1) Introduction

Toronto is a popular destination for new immigrants in Canada to reside. As a result, it is one of the most diverse and multicultural areas in the country, being home to various religious groups and places of worship. Although immigration has become a hot topic over the past few years with more governments seeking more restrictions on immigrants and refugees, the general trend of immigration into Canada has been one of on the rise.

The aim of this project is to help people in exploring better facilities around their neighbourhood. It will help people making smart and efficient decision on selecting great neighbourhood out of numbers of other neighbourhoods in Toronto, Canada.

It will help people to get awareness of the area and neighbourhood before moving to a new city, state, country or place for their work or to start a new fresh life.

2) Data

Data Link: https://en.wikipedia.org/wiki/List_of_postal_codes_of_Canada:_M
The data will be scraped from the link above. The dataset consists of latitude and longitude, zip codes.

Foursquare API Data:

Foursquare API is a platform where which we will be using to gain data about different venues in different neighbourhoods. Foursquare is a location data provider with information about all manner of venues and events within an area of interest. Such information includes venue names, locations, menus and even photos. As such, the foursquare location platform will be used as the sole data source since all the stated required information can be obtained through the API.

After finding the list of neighborhoods, we will then connect to the Foursquare API to gather information about venues in every neighbourhood.

3) Methodology

The data is first extracted from the above link mentioned above via web scraping. Then it is put into panda dataframe. Geocoder is used to collect latitude and longitude for each row in the data.

	Postal Code	Borough	Neighbourhood	Latitude	Longitude
0	M1B	Scarborough	Malvern, Rouge	43.81139	-79.19662
1	M1C	Scarborough	Rouge Hill, Port Union, Highland Creek	43.78574	-79.15875
2	M1E	Scarborough	Guildwood, Morningside, West Hill	43.76575	-79.17470
3	M1G	Scarborough	Woburn	43.76812	-79.21761
4	M1H	Scarborough	Cedarbrae	43.76944	-79.23892
...	...	...	...	...	...
98	M9N	York	Weston	43.70507	-79.51804
99	M9P	Etobicoke	Westmount	43.69630	-79.52926
100	M9R	Etobicoke	Kingsview Village, St. Phillips, Martin Grove ...	43.68681	-79.55728
101	M9V	Etobicoke	South Steeles, Silverstone, Humbergate, Jamest...	43.74453	-79.58624
102	M9W	Etobicoke	Northwest, West Humber - Clairville	43.71174	-79.57941

103 rows × 5 columns

The neighbourhoods are visualized using Folium package. This is to ensure that the data returned by Geocoder are correctly plotted.

Nearby venues around neighbourhoods are extracted using Foursquare API.

	Neighbourhood	Neighbourhood Latitude	Neighbourhood Longitude	Venue	Venue Latitude	Venue Longitude	Venue Category
0	The Beaches	43.67709	-79.29547	Glen Manor Ravine	43.676821	-79.293942	Trail
1	The Beaches	43.67709	-79.29547	The Big Carrot Natural Food Market	43.678879	-79.297734	Health Food Store
2	The Beaches	43.67709	-79.29547	Grover Pub and Grub	43.679181	-79.297215	Pub
3	The Beaches	43.67709	-79.29547	Upper Beaches	43.680563	-79.292869	Neighborhood
4	The Beaches	43.67709	-79.29547	Beaches Rec Centre	43.673659	-79.298634	College Gym

To compare the similarities of every neighbourhoods, k-means clustering algorithm is used based on the most common venues in each neigbourhood(frequency similarities). 5 cluster points are used for this project.

	Postal Code	Borough	Neighbourhood	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 M Comr Ve
0	M4E	East Toronto	The Beaches	43.67709	-79.29547	0	Health Food Store	Neighborhood	Trail	Pub	Yoga Studio	Dumpling Restaurant	Fast Fc Restau
1	M4K	East Toronto	The Danforth West, Riverdale	43.68375	-79.35512	0	Intersection	Discount Store	Park	Business Service	Coffee Shop	Ice Cream Shop	Bus Lir
2	M4L	East Toronto	India Bazaar, The Beaches West	43.66797	-79.31467	0	Sandwich Place	Park	Fast Food Restaurant	Pizza Place	Steakhouse	Sushi Restaurant	Pub
3	M4M	East Toronto	Studio District	43.66213	-79.33497	0	Brewery	Italian Restaurant	Diner	Coffee Shop	Arts & Crafts Store	Pet Store	Seafoo Restau
4	M4N	Central Toronto	Lawrence Park	43.72843	-79.38713	4	Bus Line	Business Service	Swim School	Yoga Studio	Electronics Store	Fast Food Restaurant	Farmer Market

4) Results

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
0	East Toronto	0	Health Food Store	Neighborhood	Trail	Pub	Yoga Studio	Dumpling Restaurant	Fast Food Restaurant	Farmers Market	Farm	Falafel Restaurant
1	East Toronto	0	Intersection	Discount Store	Park	Business Service	Coffee Shop	Ice Cream Shop	Bus Line	Grocery Store	Diner	Distribution Center
2	East Toronto	0	Sandwich Place	Park	Fast Food Restaurant	Pizza Place	Steakhouse	Sushi Restaurant	Pub	Ice Cream Shop	Italian Restaurant	Fish & Chips Shop
3	East Toronto	0	Brewery	Italian Restaurant	Diner	Coffee Shop	Arts & Crafts Store	Pet Store	Seafood Restaurant	Pizza Place	Comfort Food Restaurant	American Restaurant
5	Central Toronto	0	Gym / Fitness Center	Hotel	Department Store	Breakfast Spot	Food & Drink Shop	Park	General Entertainment	Dumpling Restaurant	Farmers Market	Farm
7	Central Toronto	0	Dessert Shop	Italian Restaurant	Sandwich Place	Café	Coffee Shop	Pizza Place	Thai Restaurant	Sushi Restaurant	Indian Restaurant	Restaurant
8	Central Toronto	0	Gym	Tennis Court	Convenience Store	Restaurant	Lawyer	Gift Shop	Dumpling Restaurant	Farmers Market	Farm	Falafel Restaurant
9	Central Toronto	0	Light Rail Station	Coffee Shop	Supermarket	Liquor Store	Electronics Store	Fish & Chips Shop	Fast Food Restaurant	Farmers Market	Farm	Falafel Restaurant
11	Downtown Toronto	0	Italian Restaurant	Restaurant	Park	Coffee Shop	Café	Bakery	Japanese Restaurant	Jewelry Store	Sandwich Place	Butcher
12	Downtown Toronto	0	Coffee Shop	Gay Bar	Men's Store	Dance Studio	Ramen Restaurant	Breakfast Spot	Bubble Tea Shop	Salon / Barbershop	Restaurant	Juice Bar
13	Downtown Toronto	0	Coffee Shop	Breakfast Spot	Restaurant	Yoga Studio	Spa	Bakery	Distribution Center	Electronics Store	Event Space	Food Truck
14	Downtown Toronto	0	Café	Coffee Shop	Theater	Ramen Restaurant	Comic Shop	Shopping Mall	Burrito Place	Sandwich Place	Electronics Store	Lounge
15	Downtown Toronto	0	Café	Gastropub	Theater	Coffee Shop	Cosmetics Shop	Food Truck	Italian Restaurant	Japanese Restaurant	Middle Eastern Restaurant	Bookstore
16	Downtown Toronto	0	Beer Bar	Farmers Market	Seafood Restaurant	Cocktail Bar	Coffee Shop	Bakery	Liquor Store	Restaurant	Cheese Shop	Fish Market

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
22	Central Toronto	1	Home Service	Yoga Studio	Eastern European Restaurant	Fish & Chips Shop	Fast Food Restaurant	Farmers Market	Farm	Falafel Restaurant	Event Space	Ethiopian Restaurant

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
23	Central Toronto	2	Park	Yoga Studio	Eastern European Restaurant	Fish & Chips Shop	Fast Food Restaurant	Farmers Market	Farm	Falafel Restaurant	Event Space	Ethiopian Restaurant
34	West Toronto	2	Park	Residential Building (Apartment / Condo)	Cupcake Shop	Dance Studio	Fast Food Restaurant	Farmers Market	Farm	Falafel Restaurant	Event Space	Ethiopian Restaurant

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
6	Central Toronto	3	Park	Gym Pool	Playground	Dumpling Restaurant	Fast Food Restaurant	Farmers Market	Farm	Falafel Restaurant	Event Space	Ethiopian Restaurant
10	Downtown Toronto	3	Gym / Fitness Center	Tennis Court	Playground	Park	Gift Shop	Distribution Center	Farm	Falafel Restaurant	Event Space	Ethiopian Restaurant

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
4	Central Toronto	4	Bus Line	Business Service	Swim School	Yoga Studio	Electronics Store	Fast Food Restaurant	Farmers Market	Farm	Falafel Restaurant	Event Space

5) Discussion:

Based on the results shown above, each of the clusters are segmented based on the similarity of 'most common venue'. The major purpose of this project is to suggest a better neighborhood in a new city for the person who are shifting there. Connectivity to the airport, bus stand, city center, markets and other daily needs things nearby.

6) Conclusion:

In this project, using k-means cluster algorithm I separated the neighbourhood into 5 different clusters from the dataset, which have very-similar neighbourhoods around them.

Finally, this project provides recommendation to immigrants who are looking to find a suitable neighbourhood to live in. It also gives insights to business developers on which infrastructure is lacking in that particular neighbourhood.