Capstone Project

Table of Contents:

Introduction

City of Interest:

The city of interest is Toronto, ON, Canada. This city has a wide area of about 630km^2 (Toronto. (n.d.)) and a population of about 6,000,000 (Toronto. (n.d.)).

There are many neighbourhoods in Toronto. In each neighbourhood, there would be sufficient facilities available for the residents. However, when moving, some people may feel uncertain and unwilling to move due to them being comfortable with their current neighbourhoods. This might cause them to feel less willing to move to another neighbourhood.

Aim of project:

This project aims to showcase the similarities between the neighbourhoods based on the top 10 most common areas in each neighbourhood. Depending on the top 10 most common areas, the people would be able to feel more connected as these areas are available and accessible for those in the neighbourhoods. Hence, this project aims to showcase that these locations are suitable for people with similar facilities in their current neighbourhoods.

Target Audience:

The main target audience of this project is those who are planning of moving to another neighbourhood but are not sure of where to move. This project could also apply to those who might want to move in the future.

Data

Requirements of the data:

Data sources:

The dataset for the postal codes in Toronto is referred from the Wikipedia page.

The dataset for the top 10 common venues in each neighbourhood is accumulated using Foursquare API.

Data cleaning:

Postal code dataset

This dataset is extracted from the html by webscraping and then the table is extracted. All the Borough values that are labelled "Not assigned" are removed. The Neighbourhoods labelled "Not assigned" would be given the same name as the respective Borough name. The information is then displayed as a dataframe.
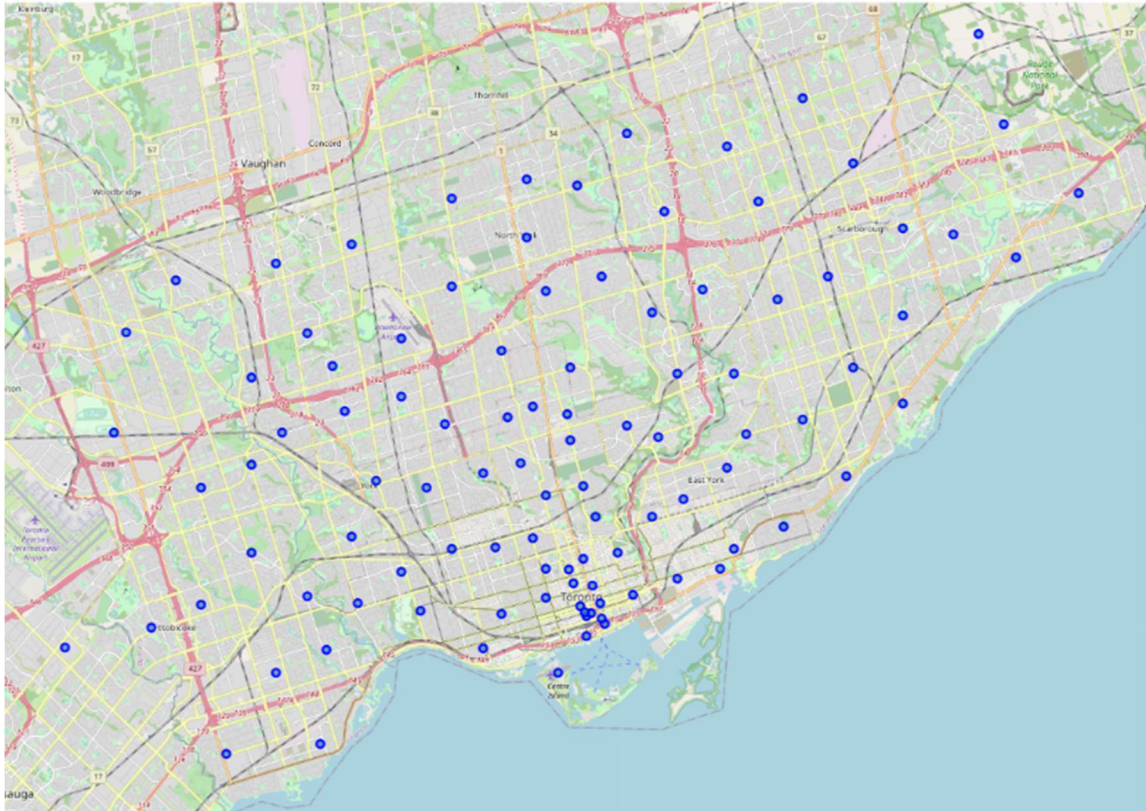
Foursquare API

Using the Foursquare API, the top 10 most common areas in each neighbourhood are received. This provides up to date information about the facilities.

Using a Foursquare developer account, a Client_Id, Client_Secret, and access token was obtained. This provides the access to make calls to the information.

Data Analysis

Based on the postal codes, we found the neighbourhoods that are spread across Toronto. Using the information, we were able to create a map of the neighbourhoods in Toronto.

Map of Neighbourhoods in Toronto

Using the Foursquare API:

We would be able to figure out locations near each neighbourhood.

	Neighbourhood	Neighbourhood Latitude	Neighbourhood Longitude	Venue	Venue Latitude	Venue Longitude	Venue Category
0	Parkwoods	43.753259	-79.329656	Brookbanks Park	43.751976	-79.332140	Park
1	Parkwoods	43.753259	-79.329656	Towns On The Ravine	43.754754	-79.332552	Hotel
2	Parkwoods	43.753259	-79.329656	Variety Store	43.751974	-79.333114	Food & Drink Shop
3	Parkwoods	43.753259	-79.329656	Corrosion Service Company Limited	43.752432	-79.334661	Construction & Landscaping
4	Victoria Village	43.725882	-79.315572	Victoria Village Arena	43.723481	-79.315635	Hockey Arena

Part of table showing the Neighbourhood's Latitude and Longitude, Venue, Venue's Latitude and Longitude and the Venue Category
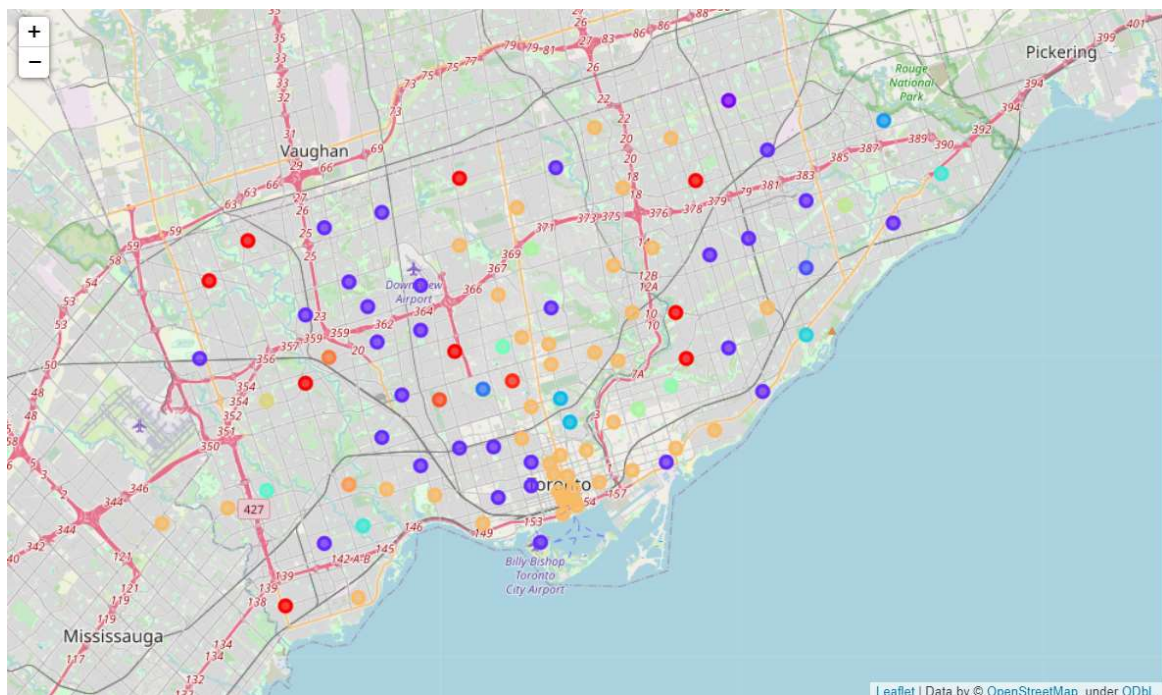
Using this information, we would be able to further group the locations and identify categories of the venues in each neighbourhoods.

Then we can extract the top 10 most common areas in each neighbourhood using Foursquare API.

	Neighbourhood	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	Agincourt	Clothing Store	Lounge	Breakfast Spot	Latin American Restaurant	Skating Rink	Eastern European Restaurant	Dog Run	Doner Restaurant	Donut Shop	Drugstore
1	Alderwood, Long Branch	Pizza Place	Pharmacy	Sandwich Place	Coffee Shop	Pool	Pub	Gym	American Restaurant	Farmers Market	Event Space
2	Bathurst Manor, Wilson Heights, Downsview North	Coffee Shop	Bank	Grocery Store	Fried Chicken Joint	Bridal Shop	Shopping Mall	Sandwich Place	Diner	Middle Eastern Restaurant	Restaurant
3	Bayview Village	Japanese Restaurant	Bank	Chinese Restaurant	Café	Yoga Studio	Discount Store	Dog Run	Doner Restaurant	Donut Shop	Drugstore
4	Bedford Park, Lawrence Manor East	Coffee Shop	Sandwich Place	Italian Restaurant	Grocery Store	Hobby Shop	Indian Restaurant	Pub	Sushi Restaurant	Restaurant	Juice Bar

Part of table shows the top 10 most common areas in each neighbourhood

After this, we can then cluster the neighbourhoods and showcase the data in a map.

Map of Cluster of Neighbourhoods

Results

	Neighbourhood	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
1	Victoria Village	0	Coffee Shop	Pizza Place	French Restaurant	Hockey Arena	Portuguese Restaurant	Drugstore	Discount Store	Distribution Center	Dog Run	Doner Restaurant
8	Parkview Hill, Woodbine Gardens	0	Pizza Place	Pharmacy	Athletics & Sports	Gastropub	Intersection	Flea Market	Pet Store	Café	Bank	Gym / Fitness Center
10	Glencairn	0	Pizza Place	Pub	Japanese Restaurant	Bakery	Ethiopian Restaurant	Escape Room	Electronics Store	Eastern European	Dumpling Restaurant	Diner

Part of table showing the information of Cluster 1

	Neighbourhood	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
85	Milliken, Agincourt North, Steeles East, L'Amo...	1	Playground	Park	Intersection	Yoga Studio	Donut Shop	Diner	Discount Store	Distribution Center	Dog Run	Doner Restaurant

Table for Cluster 2

	Neighbourhood	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
3	Lawrence Manor, Lawrence Heights	2	Furniture / Home Store	Clothing Store	Accessories Store	Boutique	Event Space	Miscellaneous Shop	Coffee Shop	Women's Store	Vietnamese Restaurant
18	Guildwood, Morningside, West Hill	2	Mexican Restaurant	Bank	Breakfast Spot	Medical Center	Electronics Store	Restaurant	Rental Car Location	Intersection	Doner Restaurant
25	Christie	2	Grocery	Café	Park	Baby Store	Nightclub	Restaurant	Candy Store	Coffee	Italian

Part of Table for Cluster 3

	Neighbourhood	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
32	Scarborough Village	3	Playground	Yoga Studio	Dumpling Restaurant	Discount Store	Distribution Center	Dog Run	Doner Restaurant	Donut Shop	Drugstore	Eastern European Restaurant

Table for Cluster 4

	Neighbourhood	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
16	Humewood-Cedarvale	4	Field	Hockey Arena	Trail	Garden	Drugstore	Discount Store	Distribution Center	Dog Run	Doner Restaurant	Donut Shop

Table for Cluster 5

	Neighbourhood	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	Malvern, Rouge	5	Fast Food Restaurant	Diner	Farmers Market	Falafel Restaurant	Event Space	Ethiopian Restaurant	Escape Room	Electronics Store	Eastern European Restaurant	Dumpling Restaurant

Table for Cluster 6

	Neighbourhood	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	Moore Park, Summerhill East	6	Park	Restaurant	Trail	Yoga Studio	Donut Shop	Diner	Discount Store	Distribution Center	Dog Run	Doner Restaurant
91	Rosedale	6	Park	Playground	Trail	Yoga Studio	Donut Shop	Diner	Discount Store	Distribution Center	Dog Run	Doner Restaurant

Table for Cluster 7

	Neighbourhood	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
51	Cliffside, Cliffcrest, Scarborough Village West	7	Motel	American Restaurant	Dumpling Restaurant	Discount Store	Distribution Center	Dog Run	Doner Restaurant	Donut Shop	Drugstore	Yoga Studio

Table for Cluster 8

	Neighbourhood	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
12	Rouge Hill, Port Union, Highland Creek	8	Bar	Home Service	Yoga Studio	Dumpling Restaurant	Distribution Center	Dog Run	Doner Restaurant	Donut Shop	Drugstore	Eastern European Restaurant
101	Old Mill South, King's Mill Park, Sunnylea, Hu...	8	Baseball Field	Home Service	Yoga Studio	Dumpling Restaurant	Distribution Center	Dog Run	Doner Restaurant	Donut Shop	Drugstore	Eastern European Restaurant

Table for Cluster 9

	Neighbourhood	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
11	West Deane Park, Princess Gardens, Martin Grov...	9	Bakery	Yoga Studio	Dumpling Restaurant	Distribution Center	Dog Run	Doner Restaurant	Donut Shop	Drugstore	Eastern European Restaurant	Field

Table for Cluster 10

	Neighbourhood	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	Roselawn	10	Health & Beauty Service	Home Service	Garden	Yoga Studio	Drugstore	Discount Store	Distribution Center	Dog Run	Doner Restaurant	Donut Shop

Table for Cluster 11

	Neighbourhood	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
14	Woodbine Heights	11	Skating Rink	Park	Beer Store	Curling Ice	Yoga Studio	Dumpling Restaurant	Dog Run	Doner Restaurant	Donut Shop	Drugstore

Table for Cluster 12

	Neighbourhood	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	Malvern, Rouge	5	Fast Food Restaurant	Diner	Farmers Market	Falafel Restaurant	Event Space	Ethiopian Restaurant	Escape Room	Electronics Store	Eastern European Restaurant	Dumpling Restaurant

Table for Cluster 13

	Neighbourhood	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	Woburn	13	Coffee Shop	Korean BBQ Restaurant	Yoga Studio	Dumpling Restaurant	Distribution Center	Dog Run	Doner Restaurant	Donut Shop	Drugstore	Eastern European Restaurant

Table for Cluster 14

	Neighbourhood	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
77	Kingsview Village, St. Phillips, Martin Grove ...	14	Sandwich Place	Park	Mobile Phone Shop	Drugstore	Discount Store	Distribution Center	Dog Run	Doner Restaurant	Donut Shop	Yoga Studio

Table for Cluster 15

	Neighbourhood	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
0	Parkwoods	15	Food & Drink Shop	Park	Construction & Landscaping	Hotel	Dumpling Restaurant	Distribution Center	Dog Run	Doner Restaurant	Donut Shop
2	Regent Park, Harbourfront	15	Coffee Shop	Park	Bakery	Breakfast Spot	Café	Pub	Theater	Beer Store	Brewery
	Queen's Park, Ontario			Sushi	College		Yoga	Japanese	Mexican	Distribution	

Table for Cluster 16

	Neighbourhood	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
98	The Kingsway, Montgomery Road, Old Mill North	16	River	Smoke Shop	Pool	Yoga Studio	Donut Shop	Diner	Discount Store	Distribution Center	Dog Run	Doner Restaurant

Table for Cluster 17

	Neighbourhood	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
64	Weston	17	Park	Yoga Studio	Dumpling Restaurant	Discount Store	Distribution Center	Dog Run	Doner Restaurant	Donut Shop	Drugstore	Eastern European Restaurant

Table for Cluster 18

	Neighbourhood	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
21	Caledonia-Fairbanks	18	Park	Women's Store	Pool	Dumpling Restaurant	Discount Store	Distribution Center	Dog Run	Doner Restaurant	Donut Shop	Drugstore

Table for Cluster 19

	Neighbourhood	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
68	Forest Hill North & West, Forest Hill Road...	19	Mexican Restaurant	Sushi Restaurant	Trail	Jewelry Store	Discount Store	Dog Run	Doner Restaurant	Donut Shop	Drugstore	Yoga Studio

Table for Cluster 20

From our results, these are our observations:

- Some neighbourhoods have similar facilities
- Some neighbourhoods do not have any similar facilities with other neighbourhoods

We can obtain these observations from the tables providing information about each cluster and the Map of Clusters we had created.

Discussion

Based on the results obtained, we can provide with some evaluations.

Most neighbourhoods have similar facilities and people would be quite willing to move around between these areas as they are similar in providing facilities that are most common in that neighbourhoods.

However, there are some neighbourhoods that do not have similar top common areas as others. These neighbourhoods may be less preferred by people to move to.

However, more research can be done to further understand the neighbourhoods in Toronto. This could target to a more specific target audience such as families with children or young couples where their preferred top common areas would be the playground and cafes respectively. Hence, a more specified target audience could help to further deepen this project.

Conclusion

Overall, Toronto has many neighbourhoods that have similar facilities for people based on their top common areas in each neighbourhood. Thus, the project aims that people would be more willing to move to new neighbourhoods when there is a need as they do not need to worry about adjusting to new facilities, since similar facilities are provided in these areas.

Thank you

References:

Toronto. (n.d.). Wikipedia. https://en.wikipedia.org/wiki/Toronto

Wikipedia contributors. (n.d.). *List of postal codes of Canada: M*. Wikipedia.

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

- Methodology section which represents the main component of the report where you discuss and describe any exploratory data analysis that you did, any inferential statistical testing that you performed, if any, and what machine learnings were used and why.

Methodology:

What is the process of the project?

1. Identify the longitude and latitude of the popular/busiest location in Singapore
2. Create a list/dataframe of the possible neighbourhoods where the restaurant may be located – locations would within 2-5km from the city area in Singapore
3. Using Foursquare API, get information about these neighbourhoods
4. Determine the number of restaurants and specifically Indian restaurants
5. Create a map to show the restaurants and highlight Indian restaurants

- Results section where you discuss the results.

After the research is done, collecting the necessary information, the results section would expand the information and elaborate on the suitable locations to open an Indian restaurant.

- Discussion section where you discuss any observations you noted and any recommendations you can make based on the results.
- Conclusion section where you conclude the report.