Introduction

Background:

The city of Toronto is the most popular city in Canada. People around the world have been attracted to be here. In 2007 Toronto has been awarded as the most safest city by economist magazine. However, we cannot overlook the uncovered side of this city. From the recent research, there is an increasing number of crime rate in Canada, even if crime in Toronto has been relatively average compared with other major cities. In this report, the topic regarding public safe, especially different types of crimes in Toronto, will be taken into consideration. The various neighborhoods in Toronto will also be explored. The insights derived from relevant data will provide readers a better understanding of public safety in Toronto which could help, for instance, to select the proper living area from nearly 170 neighborhoods.

Business Problem:

How many and what neighborhoods are shaped in Toronto?
What is the population density in each neighborhood?
The number of the different type of crime risks in 2019 from all neighborhoods
Which kind of neighborhoods are classified with similar crime risks?

Target Audience:

The purpose of this project is to help me to get a good understanding of the situation of public safety in 2009 in Toronto. Through the comparison of all neighborhoods, the different crime risks will be detected, which support people for further decisions. For instance, to investigate behind what caused the high risks in the specific area, to find the safest neighborhood, or to take the effective measures to avoid the crime cases happening again.

Methodology

Data Exploration:

Toronto police service public safety data portal

https://opendata.arcgis.com/datasets/af500b5abb7240399853b35a2362d0c0_0.geojson

The data set contains Toronto's neighborhoods, population, the types of crime risks (including assault, auto theft, break and enter, robbery), area size, longitude and latitude. Through connecting the data by using Python requests, the raw dataset will be ready for further manipulation.

	Neighborhood	Population	Assault 2019	Assault Rate 2019	AutoTheft 2019	AutoTheft Rate 2019	BreakandEnter 2019	BreakandEnter Rate 2019	Robbery 2019	Robbery Rate 2019
0	Yonge-St.Clair	12528	295.3	37	6	47.9	28	223.5	4	31.9
1	York University Heights	27593	1340.9	370	144	521.9	108	391.4	79	286.3
2	Lansing-Westgate	16164	445.4	72	32	198.0	39	241.3	11	68.1
3	Yorkdale-Glen Park	14804	1411.8	209	61	412.1	84	567.4	42	283.7
4	Stonegate-Queensway	25051	327.3	82	34	135.7	64	255.5	22	87.8

Data Manipulation:

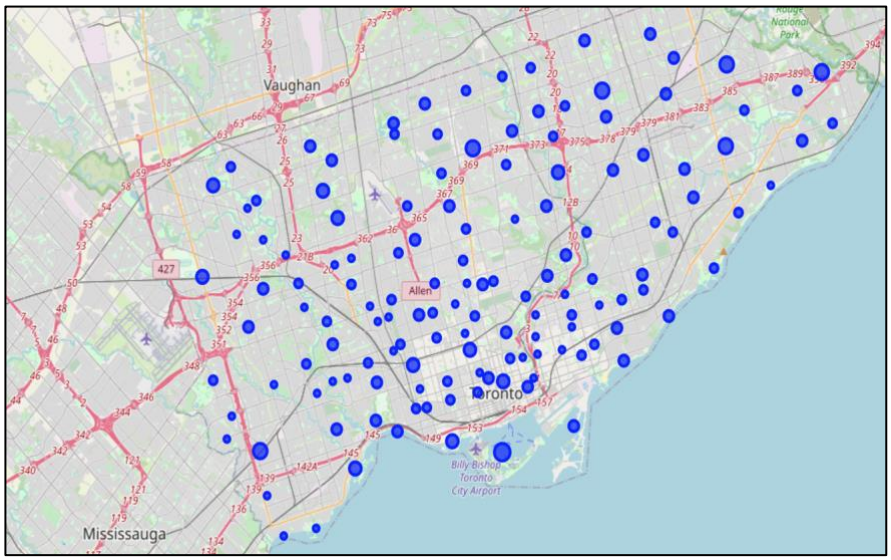
The geographical coordinates in the form of longitude and latitude are acquired with the support of Foursquare API. Geocoder package is allowed to convert the name of neighborhood to the specific accurate longitude and latitude values, and then will be combined with raw dataset.

	Neighborhood	Neighborhood Latitude	Neighborhood Longitude	Venue	Venue Latitude	Venue Longitude	Venue Category
0	Yonge-St.Clair	43.688762	-79.399013	LCBO	43.686991	-79.399238	Liquor Store
1	Yonge-St.Clair	43.688762	-79.399013	The Market By Longo's	43.686711	-79.399536	Supermarket
2	Yonge-St.Clair	43.688762	-79.399013	The Bagel House	43.687374	-79.393696	Bagel Shop
3	Yonge-St.Clair	43.688762	-79.399013	Daeco Sushi	43.687838	-79.395652	Sushi Restaurant
4	Yonge-St.Clair	43.688762	-79.399013	Mary Be Kitchen	43.687708	-79.395062	Restaurant

Data Visualization:

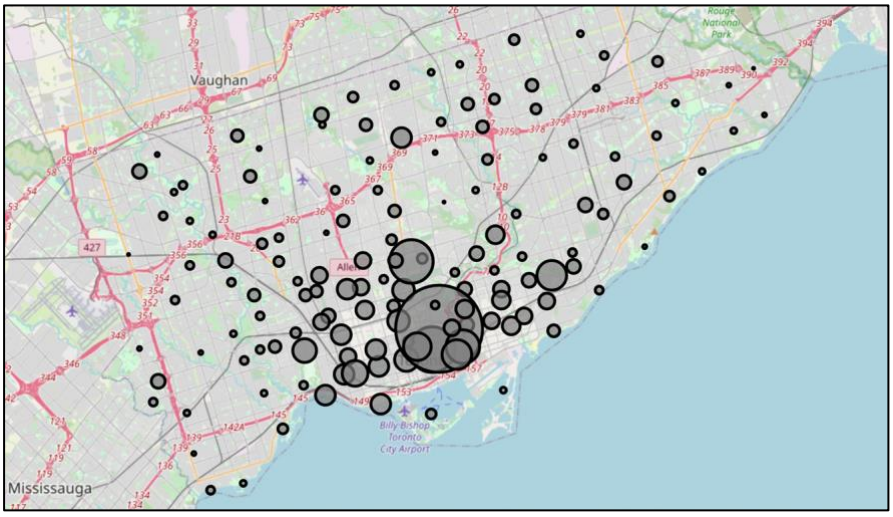
The geographical distribution of population in Toronto

From the first graphic, there are 140 neighborhoods built around in Toronto. The larger circle size means the more people live in. The calculation has been scaled by dividing 1000 and being taken by square root. The neighborhood with the largest number of residents is Waterfront Communities -The Island.



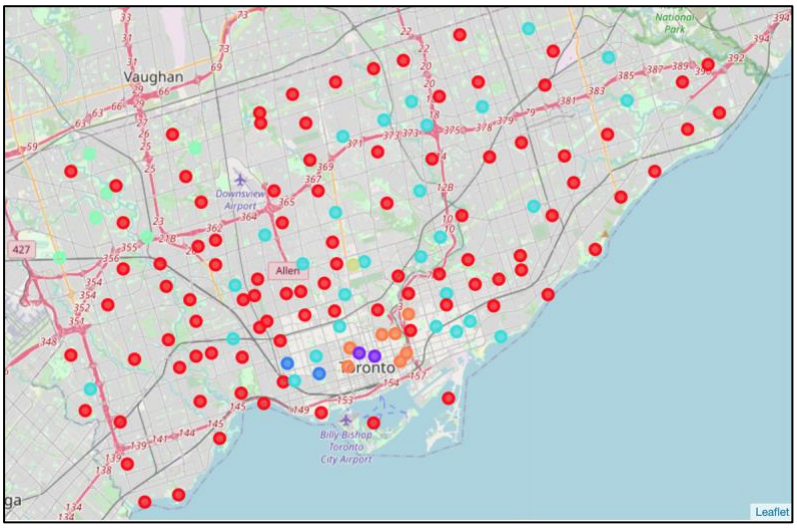
The population density among neighborhoods

The population density shows the number of population per area size. In 2019, the neighborhood with the highest density value is North St.James Town, and with the lowest density is Bridle Path-Sunnybrook-York.



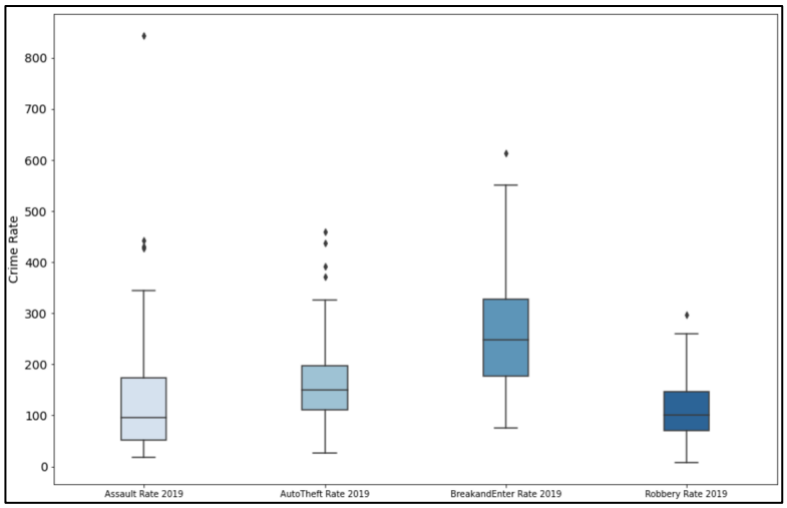
The similar pattern of neighborhoods by crime types

Through the analysis of the times of crimes in each venues among neighborhoods, and the crime rate per capita to collect the similar pattern. In this case, all neighborhoods are attributed into 7 categories, because there is elbow point founded by 6 - 7 clusters. However, the further analysis will only take clusters into consideration which contains the first three biggest number of neighborhoods. Namely, the points are colored by red, blue and orange at below. For the remaining clusters will not be discussed here due to the lack number of neighborhoods.



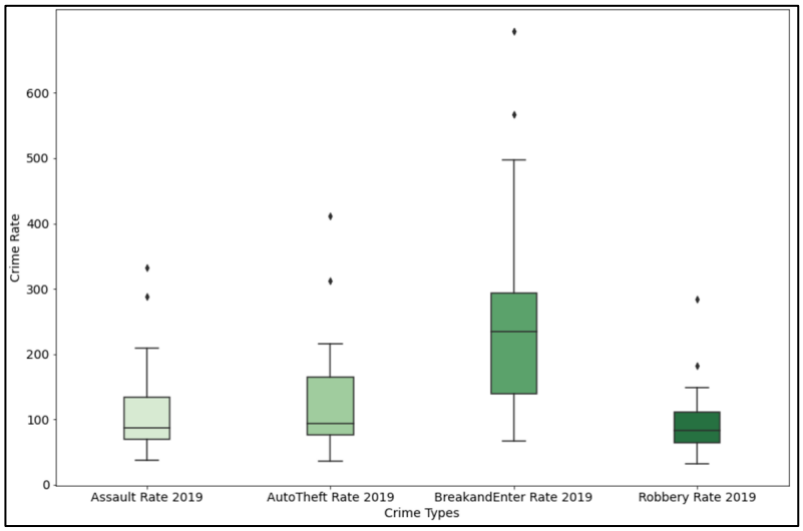
The crime rate by different crime type in cluster 1

The first clusters included the highest number of neighborhoods. The graphic shows that the most crime rate derives from the type of enter and break. The median of crime rate from assault and robbery is lower than 100.



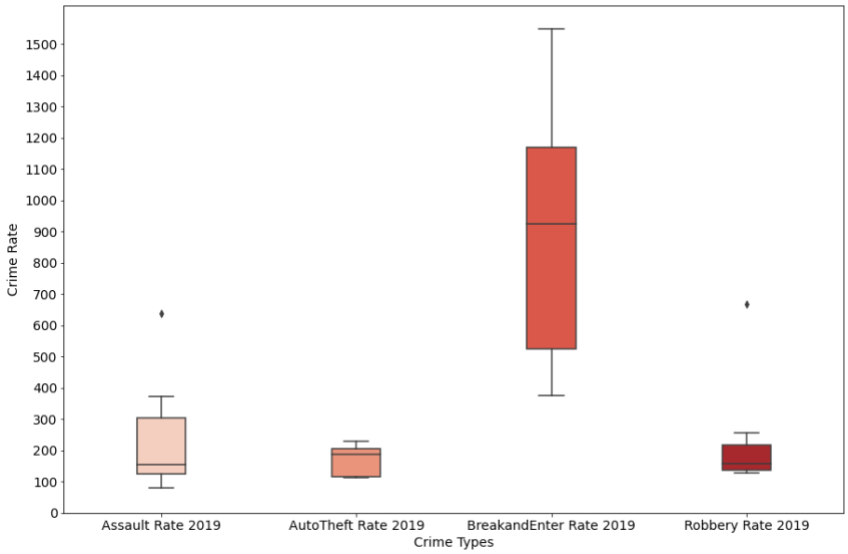
The crime rate by different crime type in cluster 2

The second clusters includes the second highest number of neighborhoods. Compared with the preceding one, the crime rate of auto theft is lower, however, the crime rate of break and enter is increasingly larger. In the specific neighborhood, the rate is even more than 600.



The crime rate by different crime type in cluster 3

The third clusters included the third highest number of neighborhoods. In this cluster, the extreme high crime rate of break and enter can be detected, compared with other crime types.



Conclusion

The three clusters mentioned above contains the most of neighborhoods in Toronto. In these clusters, the common point has been founded: the crime type with most highest crime rate is break and enter. The crime rate of break and enter in some specific neighborhoods are over than 1500. The police officer in Toronto needs to figure out some measures to reduce this crime rate in the future. And there is no large difference of crime rate in assault, auto-theft, and robbery.