

Best Location for a new Barbershop in Toronto

Yunkun Yang

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1. Introduction

1.1 Background

Social science research indicates that people's appearance has a significant impact on their success. Halo effect, a psychological concept, says positive impression of a person can positively influence other's opinion and feelings. More and more people realize the advantage one positive improvement on their appearance can bring. Among all the changes you can make, getting a haircut is easiest, especially before some special events, such as a friend's wedding, or an interview. However, it is not always easy to find a barbershop in some neighborhood, and people have to drive very far before they can find any barbershop.

In this report, we will mainly discuss which neighborhood has the fewest barbershop and where is the most necessary place to open a new barbershop in Toronto. The requirement for this location is that we need the neighborhood with fewer than 4 barbershops and the population to be over 5000.

1.2 Interested Audience

The interested audience should be those investors who hope to open a new barbershop and those residents who lives in nearby neighbourhoods.

2. Data Sources

All the neighborhoods data are scraped from Wikipedia pages. First page is the list of postal codes of Canada: M [\[Link\]](#), from where we are able to load all postal codes of all neighbourhood in Toronto. Second page is the demographic of Toronto neighborhoods [\[link\]](#), from where we are able to obtain all neighborhood detailed data in GTA area such as population.

All scraped data will be like following:

	FM	Name	Population
0	EY	Crescent Town	8157.0
1	EY	Governor's Bridge/Bennington Heights	2112.0
2	EY	Leaside	13876.0
3	EY	O'Connor-Parkview	17740.0
4	EY	Old East York	52220.0
...
151	S	Woburn	48507.0
152	OCOT	Wychwood	4182.0
153	NY	York Mills	17564.0
154	NY	York University Heights	26140.0
155	OCOT	Yorkville	6045.0

	Postal Code	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
5	M6A	North York	Lawrence Manor, Lawrence Heights
6	M7A	Downtown Toronto	Queen's Park, Ontario Provincial Government
7	M8A	Not assigned	Not assigned
8	M9A	Etobicoke	Islington Avenue, Humber Valley Village
9	M1B	Scarborough	Malvern, Rouge

Note:

By definition from Wikipedia, we know that the abbrev of each city is noted below.

- Old City of Toronto (OCOT)
- Scarborough (S)
- North York (NY)
- Etobicoke (E)
- York (Y)
- East York (EY)

We are also able to obtain all spatial data with coordinates of neighbourhoods in Toronto from the link [\[here\]](#). With a map, we can easily getting all detailed information about all neighborhoods in Toronto.

To get the venue data(all barbershop locations), we use Foursquare API to get those data. Foursquare API is an developer tool for us to scrape those real-world venues data. More details can be explored and found in the following link. [Foursquare](#)

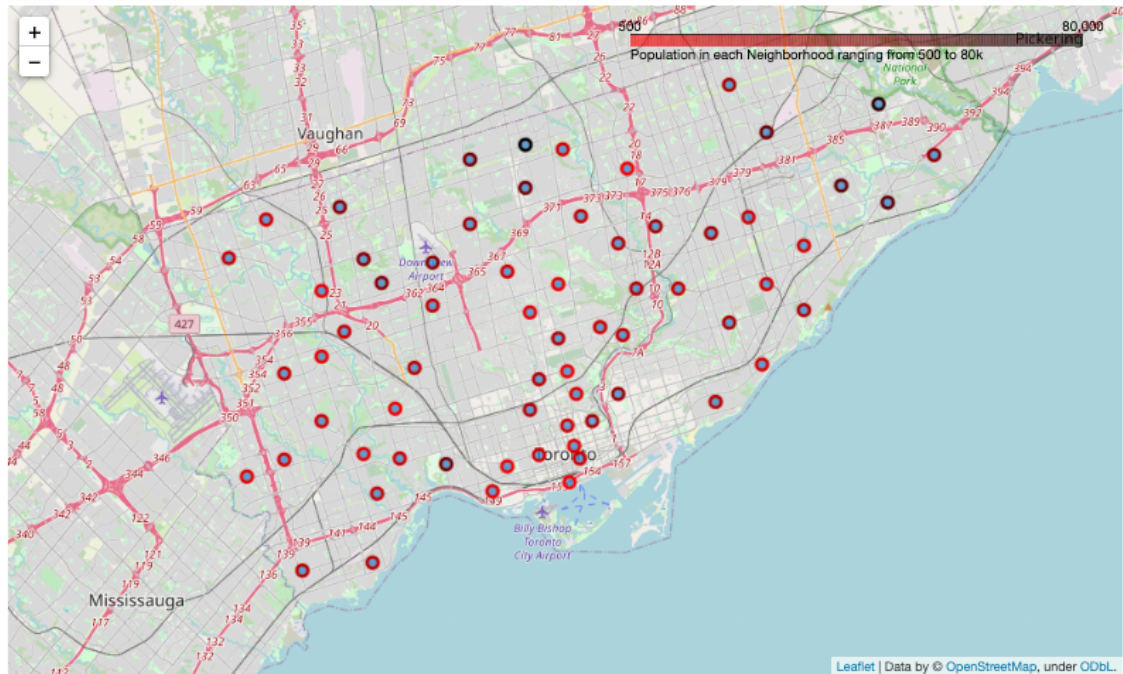
3. Exploratory Analysis

After we merge and cleaned the data, we are able to obtain a table with the locations and populations of each neighborhood.

	Postal Code	Borough	Latitude	Longitude	Neighbourhood	Population
0	M1B	Scarborough	43.806686	-79.194353	Malvern,Rouge	67048.0
1	M1C	Scarborough	43.784535	-79.160497	Rouge Hill,Port Union,Highland Creek	36470.0
2	M1E	Scarborough	43.763573	-79.188711	Guildwood,Morningside,West Hill	49924.0
3	M1G	Scarborough	43.770992	-79.216917	Woburn	48507.0
4	M1J	Scarborough	43.744734	-79.239476	Scarborough Village	12796.0
...
61	M9M	North York	43.724766	-79.532242	Humberlea	4327.0
62	M9N	York	43.706876	-79.518188	Weston	16476.0
63	M9P	Etobicoke	43.696319	-79.532242	Westmount	5857.0
64	M9R	Etobicoke	43.688905	-79.554724	Kingsview Village	16254.0
65	M9V	Etobicoke	43.739416	-79.588437	Thistletown	16790.0

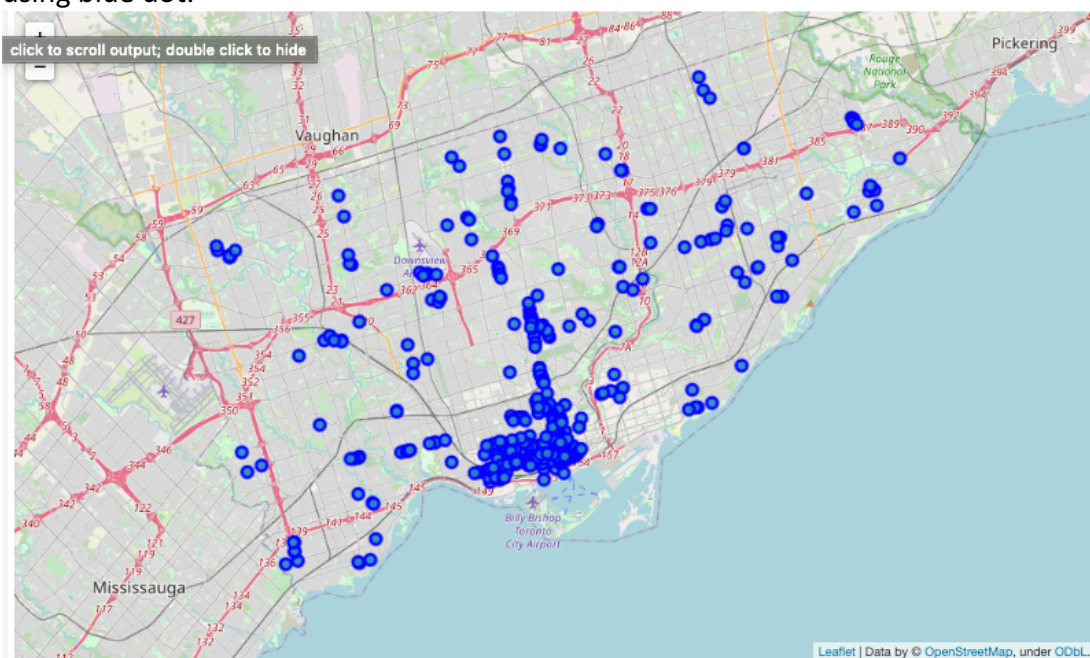
We are able to draw all the neighborhoods in the map to have a general idea about how this data appears.

Out[14]:



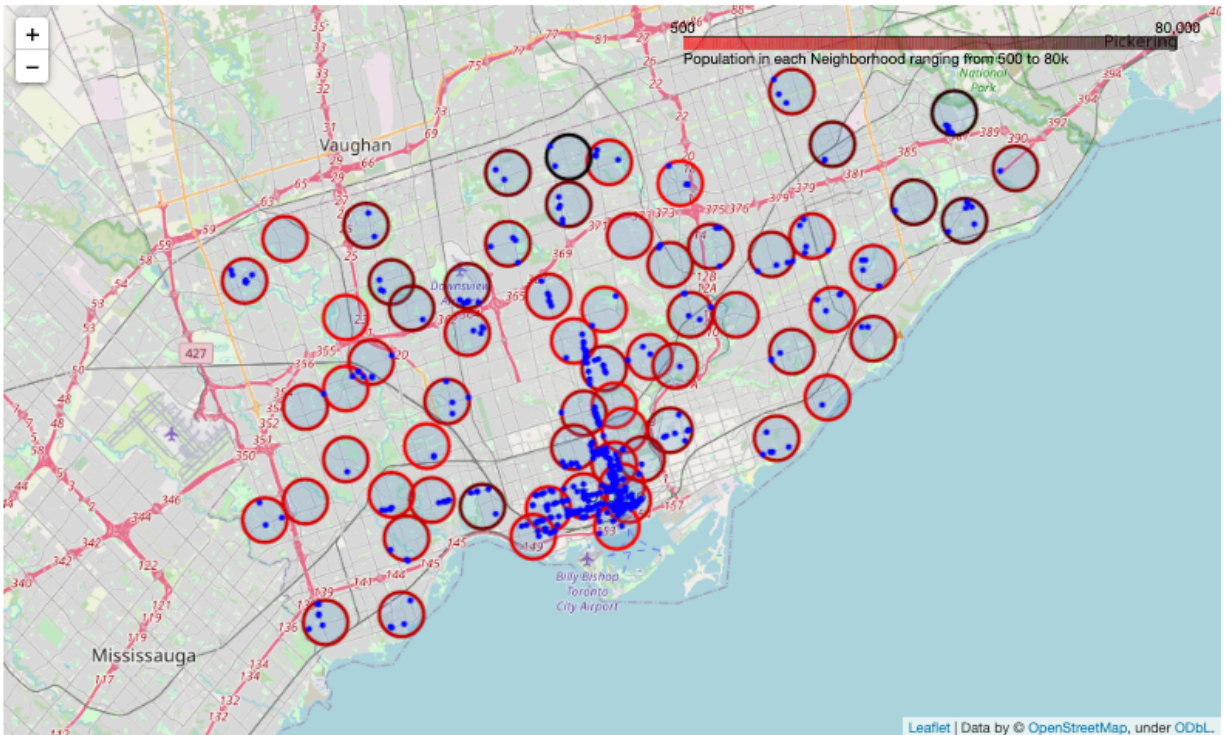
The color of dots indicates the number of population in each neighborhood. It can be seen that most of the population concentrate in Downtown, North York, Scarborough and Etobicoke. Population in Toronto Island, for example, is very small and appears to be a light dot in the map.

Secondly, after we get venue data using Foursquare API, we are also able to plot it in the map using blue dot.



We can see there are a lot of salons open in Downtown area and North York, but in other areas, salons still mainly concentrate in a few plazas.

With the previous two maps overlaid together, we can somehow have a better sense on which neighborhood requires more new barbershop open.



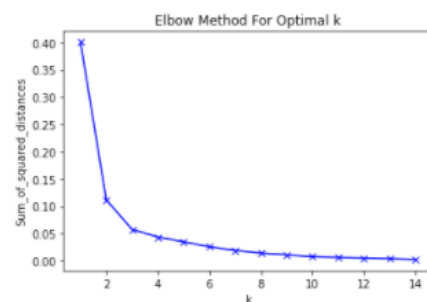
Each red circle in the map is the circle with radius 1km around its center, and we can see there are overwhelming barbershops in Downtown area, greatly more than it should be while some neighborhoods in Etobicoke or Scarborough do not have enough barbershops around.

To tackle this problem, we will use k-means clustering techniques to cluster those neighborhoods with fewer barbershops and find the optimal location.

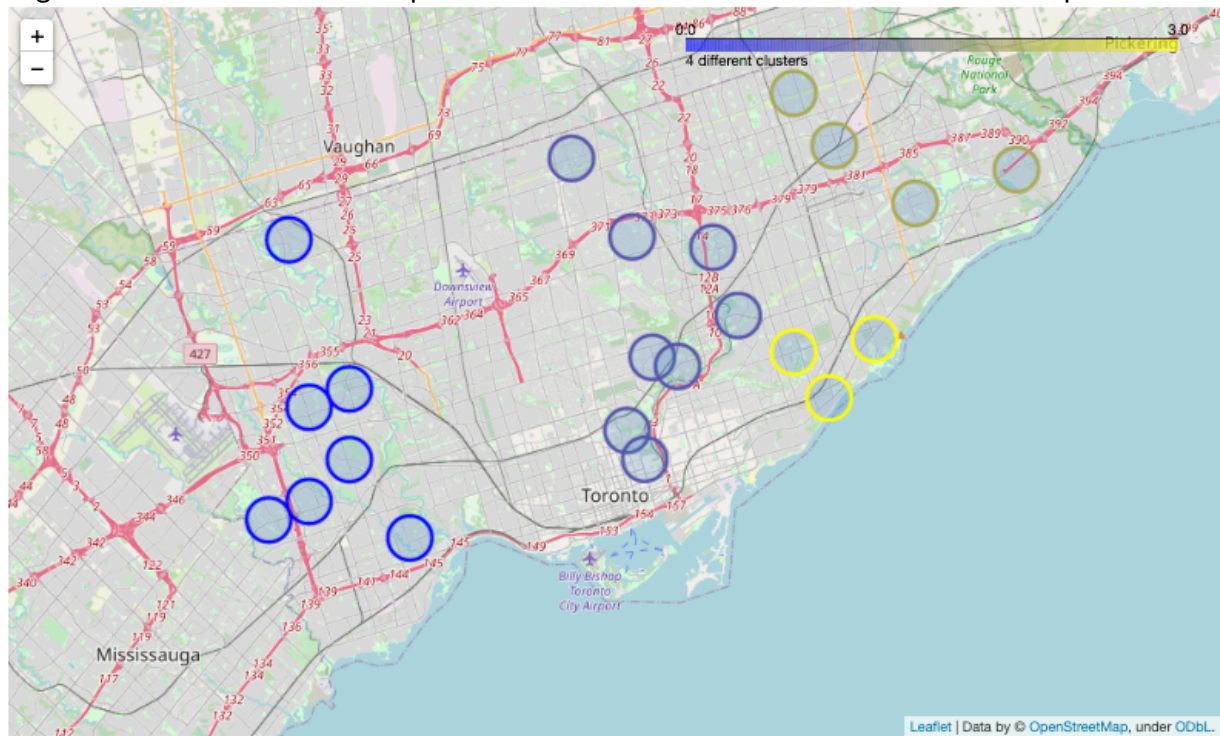
4. Modelling

After filtering those neighborhoods with more than 4 shops and fewer than 5000 people. We are able to run a k-means clustering to group those close neighborhoods together.

We first use elbow method to detect the best k for the dataset, as shown in the graph, I am able to find the $k = 3$.



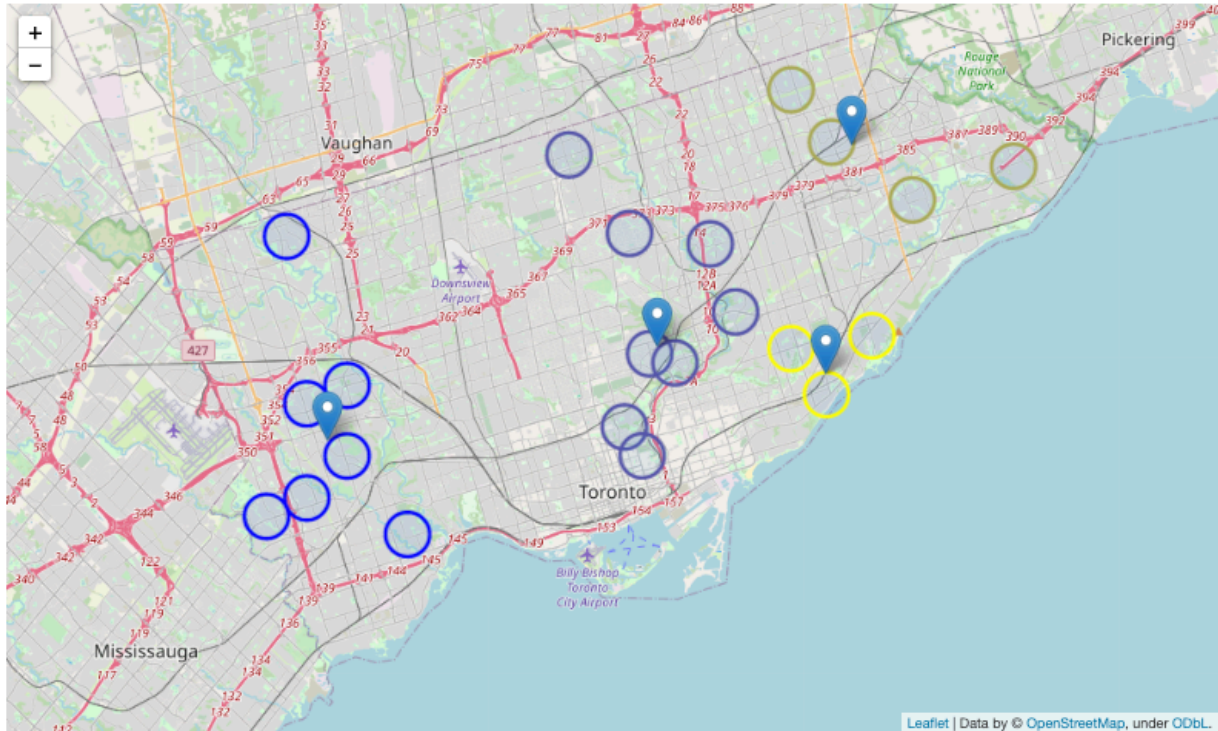
After modelling with $k=3$, we find that an extra cluster can be used so each different neighborhoods can be better separated. The final clusters can be shown in the map below.



To find the optimal location for each cluster, we decide to use the geometric median. Geometric median of a set of point is the median point which minimize the sum of the distance from the median point to each point.

5. Result and Discussion

We are able to find the optimal location has the latitude and longitude as stated below, and the ir following address are stated following



5, Ravensbourne Crescent, Princess Anne Manor, Etobicoke, Etobicoke Centre, Etobicoke, Toronto, Golden Horseshoe, Ontario, M9A 2 P7, Canada

90, Wicksteed Avenue, Leaside Business Park, Don Valley West, East York, Toronto, Golden Horseshoe, Ontario, M4G 4E8, Canada

Furniture Source, Shorting Road, Malvern West, Scarborough North, Scarborough, Toronto, Golden Horseshoe, Ontario, M1S 3V8, Canada

86, Aylesworth Avenue, Birchcliff, Scarborough Southwest, Scarborough, Toronto, Golden Horseshoe, Ontario, M1K 1A1, Canada

	Latitude	Longitude
0	43.673616	-79.543079
1	43.711643	-79.359347
2	43.793082	-79.250580
3	43.700587	-79.265072

The results are quite straightforward since they are just locations of where the barbershop should be opened. From the modelling perspective, since we remove those neighborhoods with more salons and fewer populations from our final modelling, adding those neighborhoods, may give different results.

What we are sure about this analysis is that those neighborhoods do require the new barbershops, but the actual location where those shops should be open can vary. More factors should be considered if an investor does hope to open the shop, such as the rent or the labor cost or even taxation in different cities. Different neighborhoods may contain different people who have very diverse preference, and that can also be a significant effect whether a new barbershop should be opened.

6. Conclusion

The purpose of the project is to detect which neighborhoods require new barbershop open and where is the optimal location. According to the Foursquare API, we are able to detect a few spots for those new shops, and they are already marked in the previous map. Without further information, investors can choose those spots or anywhere nearby to open a new shop.