Final Neighborhood Project Article

Cafe Competition in Toronto

Introduction

The problem which I plan to use Foursquare location data to solve the following: I plan to use the Foursquare API to help a new Café owner to locate the neighborhoods in the Toronto area which have the most competition. The target audience is a Cafe owner as such a program would allow him/her to discover the neighborhoods which should be avoided when setting up a shop, since these areas have a high frequency of Cafes already. Thus, there may be high saturation in those markets for Cafe products. This would greatly benefit a new owner who is unfamiliar to the Cafe business or the geography of the Toronto area. Rather than finding the number of Cafes manually, they can sort and map using the Foursquare location API.

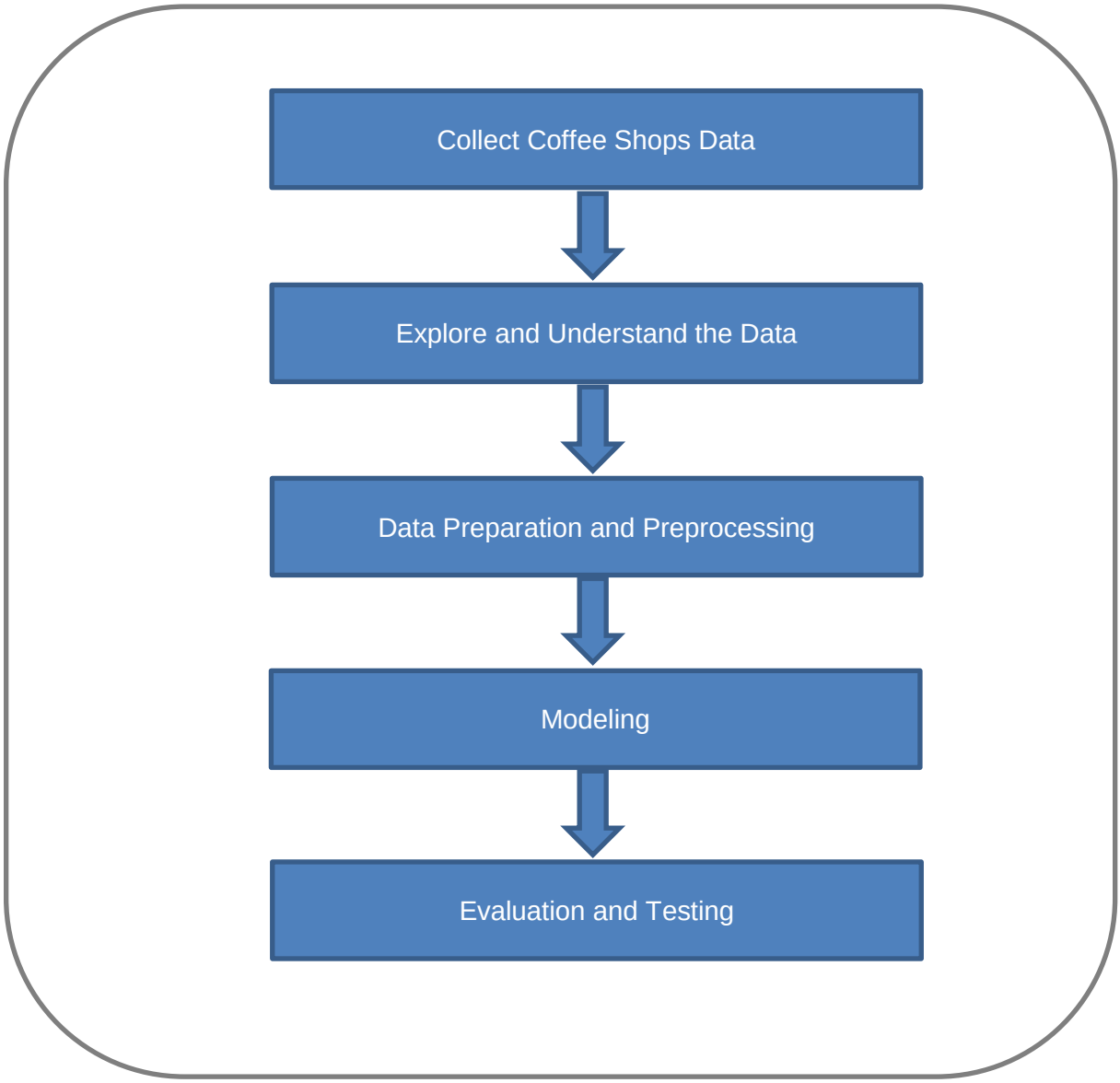
Data

The data being used will be two fold. First, data will be taken about the geographical coordinates of each neighborhood in Canada; it will be narrowed down to include only Toronto neighborhoods. This data will be taken from a postal code/neighborhood database. The postal codes will be converted to longitude and latitude coordinates so that they may be analyzed in the Foursquare API. The Foursquare API can then be used to find the frequency of various venues near each of the identified neighborhoods. The neighborhoods will then be sorted based on the frequency of Cafes in particular and then they will be clustered together based on similarity in this frequency. Then, the areas with the highest frequency of Cafe presence will be isolated and displayed on a map, with name labels for the user to identify.

I took this data from:

https://en.wikipedia.org/wiki/List_of_postal_codes_of_Canada:_M

Methodology



Results

The results obtained throughout the process are as follows.

Toronto - 103 FSAs [edit]

Note: There are no rural FSAs in Toronto, hence no postal codes should start with M0, however, the postal code M0R 8T0 is assigned to an Amazon warehouse in Mississauga, suggesting that Canada Post may be allocating the M0 FSA for high volume addresses.

Postal code	Borough	Neighborhood
M1A	Not assigned	
M2A	Not assigned	
M3A	North York	Parkwoods
M4A	North York	Victoria Village
M5A	Downtown Toronto	Regent Park / Harbourfront
M6A	North York	Lawrence Manor / Lawrence Heights
M7A	Downtown Toronto	Queen's Park / Ontario Provincial Government
M8A	Not assigned	
M9A	Etobicoke	Islington Avenue
M1B	Scarborough	Malvern / Rouge
M2B	Not assigned	
M3B	North York	Don Mills
M4B	East York	Parkview Hill / Woodbine Gardens
M5B	Downtown Toronto	Garden District, Ryerson
M6B	North York	Glencairn
M7B	Not assigned	
M8B	Not assigned	
M9B	Etobicoke	West Deane Park / Princess Gardens / Martin Grove / Islington / Cloverdale
M1C	Scarborough	Rouge Hill / Port Union / Highland Creek
M2C	Not assigned	

Fig 1: Sample of the neighborhoods database from Wikipedia.

	Postal code	Borough	Neighborhood
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
8	M9A	Etobicoke	Islington Avenue
9	M1B	Scarborough	Malvern , Rouge
11	M3B	North York	Don Mills
12	M4B	East York	Parkview Hill , Woodbine Gardens
13	M5B	Downtown Toronto	Garden District, Ryerson
14	M6B	North York	Glencairn
17	M9B	Etobicoke	West Deane Park , Princess Gardens , Martin Gr...
18	M1C	Scarborough	Rouge Hill , Port Union , Highland Creek
20	M3C	North York	Don Mills
21	M4C	East York	Woodbine Heights

Fig 2: Cleaned data from Wikipedia to get 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	M1J	Scarborough	Scarborough Village	43.744734	-79.239476
6	M1K	Scarborough	Kennedy Park , Ionview , East Birchmount Park	43.727929	-79.262029
7	M1L	Scarborough	Golden Mile , Clairlea , Oakridge	43.711112	-79.284577
8	M1M	Scarborough	Cliffside , Cliffcrest , Scarborough Village West	43.716316	-79.239476
9	M1N	Scarborough	Birch Cliff , Cliffside West	43.692657	-79.264848
10	M1P	Scarborough	Dorset Park , Wexford Heights , Scarborough To...	43.757410	-79.273304
11	M1R	Scarborough	Wexford , Maryvale	43.750072	-79.295849
12	M1S	Scarborough	Agincourt	43.794200	-79.262029
13	M1T	Scarborough	Clarks Corners , Tam O'Shanter , Sullivan	43.781638	-79.304302
14	M1V	Scarborough	Milliken , Agincourt North , Steeles East , L'...	43.815252	-79.284577

Fig 3: Cleaned table with latitude and longitude information.

	Neighborhood	Neighborhood Latitude	Neighborhood Longitude	Venue	Venue Latitude	Venue Longitude	Venue Category
0	The Beaches	43.676357	-79.293031	Glen Manor Ravine	43.676821	-79.293942	Trail
1	The Beaches	43.676357	-79.293031	The Big Carrot Natural Food Market	43.678879	-79.297734	Health Food Store
2	The Beaches	43.676357	-79.293031	Grover Pub and Grub	43.679181	-79.297215	Pub
3	The Beaches	43.676357	-79.293031	Upper Beaches	43.680563	-79.292869	Neighborhood
4	The Danforth West , Riverdale	43.679557	-79.352188	Pantheon	43.677621	-79.351434	Greek Restaurant
5	The Danforth West , Riverdale	43.679557	-79.352188	MenEssentials	43.677820	-79.351265	Cosmetics Shop
6	The Danforth West , Riverdale	43.679557	-79.352188	Mezes	43.677962	-79.350196	Greek Restaurant
7	The Danforth West , Riverdale	43.679557	-79.352188	Cafe Fiorentina	43.677743	-79.350115	Italian Restaurant
8	The Danforth West , Riverdale	43.679557	-79.352188	Dolce Gelato	43.677773	-79.351187	Ice Cream Shop
9	The Danforth West , Riverdale	43.679557	-79.352188	Moksha Yoga Danforth	43.677622	-79.352116	Yoga Studio
10	The Danforth West , Riverdale	43.679557	-79.352188	Louis Cifer Brew Works	43.677663	-79.351313	Brewery
11	The Danforth West , Riverdale	43.679557	-79.352188	Messini Authentic Gyros	43.677827	-79.350569	Greek Restaurant

Fig 4: Filter for only Toronto and venues for each neighborhood located

	Yoga Studio	Airport	Airport Food Court	Airport Gate	Airport Lounge	Airport Service	Airport Terminal	American Restaurant	Antique Shop	Aquarium	Art Gallery	Arts & Crafts Store	Asian Restaurant	Athletics & Sports	Auto Workshop	BBQ Joint	Baby Store	Bagel Shop	Bakery	Bank	Bar
0	0	0	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	0	0	0	0	0	0	0	0	0	0	0
2	0	0	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	0	0
4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Fig 5: Venue frequency determined

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----Berczy Park----
          venue  freq
0  Coffee Shop  0.05
1   Restaurant  0.04
2       Bakery  0.04
3         Café  0.04
4  Cheese Shop  0.04


----Brockton , Parkdale Village , Exhibition Place----
             venue  freq
0            Café  0.13
1     Coffee Shop  0.09
2  Breakfast Spot  0.09
3   Grocery Store  0.04
4   Burrito Place  0.04
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Fig 6: Venue frequencies attached to respective neighborhoods

	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	Coffee Shop	Italian Restaurant	Beer Bar	Restaurant	Café	Cheese Shop	Cocktail Bar	Bakery	Seafood Restaurant	Farmers Market
1	Brockton , Parkdale Village , Exhibition Place	Café	Breakfast Spot	Coffee Shop	Burrito Place	Italian Restaurant	Intersection	Stadium	Restaurant	Bar	Bakery
2	Business reply mail Processing CentrE	Skate Park	Restaurant	Burrito Place	Light Rail Station	Fast Food Restaurant	Auto Workshop	Farmers Market	Spa	Pizza Place	Brewery
3	CN Tower , King and Spadina , Railway Lands , ...	Airport Lounge	Airport Service	Airport Terminal	Airport	Airport Food Court	Airport Gate	Sculpture Garden	Boutique	Harbor / Marina	Boat or Ferry
4	Central Bay Street	Coffee Shop	Italian Restaurant	Café	Sandwich Place	Bubble Tea Shop	Spa	Burger Joint	Sushi Restaurant	Japanese Restaurant	Salad Place

Fig 7: Converted data to dataframe for easier data manipulation and visualization

	Postal code	Borough	Neighborhood	Latitude	Longitude	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
0	M4E	East Toronto	The Beaches	43.676357	-79.293031	0	Trail	Health Food Store	Pub	Women's Store	Department Store	Ethiopian Restaurant	Electronics Store	Eastern European Restaurant	Dumpling Restaurant	Donut Shop
1	M4K	East Toronto	The Danforth West , Riverdale	43.679557	-79.352188	0	Greek Restaurant	Coffee Shop	Italian Restaurant	Ice Cream Shop	Furniture / Home Store	Restaurant	Bookstore	Bubble Tea Shop	Bakery	Pub
2	M4L	East Toronto	India Bazaar , The Beaches West	43.668999	-79.315572	0	Park	Fast Food Restaurant	Pub	Sandwich Place	Liquor Store	Italian Restaurant	Burrito Place	Ice Cream Shop	Steakhouse	Restaurant
3	M4M	East Toronto	Studio District	43.659526	-79.340923	0	Café	Coffee Shop	Gastropub	Bakery	Brewery	American Restaurant	Yoga Studio	Comfort Food Restaurant	Seafood Restaurant	Sandwich Place
4	M4N	Central Toronto	Lawrence Park	43.728020	-79.388790	3	Park	Swim School	Bus Line	Dessert Shop	Ethiopian Restaurant	Electronics Store	Eastern European Restaurant	Dumpling Restaurant	Donut Shop	Doner Restaurant

Fig 8: Clustering completed, labelling each cluster by similarity among neighborhoods in terms of venue frequency.

Fig 9: Final plot of cafes in the Toronto area, filtered to include venues with café.

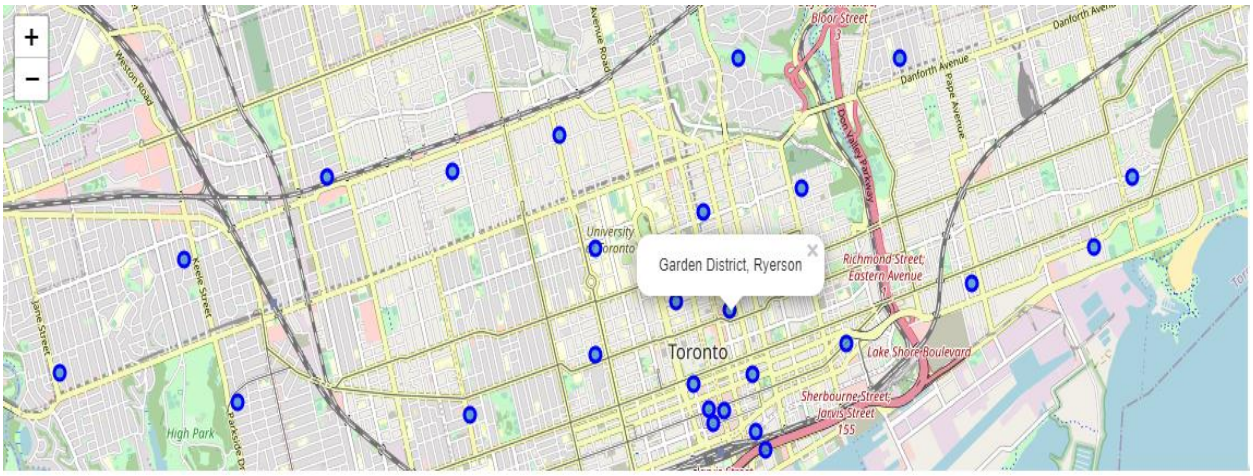

Fig 10: Markers are labelled with their neighborhood name and cluster number, to show the extent of homogeneity among these areas with high competition.

Discussion

To reiterate, the main goals of this analysis were as follows. Use the Foursquare API to help a new Café owner to locate the neighborhoods in the Toronto area which have the most competition. This would allow Cafe owners to discover the neighborhoods which should be avoided when setting up a shop, since these areas have a high frequency of Cafes already. It would also allow a user to see the homogeneity among different areas when looking at the competition for Cafes in that area. Thus, he/she could better diversify their cafe portfolio by choosing areas that are heterogeneous to one another, allowing for greater market testing. Thus, there may be high saturation in those markets for Cafe products. This would greatly benefit a new owner who is unfamiliar to the Cafe business or the geography of the Toronto area. Rather than finding the number of Cafes manually, they can be sorted and mapped using the Foursquare location API.

Final results show a total of eight neighborhoods identified to have cafe in their top 3 most frequent venues. They were generally located quite sporadically, but 3 of them were located extremely close to one another which is an interesting observation. This area is thus concluded to be the area with most great competition among all Toronto and can accordingly be avoided by new cafe owners. Also, the clustering of these data points show that there is high similarity among the neighborhoods which belong to the cluster, indicating that certain attributes of other venues present may be influencing the presence of a cafe there.

Such an observation is extremely useful to a user as it demonstrates the ideal location for a new cafe to be set up and thrive. However, the user should likely avoid current locations with high competition if they are new and would like to avoid bigger competitors during initial growth prior to expanding their business.

Conclusion

Ultimately, this analysis has succeeded in identifying the neighborhoods with greatest competition in the Toronto area for cafes. This was done by frequency analysis using the Foursquare API and provides an interactive plot, showing the top neighborhoods for a new cafe owner to avoid. The addition of clustering with colored markers based on clusters allows the owner to identify homogeneity among these top areas and he/she can use this information to determine what makes a good location for a Cafe. Further iteration on this analysis can be used to determine locations with such suitable features, of similar clusters, but with less frequency of cafes in the area. This would essentially allow a new owner to pick the ideal location with relatively less competition to help them during the initial growth phase before expanding their business.