaches	
The Junction		
Yorkville		
St.Lawrence		
Queen West		
Toronto's Financial District		
Baldwin Village		

Table 1: Lists of best Toronto neighborhoods to live in (retrieved from a few blogs)

Methodology

Results

Discussion

Conclusion

References

1. Coursera Capstone: Segmenting and Clustering Neighborhoods in Toronto, https://github.com/mferle/Coursera_Capstone/blob/master/Coursera_Capstone.ipynb
2. Ontario public school contact information, https://www.ontario.ca/data/ontario-public-school-contact-information
3. Population and Dwelling Count Highlight Tables, 2016 Census, https://www12.statcan.gc.ca/census-recensement/2016/dp-pd/hlt-fst/pd-pl/Table.cfm?Lang=Eng&T=1201&S=22&O=A (accessed February 15, 2019)
4. Top 16 Toronto Neighbourhoods for Young Professionals, https://www.torontorentals.com/blog/toronto-neighbourhoods-for-young-professionals
5. Top Ten Best Toronto Neighbourhoods To Live In 2018, https://www.torontorentals.com/blog/best-toronto-neighbourhoods-to-live-in
6. 8 Most Popular Toronto Neighbourhoods, https://www.zumper.com/blog/2018/01/8-most-popular-toronto-neighbourhoods/
7. Neighborhoods in Toronto, https://www.tripadvisor.com/NeighborhoodList-g155019-Toronto_Ontario.html
8. Foursquare API, https://developer.foursquare.com/docs

Acknowledgment