



A CAFÉ IN TORONTO

Alisha Shaik

Introduction / Business Problem

A multinational chain of coffeehouses is looking for a right location in Toronto, Canada, where they can kickstart their services like Café's, Coffee Houses, etc and further expand. As a Data Scientist, depending on the various venues in the neighbourhoods of Toronto, we have to come up with the location for the Café/Coffee house where the business will be successful and there is opportunity for expansion further

Data

Data Requirements:

For this particular problem, the data we need is geographical locations of various popular venues in the neighbourhoods of Toronto, Canada. The venues are of different types, for example, Café's, Restaurants, Bars, Pizza places, Pharmacies, Pubs, Bagel Shops, etc. Geographical location values are nothing but, the latitude and longitude values. We can get these values from Foursquare API. Depending on this data, the scope for a launch of a Café's/Coffee House in a right location is determined.

Data Collection:

- List of postal codes of Canada
- Get Geospatial Coordinates of postal codes in Canada
- Get Geolocations of different venues of the area which we are interested in Canada i.e Toronto

Data Understanding:

Data	Description	Acquisition
Postal Code	Postal Codes of Canada	https://en.wikipedia.org/wiki/List_of_postal_codes_of_Canada:_M
Borough	A town or district which is an administrative unit.	https://en.wikipedia.org/wiki/List_of_postal_codes_of_Canada:_M
Neighborhood	Neighborhoods near to the area of interest	https://en.wikipedia.org/wiki/List_of_postal_codes_of_Canada:_M
Latitude	Latitude Co-ordinates of neighborhoods	Foursquare API
Longitude	Longitude Co-ordinates of neighborhoods	Foursquare API
Venue	Names of various Venues	Foursquare API
Venue Latitude	Latitude Co-ordinates of Venues	Foursquare API
Venue Longitude	Longitude Co-ordinates of Venues	Foursquare API
Venue Category	Categories of Venues	Foursquare API
Top 10 Most common Venues	Top 10 most common venues categories splited in 10 columns	Foursquare API

Methodology

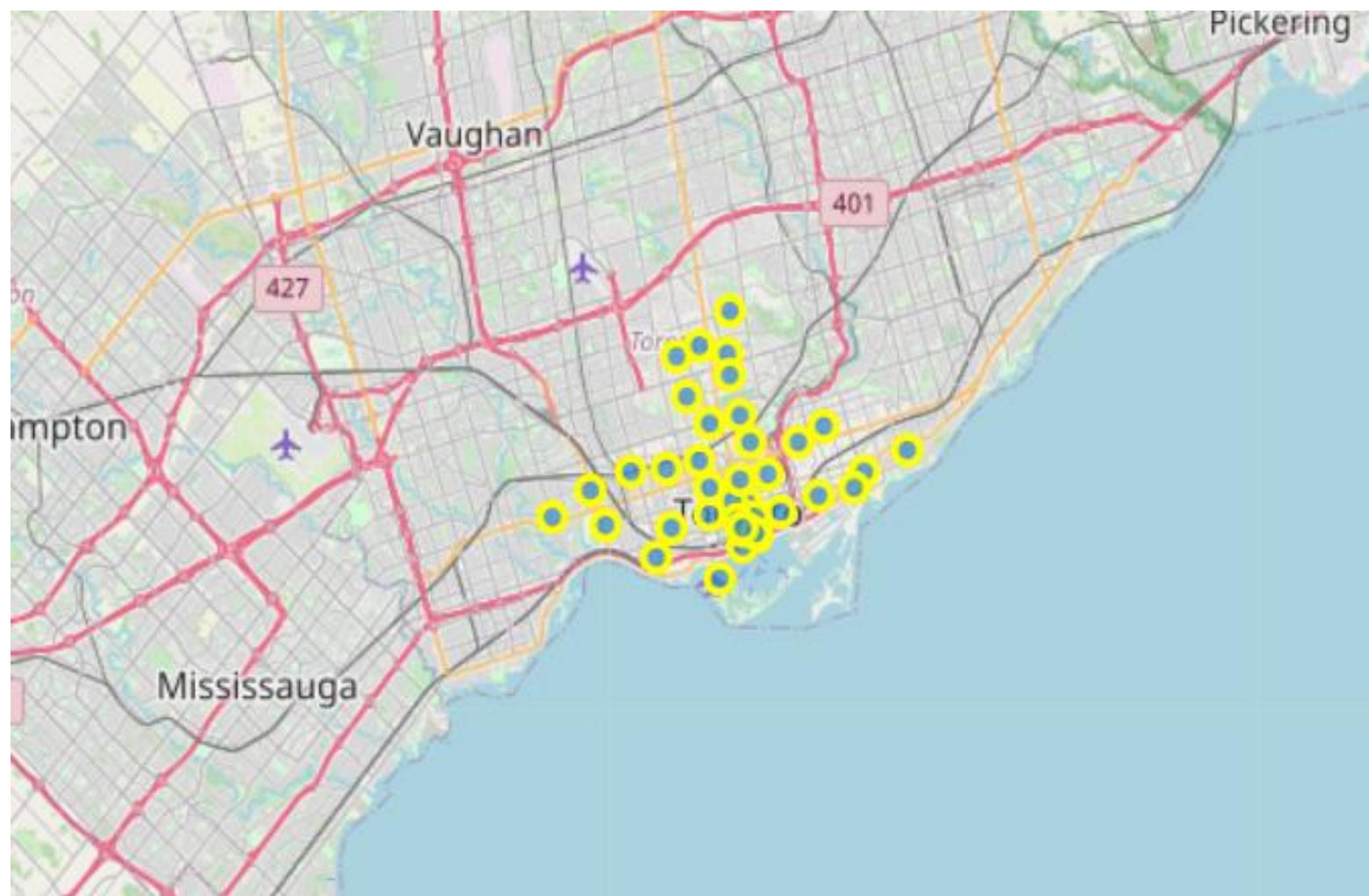
Analysis:

- Get the postal codes, boroughs, neighbourhoods of Canada from the 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)
- From this wiki link we are transferring this data to dataframe for better understanding using BeautifulSoup library available in python.
- Next we collected the latitude and longitude locations of Postal codes of Canada, which is csv file named as ‘Geospatial_Coordinates.csv’ and read these coordinates into an another dataframe.
- We joined the two dataframes on postal code into a single dataframe.

```
In [15]: mergedData['Borough'].unique()
```

```
Out[15]: array(['North York', 'Downtown Toronto', "Queen's Park", 'Etobicoke',  
               'Scarborough', 'East York', 'York', 'East Toronto', 'West Toronto',  
               'East York/East Toronto', 'Central Toronto', 'Mississauga',  
               'Downtown Toronto Stn A', 'Etobicoke Northwest',  
               'East Toronto Business'], dtype=object)
```

- Since, we are only interested in the Toronto region, we filtered out the areas which has Toronto in its borough name and named it as toronto_df dataframe
- After analysis we figured out that toronto_df dataframe has 7 boroughs and 39 neighbourhoods.
- We, visualized the same using geopy.geocoders library on a map as shown below.



- Using Foursquare API, we got details about nearby venues like names, latitudes, longitudes, Venue Categories etc as shown below.

	Neighborhood	Neighborhood Latitude	Neighborhood Longitude	Venue	Venue Latitude	Venue Longitude	Venue Category
0	Regent Park, Harbourfront	43.65426	-79.360636	Roselle Desserts	43.653447	-79.362017	Bakery
1	Regent Park, Harbourfront	43.65426	-79.360636	Tandem Coffee	43.653559	-79.361809	Coffee Shop
2	Regent Park, Harbourfront	43.65426	-79.360636	Cooper Koo Family YMCA	43.653249	-79.358008	Distribution Center
3	Regent Park, Harbourfront	43.65426	-79.360636	Body Blitz Spa East	43.654735	-79.359874	Spa
4	Regent Park, Harbourfront	43.65426	-79.360636	Impact Kitchen	43.656369	-79.356980	Restaurant

- After analysing, we found out that there are 191 unique venue categories.
- Using onehot encoding technique, we gave weightage for various venues in each neighbourhood as shown below.

	Neighborhood	Yoga Studio	Adult Boutique	Airport	Airport Food Court	Airport Gate	Airport Lounge	Airport Service	Airport Terminal	American Restaurant	...	Theater	Theme Restaurant	Tibetan Restaurant	Toy / Game Store	Trail
0	Berczy Park	0.000000	0.000000	0.0000	0.0000	0.0000	0.000	0.0000	0.0000	0.000000	...	0.000000	0.000000	0.000000	0.000000	0.0000
1	Brockton, Parkdale Village, Exhibition Place	0.000000	0.000000	0.0000	0.0000	0.0000	0.000	0.0000	0.0000	0.000000	...	0.000000	0.000000	0.000000	0.000000	0.0000
2	CN Tower, King and Spadina, Railway Lands, Har...	0.000000	0.000000	0.0625	0.0625	0.0625	0.125	0.1875	0.0625	0.000000	...	0.000000	0.000000	0.000000	0.000000	0.0000
3	Central Bay Street	0.033333	0.000000	0.0000	0.0000	0.0000	0.000	0.0000	0.0000	0.000000	...	0.000000	0.000000	0.000000	0.000000	0.0000
4	Christie	0.000000	0.000000	0.0000	0.0000	0.0000	0.000	0.0000	0.0000	0.000000	...	0.000000	0.000000	0.000000	0.000000	0.0000
5	Church and Wellesley	0.000000	0.033333	0.0000	0.0000	0.0000	0.000	0.0000	0.0000	0.000000	...	0.000000	0.033333	0.000000	0.000000	0.0000

- Depending on these values, top 5 and top 10 most common venue categories is determined.

	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	Cocktail Bar	Seafood Restaurant	Beer Bar	Farmers Market	Museum	Creperie	Breakfast Spot	Restaurant	Jazz Club
1	Brockton, Parkdale Village, Exhibition Place	Café	Breakfast Spot	Coffee Shop	Performing Arts Venue	Office	Furniture / Home Store	Stadium	Bakery	Intersection	Italian Restaurant
2	CN Tower, King and Spadina, Railway Lands, Har...	Airport Service	Airport Lounge	Boat or Ferry	Airport Terminal	Rental Car Location	Sculpture Garden	Harbor / Marina	Coffee Shop	Bar	Airport Gate
3	Central Bay Street	Coffee Shop	Italian Restaurant	Café	Sushi Restaurant	Comic Shop	Park	Modern European Restaurant	Miscellaneous Shop	Middle Eastern Restaurant	Poke Place
4	Christie	Grocery Store	Café	Park	Coffee Shop	Candy Store	Italian Restaurant	Baby Store	Restaurant	Nightclub	Cosmetics Shop

----Berczy Park----

	venue	freq
0	Seafood Restaurant	0.07
1	Farmers Market	0.07
2	Beer Bar	0.07
3	Cocktail Bar	0.07
4	Coffee Shop	0.07

Clustering

- Here, we have used kMeans Clustering Machine learning Algorithm for finding the clusters in Toronto for different venues.
- We have divided the region and venues into 5 clusters ($k=5$) with top 10 venues.
- Also, we have added a new column named '**Cluster Labels**' to identify and retrieve data related to specific clusters as depicted below.

Cluster 1

	Borough	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
9	Downtown Toronto	0	Café	Ramen Restaurant	Clothing Store	Electronics Store	Japanese Restaurant	Bookstore	Sandwich Place	Diner	Burger Joint	Burrito Place
19	East Toronto	0	Trail	Pub	Health Food Store	Wine Bar	Cuban Restaurant	Donut Shop	Dog Run	Distribution Center	Discount Store	Diner
36	Downtown Toronto	0	Park	Plaza	Café	Hotel	Chinese Restaurant	Dessert Shop	IT Services	Bar	Basketball Stadium	Skating Rink
37	West Toronto	0	Bar	Asian Restaurant	Men's Store	Vietnamese Restaurant	Wine Bar	French Restaurant	New American Restaurant	Korean Restaurant	Japanese Restaurant	Italian Restaurant
41	East Toronto	0	Greek Restaurant	Italian Restaurant	Coffee Shop	Ice Cream Shop	Yoga Studio	Pizza Place	Bookstore	Juice Bar	Restaurant	Dessert Shop
47	East Toronto	0	Pizza Place	Park	Fish & Chips Shop	Sandwich Place	Italian Restaurant	Intersection	Burrito Place	Restaurant	Ice Cream Shop	Liquor Store
67	Central Toronto	0	Park	Gym / Fitness Center	Breakfast Spot	Sandwich Place	Department Store	Food & Drink Shop	Hotel	Gym	Comic Shop	Dog Run
68	Central Toronto	0	Bus Line	Jewelry Store	Trail	Sushi Restaurant	Deli / Bodega	Eastern European Restaurant	Donut Shop	Dog Run	Distribution Center	Discount Store
69	West Toronto	0	Mexican Restaurant	Café	Thai Restaurant	Arts & Crafts Store	Discount Store	Bookstore	Diner	Italian Restaurant	Cajun / Creole Restaurant	Fast Food Restaurant
73	Central Toronto	0	Coffee Shop	Clothing Store	Fast Food Restaurant	Park	Chinese Restaurant	Cosmetics Shop	Café	Mexican Restaurant	Rental Car Location	Restaurant
79	Central Toronto	0	Dessert Shop	Pizza Place	Coffee Shop	Italian Restaurant	Café	Sandwich Place	Sushi Restaurant	Gym	Park	Brewery
81	West Toronto	0	Café	Italian Restaurant	Coffee Shop	Sushi Restaurant	Pub	Pizza Place	Indie Movie Theater	Bank	Bar	Dessert Shop
87	Downtown Toronto	0	Airport Service	Airport Lounge	Boat or Ferry	Airport Terminal	Rental Car Location	Sculpture Garden	Harbor / Marina	Coffee Shop	Bar	Airport Gate
99	Downtown Toronto	0	Park	Dance Studio	Ethiopian Restaurant	Escape Room	Café	Pub	Ice Cream Shop	Beer Bar	Ramen Restaurant	Juice Bar
100	East Toronto Business	0	Auto Workshop	Pizza Place	Brewery	Burrito Place	Butcher	Farmers Market	Fast Food Restaurant	Restaurant	Light Rail Station	Skate Park

Cluster 2

	Borough	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
83	Central Toronto	1	Playground	Wine Bar	Dance Studio	Eastern European Restaurant	Donut Shop	Dog Run	Distribution Center	Discount Store	Diner	Dessert Shop

Cluster 3

	Borough	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
62	Central Toronto	2	Garden	Home Service	Wine Bar	Dance Studio	Eastern European Restaurant	Donut Shop	Dog Run	Distribution Center	Discount Store	Diner

Cluster 4

	Borough	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
2	Downtown Toronto	3	Coffee Shop	Park	Bakery	Breakfast Spot	Theater	Yoga Studio	Dessert Shop	Spa	Restaurant	Farmers Market
15	Downtown Toronto	3	Café	Gastropub	Coffee Shop	Japanese Restaurant	Farmers Market	Cocktail Bar	BBQ Joint	Park	Cosmetics Shop	Middle Eastern Restaurant
20	Downtown Toronto	3	Coffee Shop	Cocktail Bar	Seafood Restaurant	Beer Bar	Farmers Market	Museum	Creperie	Breakfast Spot	Restaurant	Jazz Club
24	Downtown Toronto	3	Coffee Shop	Italian Restaurant	Café	Sushi Restaurant	Comic Shop	Park	Modern European Restaurant	Miscellaneous Shop	Middle Eastern Restaurant	Poke Place
25	Downtown Toronto	3	Grocery Store	Café	Park	Coffee Shop	Candy Store	Italian Restaurant	Baby Store	Restaurant	Nightclub	Cosmetics Shop
30	Downtown Toronto	3	Coffee Shop	Café	Seafood Restaurant	Monument / Landmark	Sushi Restaurant	Salon / Barbershop	Hotel	Smoke Shop	Plaza	Bakery
31	West Toronto	3	Bakery	Pharmacy	Pet Store	Café	Bank	Bar	Portuguese Restaurant	Middle Eastern Restaurant	Supermarket	Grocery Store
42	Downtown Toronto	3	Café	Coffee Shop	Restaurant	Bakery	Japanese Restaurant	Sandwich Place	Gym / Fitness Center	Hotel	Pub	Deli / Bodega
43	West Toronto	3	Café	Breakfast Spot	Coffee Shop	Performing Arts Venue	Office	Furniture / Home Store	Stadium	Bakery	Intersection	Italian Restaurant
48	Downtown Toronto	3	Café	Gastropub	Restaurant	Coffee Shop	Japanese Restaurant	American Restaurant	Hotel	Gluten-free Restaurant	Steakhouse	Seafood Restaurant
54	East Toronto	3	Coffee Shop	American Restaurant	Café	Bakery	Park	Middle Eastern Restaurant	Pet Store	Clothing Store	Cheese Shop	Stationery Store
74	Central Toronto	3	Sandwich Place	Café	Coffee Shop	Donut Shop	Middle Eastern Restaurant	Liquor Store	Burger Joint	Indian Restaurant	BBQ Joint	Pub
75	West Toronto	3	Gift Shop	Breakfast Spot	Bar	Italian Restaurant	Eastern European Restaurant	Dog Run	Dessert Shop	Cuban Restaurant	Movie Theater	Restaurant
80	Downtown Toronto	3	Café	Sandwich Place	Bookstore	Japanese Restaurant	Bar	Bakery	Yoga Studio	Sushi Restaurant	College Gym	College Arts Building
84	Downtown Toronto	3	Café	Caribbean Restaurant	Vietnamese Restaurant	Bakery	Wine Bar	Bar	Beer Bar	Belgian Restaurant	Italian Restaurant	Jazz Club
86	Central Toronto	3	Coffee Shop	Pub	Fried Chicken Joint	Sushi Restaurant	Bagel Shop	Bank	Restaurant	Pizza Place	American Restaurant	Liquor Store
92	Downtown Toronto Stn A	3	Café	Seafood Restaurant	Farmers Market	Cocktail Bar	Beer Bar	Creperie	Bakery	Japanese Restaurant	Jazz Club	Gastropub
96	Downtown Toronto	3	Italian Restaurant	Restaurant	Café	Bakery	Park	Diner	Japanese Restaurant	Indian Restaurant	Beer Store	Butcher
97	Downtown Toronto	3	Café	Coffee Shop	Restaurant	Seafood Restaurant	Hotel	Gluten-free Restaurant	Gym	Japanese Restaurant	Pub	Speakeasy

Cluster 5

	Borough	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
35	East York/East Toronto	4	Park	Convenience Store	Metro Station	Wine Bar	Deli / Bodega	Eastern European Restaurant	Donut Shop	Dog Run	Distribution Center	Discount Store
61	Central Toronto	4	Bus Line	Park	Swim School	Wine Bar	Eastern European Restaurant	Donut Shop	Dog Run	Distribution Center	Discount Store	Diner
91	Downtown Toronto	4	Park	Playground	Trail	Wine Bar	Cuban Restaurant	Donut Shop	Dog Run	Distribution Center	Discount Store	Diner

Results and Discussion

On Observing the above clusters, we can say that Cluster 1 comprises most of the Central, east and west Toronto and has most common business-like Restaurants, Bars, Pizza place etc. But there are no much cafes in these areas. On the Other hand, Cluster 4 has most of Downtown Toronto and has lots of Café 's, Coffee Houses, restaurants, bars, pubs, etc but this area is mostly dominated by Café 's and Coffee Houses. Cluster 2, 3 and 5 are mostly recreational areas like parks, gardens, playgrounds and doesn't have enough Café 's /Coffee Houses.

Conclusion

Depending on all the analysis and observations, we conclude that Clusters 1,2,3 and 5, which comprises most of Central, East and West Toronto is the right place to start a Café as the frequency of Café 's is very less, hence, the competition will be low, also these areas have multicuisine restaurants, pubs, bars etc. which states that these areas are the most happening places in the city. Starting a Café here would attract the crowd, resulting in the success of the café and areas which have venues like parks, gardens etc has lot of crowd visiting them and opening a café near to these venues would be a huge success.

On the other hand, Cluster 4 which is mostly Downtown Toronto is the least likely place to start a café, as this area has already huge number of cafés and coffee houses. Starting a Café here will result in huge competition from existing shops and sales will not be good.

THANK YOU