

Report on Exploring for a potential coffee shop venue in Toronto

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Introduction

Background

- Compare different neighborhoods of Toronto
- Toronto - capital of Ontario province in Canada.
- Characterized as one of the most multicultural and cosmopolitan cities in the world.
- Coffee shop business is one of the strengths of its highly diversified economy.
- Search for optimal location of coffee shop with low neighborhood crime rate.

Business Problem

- The XYZ company is willing to open a new coffee shop in a comparatively populated neighborhood of Toronto with lowest crime rate. The coffee shops should be popular in that neighborhood.

Methodology

Queries

- Which neighborhoods have the lowest crime?
- Is population density correlated to the crime level?
- What venues are the most common in different locations within the neighborhoods with lowest crime rate?
- What is the densely populated neighborhood fulfilling the above requirements?

Method

- ✓ The City of Toronto segmented into different neighborhoods using the geographical coordinates of the center of each neighborhood, and then using a combination of location data and machine learning, the neighborhoods grouped into clusters.
- ✓ It is required to leverage location data to get deeper insights into a neighborhood's reputation.

Data

❖ Toronto open data used:

1. [Toronto Crime by Neighbourhood](#)
2. [Toronto Neighbourhoods Geo](#)
3. [Foursquare Developers Access](#)

❖ Toronto Crime by Neighborhood data

- ✓ to find out the neighborhoods having lowest crime rate.
- ✓ also contains the population info of each neighborhoods.

❖ The combination of Foursquare APIs and the Toronto Neighborhoods Geo data

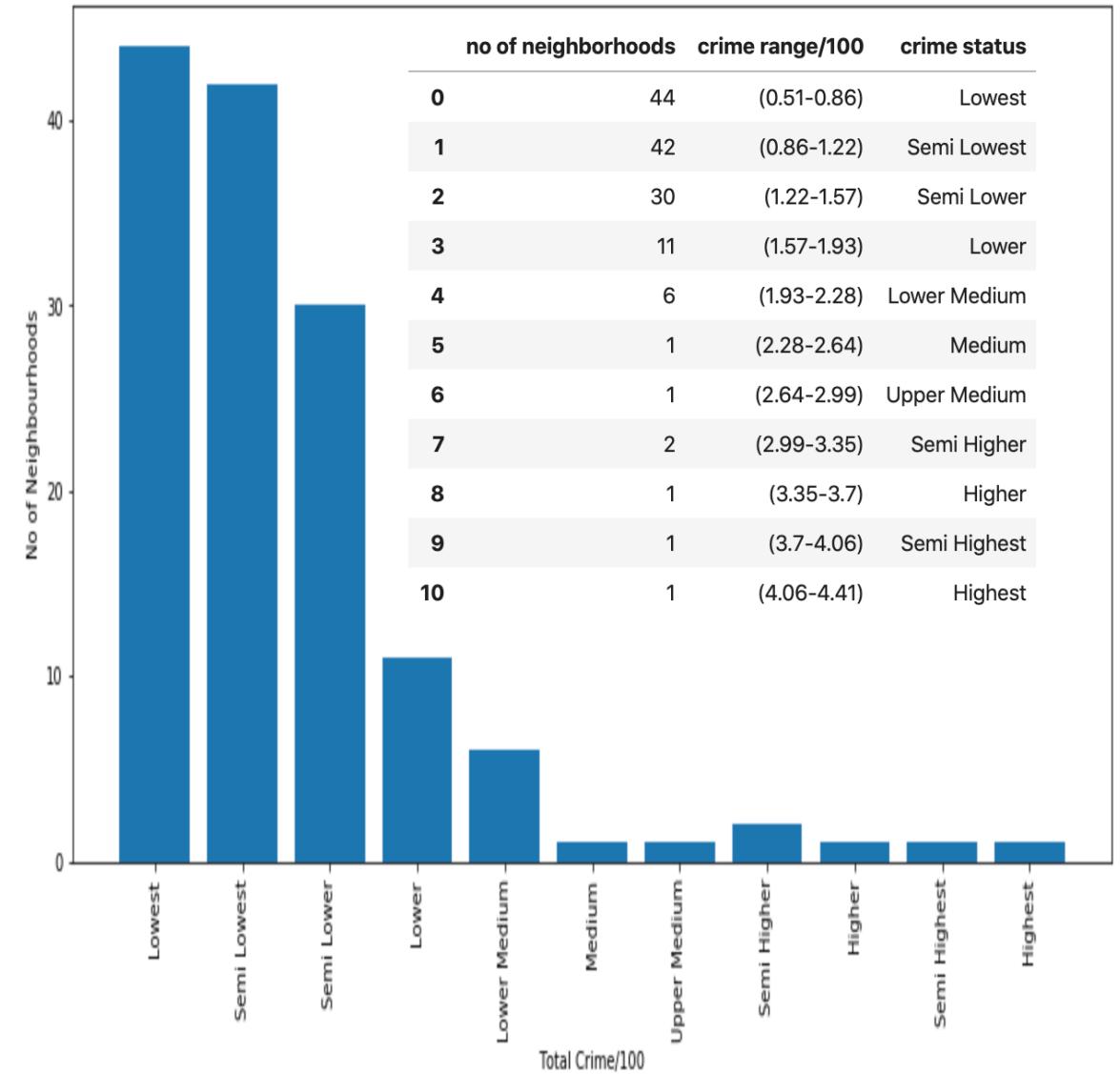
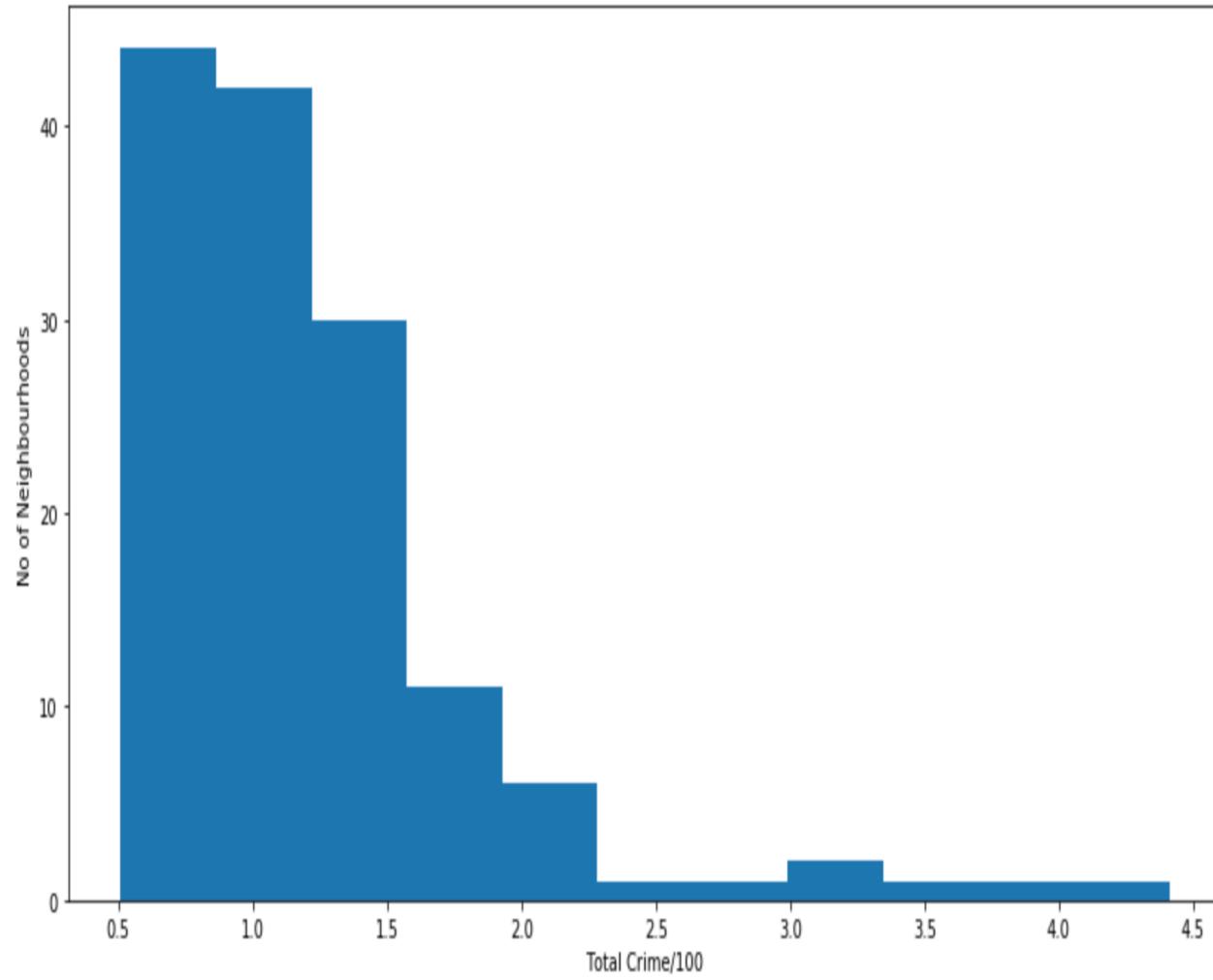
- ✓ to cluster and quantitatively understand the venues most common to that location.

Analysis

	Neighbourhood	Population	Assault_AVG	AutoTheft_AVG	BreakandEnter_AVG	Homicide_AVG	Robbery_AVG	TheftOver_AVG	Total Crime	Total Crime/100
0	Yonge-St.Clair	12528	31.0	4.3	23.3	0.0	5.7	4.3	68.6	0.55
1	York University Heights	27593	333.2	106.3	113.2	0.8	75.8	36.3	665.6	2.41
2	Lansing-Westgate	16164	70.7	23.7	38.8	1.7	14.7	7.0	156.6	0.97
3	Yorkdale-Glen Park	14804	160.2	55.5	63.3	1.2	31.5	22.5	334.2	2.26
4	Stonegate-Queensway	25051	83.2	28.7	52.8	0.0	20.7	6.0	191.4	0.76

- Toronto Crime by Neighborhood dataframe was cleaned and two new columns added.
- Total Crime : Summation of crime for a neighborhood.
- Total Crime/100 : Dividing the total crime by population and then multiplied by 100 .

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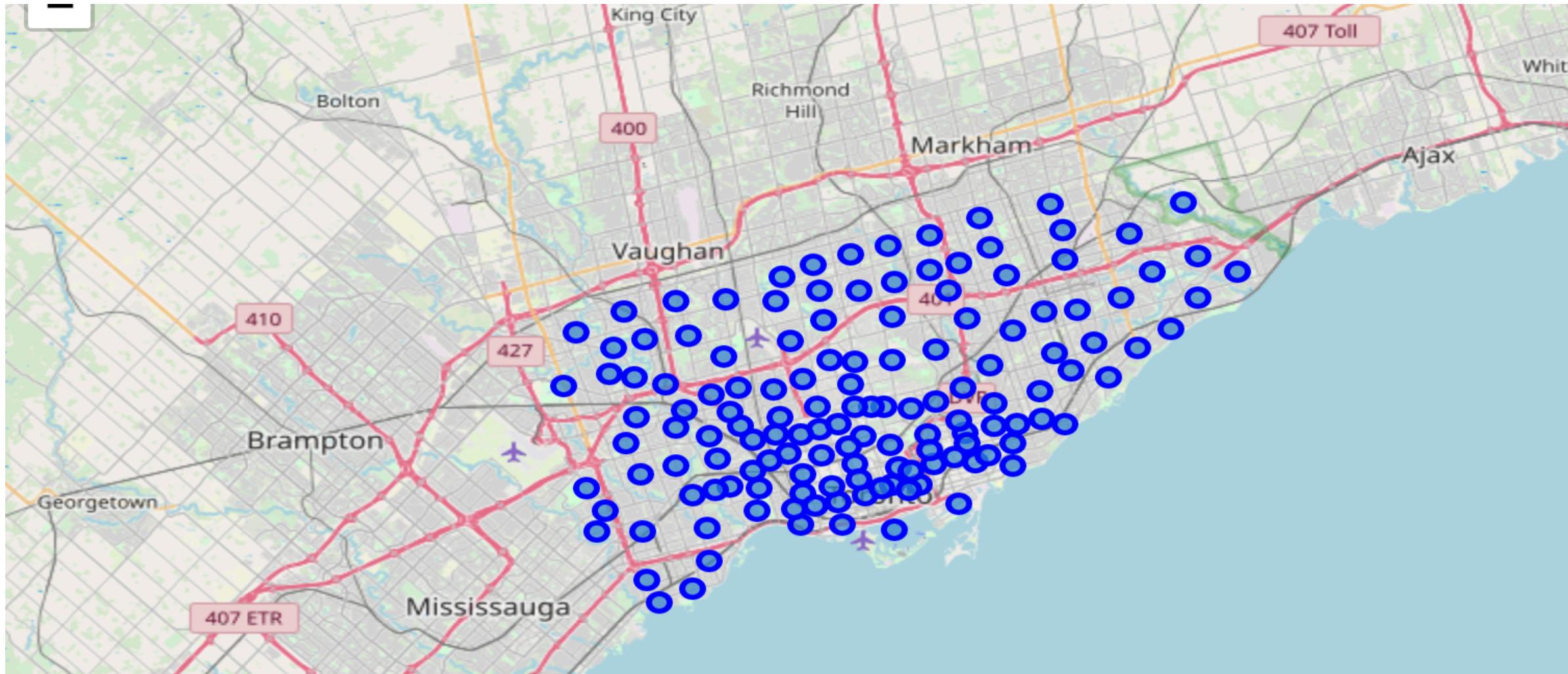
There are 44 neighborhoods within 0.51-0.86 range which are termed as lowest crime rate

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- Toronto Neighborhoods Geo data was cleaned and neighborhood column
- matched with Toronto Crime by Neighborhood .

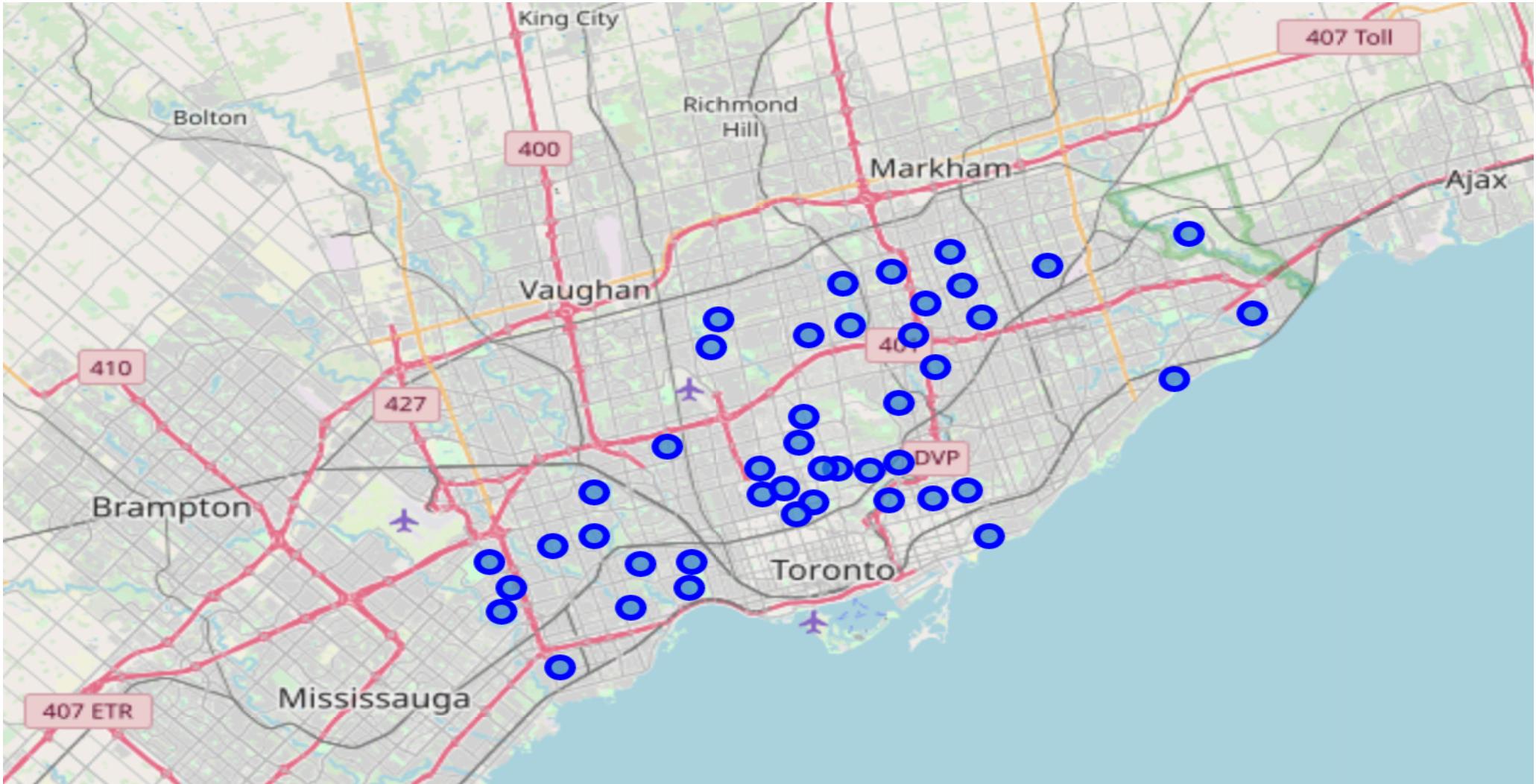
	From Crime DF	From Geo DF
0	Yonge-St.Clair	Yonge-St.Clair
1	York University Heights	York University Heights
2	Lansing-Westgate	Lansing-Westgate
3	Yorkdale-Glen Park	Yorkdale-Glen Park
4	Stonegate-Queensway	Stonegate-Queensway
5	Tam O'Shanter-Sullivan	Tam O'Shanter-Sullivan
6	The Beaches	The Beaches
7	Thistletown-Beaumont Heights	Thistletown-Beaumont Heights
8	Thorncliffe Park	Thorncliffe Park
9	Danforth East York	Danforth East York
10	Humewood-Cedarvale	Humewood-Cedarvale
11	Islington-City Centre West	Islington-City Centre West
12	Danforth	Danforth
13	Rustic	Rustic
14	Scarborough Village	Scarborough Village
15	South Parkdale	South Parkdale
16	South Riverdale	South Riverdale
17	St.Andrew-Windfields	St.Andrew-Windfields

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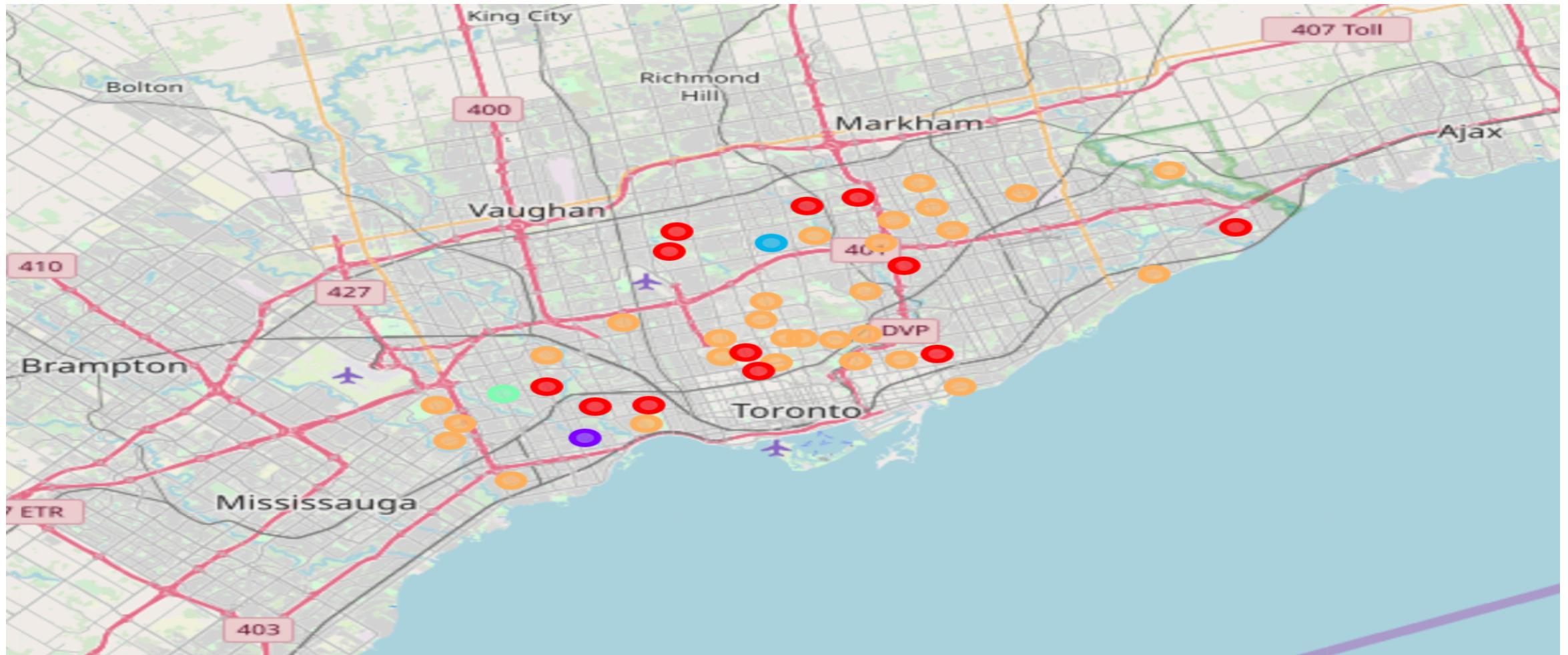
Latitude and Longitude infos of neighborhoods was used to create a map of Toronto with 140 neighborhoods on it.

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Map now shows only 44 neighborhoods that has lowest crime rate.

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Segmented the 44 neighborhoods into 5 clusters

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Comparison of all the clusters with most common venues

Most Common Venue		c0_ven (12 neighborhoods)	c0_freq	c1_ven (1 neighborhoods)	c1_freq	c2_ven (1 neighborhoods)	c2_freq	c3_ven (1 neighborhoods)	c3_freq	c4_ven (29 neighborhoods)	c4_freq
0	1st	Playground	3	Baseball Field	1	Hotel	1	Playground	1	Coffee Shop	4
1	2nd	Park	5	Zoo Exhibit	1	Dance Studio	1	Zoo Exhibit	1	Pizza Place	5
2	3rd	Park	3	Fish & Chips Shop	1	Frozen Yogurt Shop	1	Field	1	Park	3
3	4th	Fast Food Restaurant	2	Frozen Yogurt Shop	1	Fried Chicken Joint	1	Fried Chicken Joint	1	Coffee Shop	3
4	5th	French Restaurant	4	Fried Chicken Joint	1	French Restaurant	1	French Restaurant	1	Zoo Exhibit	3
5	6th	Food Truck	5	French Restaurant	1	Food Truck	1	Food Truck	1	Field	4
6	7th	Food & Drink Shop	5	Food Truck	1	Food & Drink Shop	1	Food & Drink Shop	1	French Restaurant	5
7	8th	Food	6	Food & Drink Shop	1	Food	1	Food	1	Food Truck	5
8	9th	Flower Shop	6	Food	1	Flower Shop	1	Flower Shop	1	Food & Drink Shop	5
9	10th	Fish & Chips Shop	6	Flower Shop	1	Fish & Chips Shop	1	Fish & Chips Shop	1	Food	5

Based on the the above datframe the cluster 4 will be best for the coffee shop location

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Neighbourhood	Population	Total Crime/100	Crime Status	Latitude	Longitude	Cluster Label	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
L'Amoreaux	43993	0.71	Lowest	43.795716	-79.314084	4	Chinese Restaurant	Pizza Place	Bank	Hotpot Restaurant	Noodle House	Supermarket	Breakfast Spot
Mount Pleasant West	29658	0.73	Lowest	43.704435	-79.393360	4	Coffee Shop	Italian Restaurant	Café	Sushi Restaurant	Pizza Place	Dessert Shop	Restaurant
Banbury-Don Mills	27695	0.73	Lowest	43.737657	-79.349718	4	Pizza Place	Coffee Shop	Gourmet Shop	Clothing Store	Cosmetics Shop	Shoe Store	Kids Store
The Beaches	21567	0.86	Lowest	43.671050	-79.299601	4	Coffee Shop	Japanese Restaurant	Pizza Place	BBQ Joint	Pub	Park	Bar
Thorncliffe Park	21108	0.72	Lowest	43.707749	-79.349984	4	Indian Restaurant	Pharmacy	Restaurant	Fast Food Restaurant	Gas Station	Coffee Shop	Burger Joint
Eringate-Centennial-West Deane	18588	0.71	Lowest	43.658017	-79.580445	4	Hockey Arena	Chinese Restaurant	Pharmacy	Convenience Store	Park	Coffee Shop	Pizza Place
Danforth East York	17180	0.65	Lowest	43.689468	-79.331403	4	Farmers Market	Athletics & Sports	Park	Coffee Shop	Italian Restaurant	Field	Fried Chicken Joint
Leaside-Bennington	16828	0.58	Lowest	43.703797	-79.366072	4	Coffee Shop	Sporting Goods Shop	Bike Shop	Park	Performing Arts Venue	Pizza Place	Pool

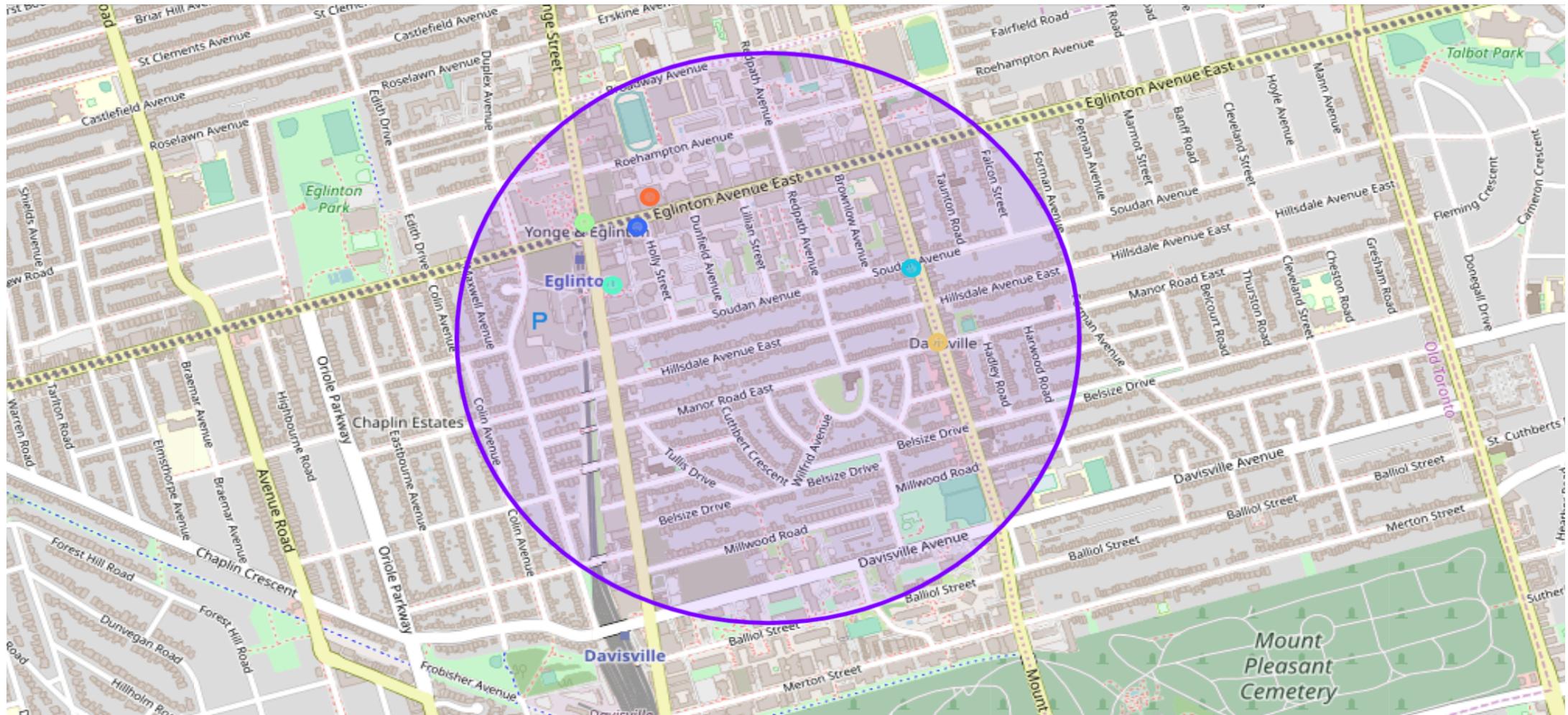
There are 17 neighborhoods with coffee shop being one of the 10 most common venue. Those were sorted in terms of population and the potential neighborhood with lowest crime rate, but comparatively higher population found to be **Mount Pleasant West**.

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There were 66 venues returned by Foursquare. Among them 6 were coffee shops. The coffee shops are the followings

		name	categories	lat	lng
14		Starbucks	Coffee Shop	43.706859	-79.396950
29		Starbucks	Coffee Shop	43.705940	-79.389410
30		Starbucks	Coffee Shop	43.705563	-79.397630
34	Aroma Espresso Bar		Coffee Shop	43.706944	-79.398413
56		Second Cup	Coffee Shop	43.704344	-79.388659
57		Tim Hortons	Coffee Shop	43.707501	-79.396619

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There are 2 coffee shops namely **Tim Hortons** (red) and **Aroma Espresso Bar** (light green) within 120m distance of **Starbucks-1** (dark blue). Moreover, there is another **Starbucks-2** (sky blue) which is 154m away from **Starbucks-1** (dark blue). In addition to that, in far away of 616m and 724m from **Starbucks-1** (dark blue) there are **Starbucks-3** (cyan) and **Second Cup** (yellow).

Starbucks.
Starbucks & distance from 1st Starbucks = 616 m.
Starbucks & distance from 1st Starbucks = 154 m.
Aroma Espresso Bar & distance from 1st Starbucks = 118 m.
Second Cup & distance from 1st Starbucks = 724 m.
Tim Hortons & distance from 1st Starbucks = 76 m.

Results and Discussion

- ✓ The potential neighbourhood is **Mount Pleasant West** which has lowest crime rate with good number of population.
- ✓ The most common venues in **Mount Pleasant West** are coffee shops according to Foursquare location data.
- ✓ In the neighbourhood, there are 3 **Starbucks**, 1 **Tim Hortons**, **Aroma Espresso Bar** and **Second Cup**.
- ✓ It was also noticeable that four coffee shops are in close proximity of **Young & Eglinton**.
- ✓ The remaining twos are in the side of **Mount Pleasant Road** in a distance of ~108m among them.
- ✓ The XYZ company can open a new coffee shop at the junction of **Mount Pleasant & Eglinton**.

Conclusion

- ✓ There are 140 neighbourhoods in the city of Toronto with each has its own features.
- ✓ As XYZ company was looking for a neighbourhood with lowest crime rate, first the neighbourhoods belong to that criteria were identified.
- ✓ Thanks to Toronto open data portal that provided us the data specially, neighbourhoods, population, crime, demographic infos.
- ✓ The most common venues were identified using the combination of Foursquare APIs and location data.
- ✓ Ultimately, the potential neighbourhood is found to be **Mount Pleasant West**.