# Neighbourhoods Recommendation

A Comparison Among 140 Neighbourhoods of Toronto

## Problem

As Toronto attracted a large number of investors and immigrants all over the world,the question of which neighbourhood is better in Toronto for settlement has draw many people's concern.

We will find out a group of neighbourhoods in Toronto with better performance on safety ,employment,shelter affordability, and with  venues that comply with people's preference.

New immigrants and residents who consider to make a move will be interested in our findings. The government of Toronto may also be interested in the comparison result among neighbourhoods.

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# CONTENTS

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# Data Acquisition and Cleaning

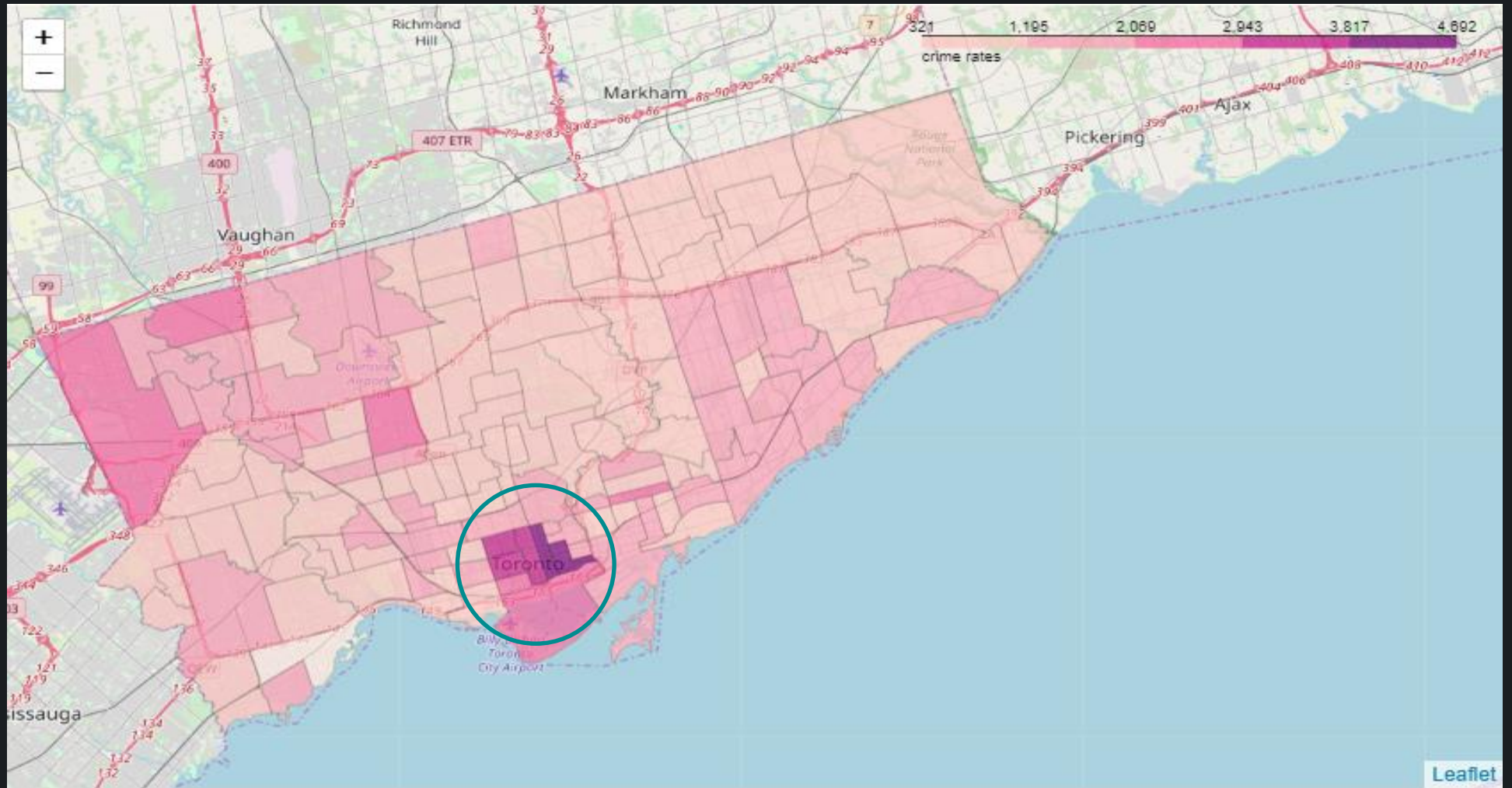1、 Latitudes and and longitudes of neighbourhoods boundaries, unemployment rate and unaffordable rate data are derives from https://www.toronto.ca/citygovernment/neighbourhood-profiles

2、 Crime rate derived from http://data.torontopolice.on.ca/search?q=crimeate

3、 Latitudes and Longitudes of neighbourhoods centers calculated using mapwindow software by Latitudes and and longitudes of neighbourhoods boundaries

4、 unaffordable rate is calculated using the people have to spend 30% or more of income on shelter costs for each neighbourhood dividing  by the number of Owner and tenant households with household total income greater than zero
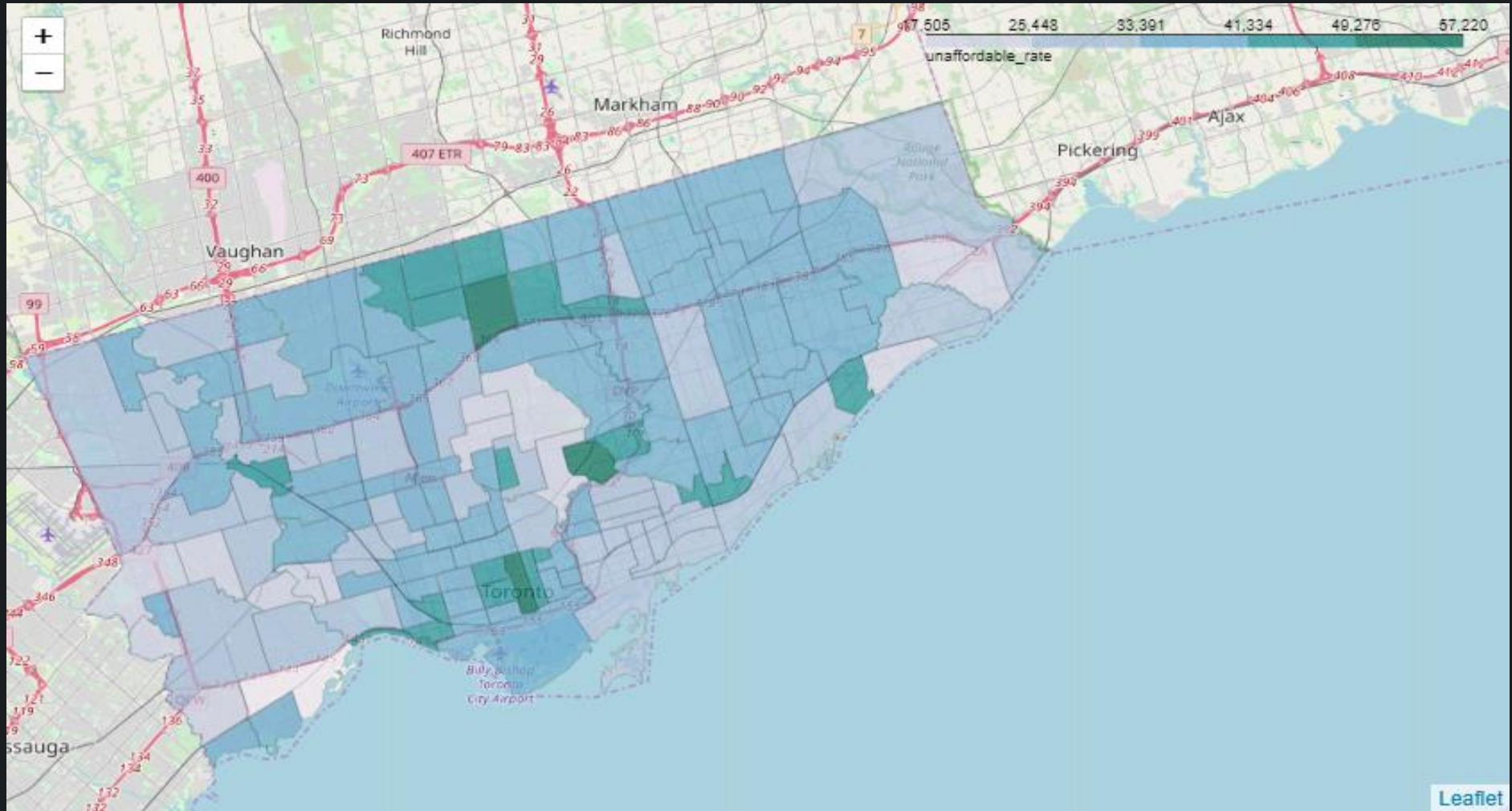
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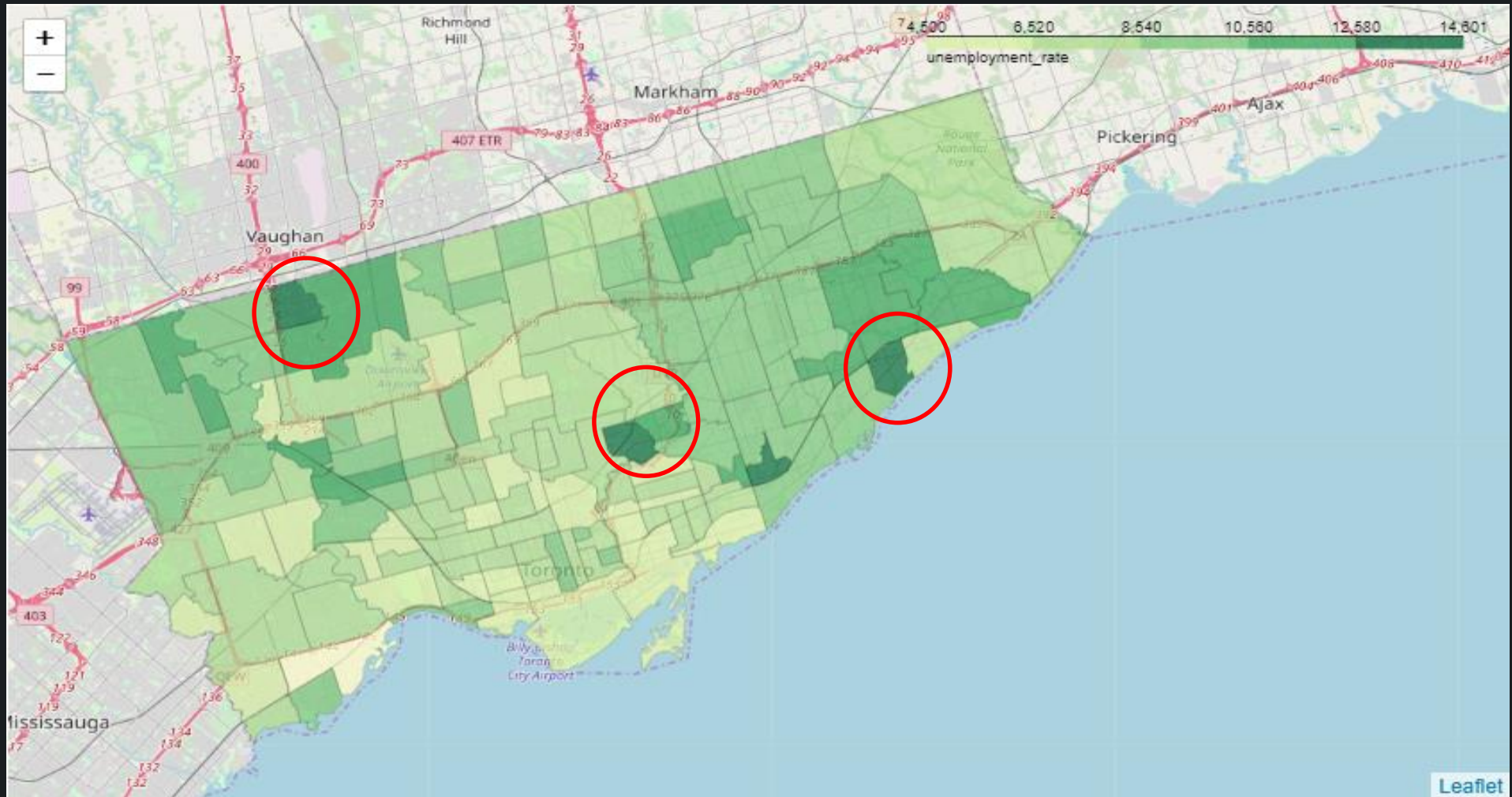
Data visualization -crime rate

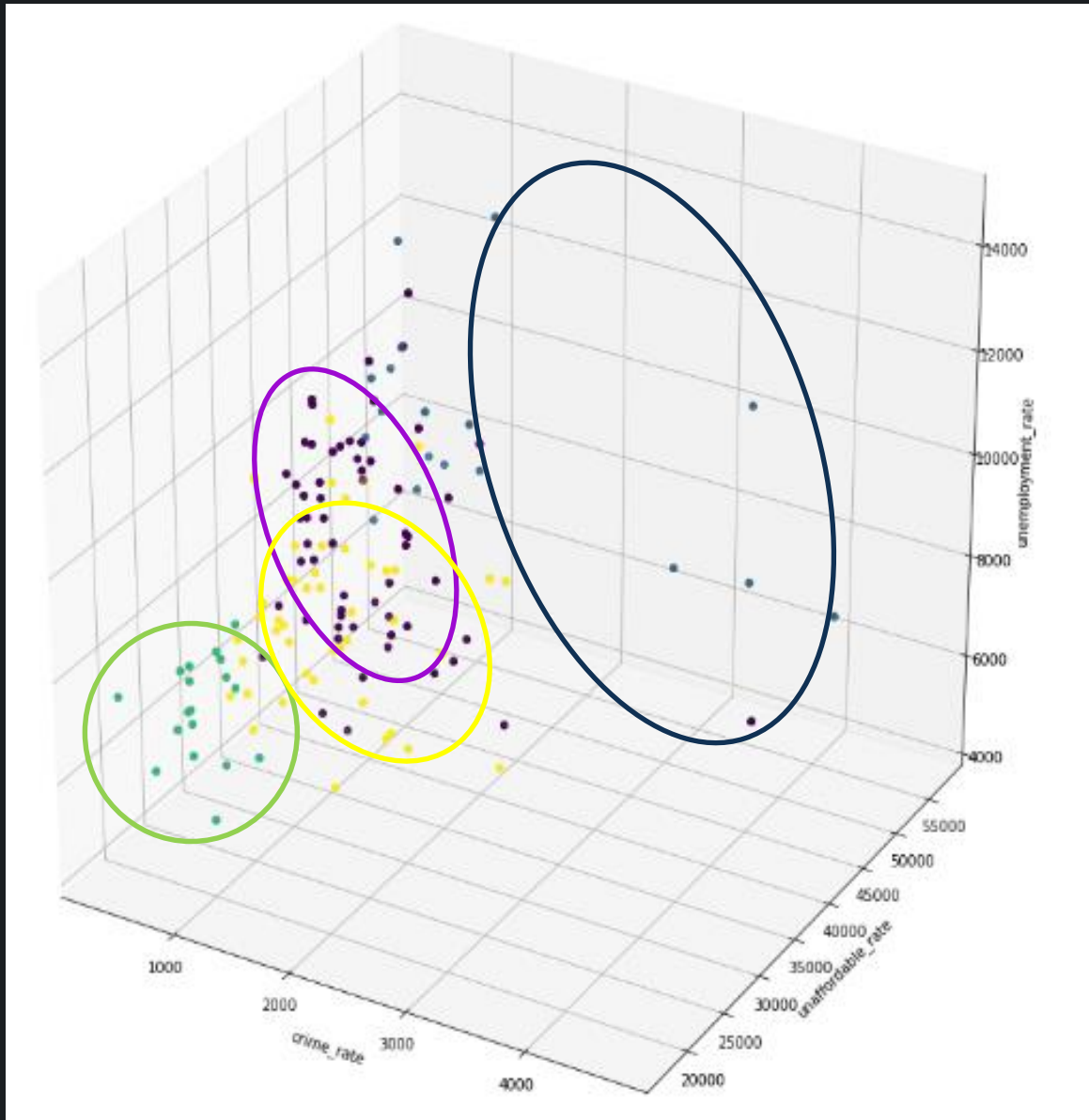Areas in blue circle have highest crime rate, while the central and eastern Toronto have lower crime rate on average.

people live in central Toronto are more likely to pay less than 30% income for shelters.The rate is also low in western and eastern Toronto.

the unemployment rate is lowest in southwestern Toronto. Some parts of central and eastern Toronto has relative low unemployment rate as well. Conversely,areas in red circles undertake higher unemployment rate.
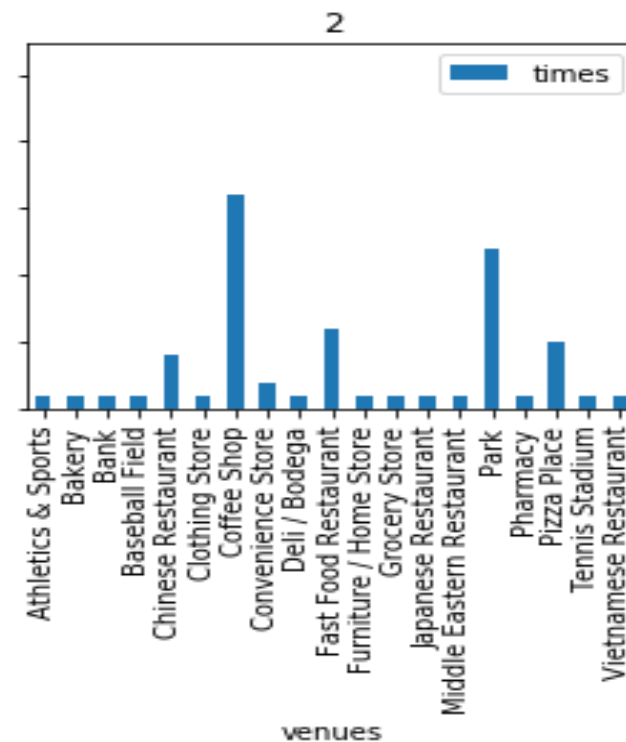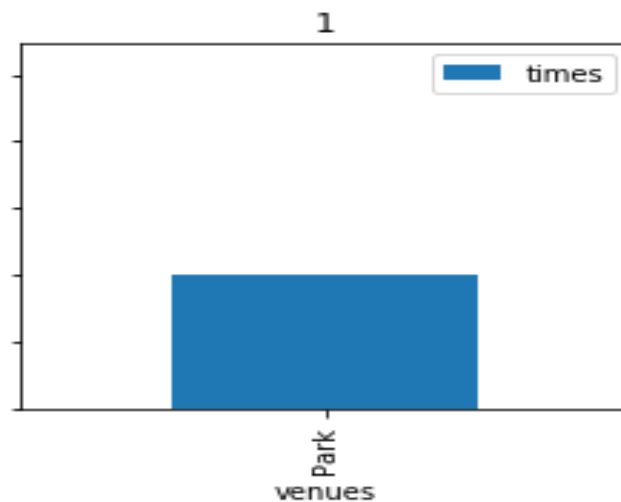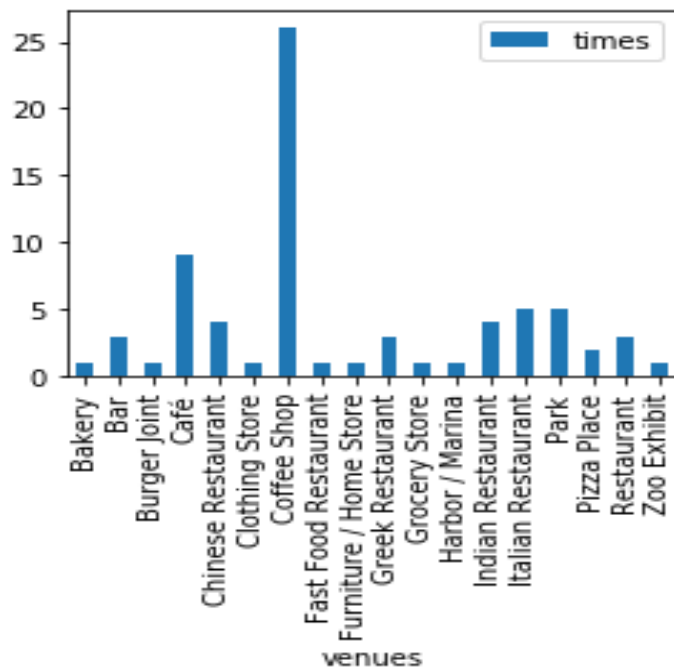
## Numeric data clustering

Using unsupervised learning K-means algorithm to cluster the neighbourhoods with clusters =4 .

We can find that:

-cluster 0: higher on average unaffordable rate , high or low crime rate , and medium to high unemployment rate.

-cluster1,: very high unaffordable rate , high or low crime rate , and medium to high on average unemployment rate.

-cluster2, very low unaffordable rate , lower than average crime rate , and lower than average unemployment rate.

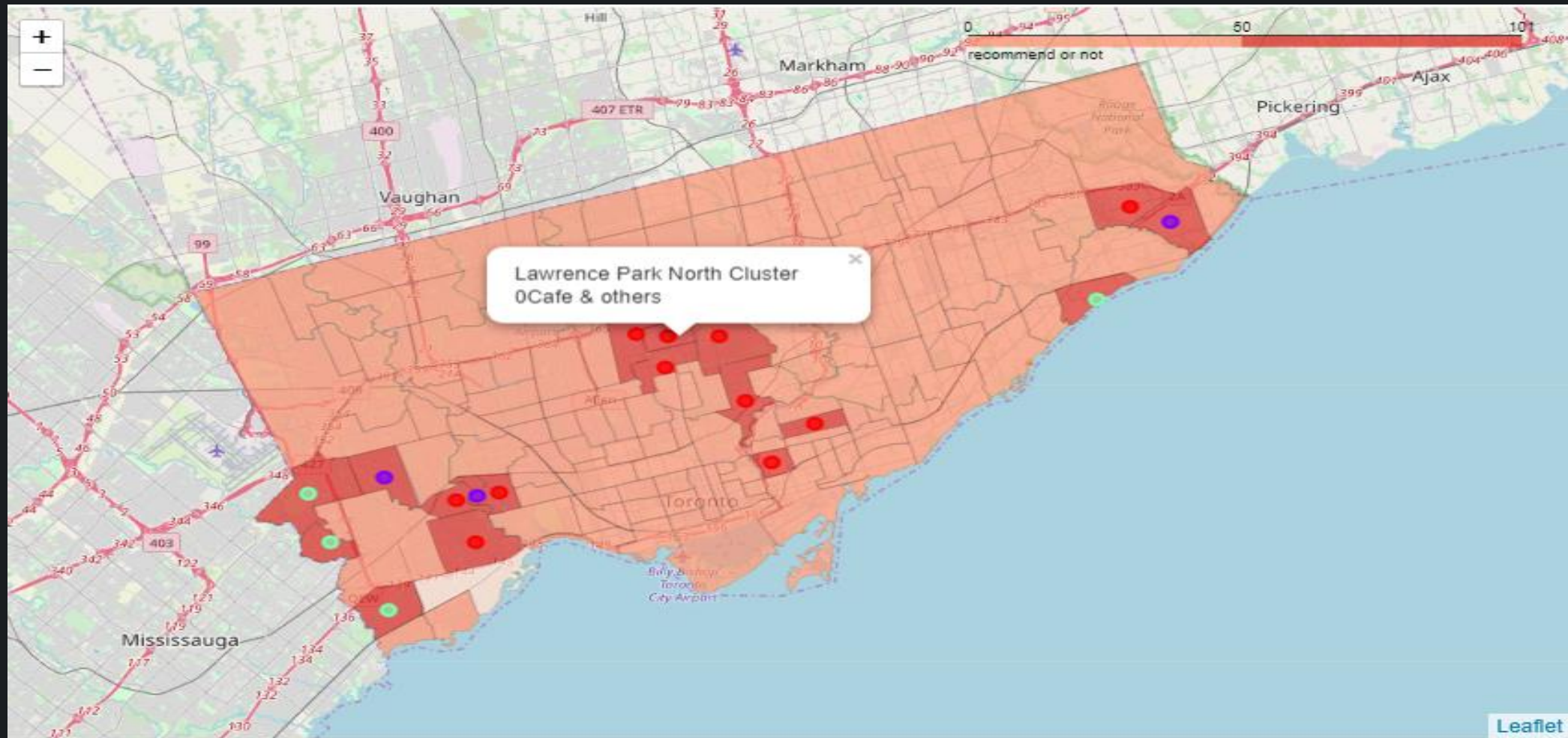-cluster3, medium unaffordable rate , medium crime rate , and medium to high unemployment rate.

## Venues data clustering

Using unsupervised learning K-means algorithm to cluster the neighbourhoods with clusters =3 .

We can find that:

-Cluster0: "Cafe & others Venues"

-Cluster1: "park Venues"

-Cluster2: "Multiple Social Venues"

## Recommendation choropleth

The final choropleth map highlight our recommended neighbourhoods with dark red,while other neighbourhoods in light red color. I also add markers on the choropleth map to distinguish venues clusters and text information indicating neighbourhoods name.

| Hood | Neighbourhood | crime_Rate (per 100000 people) | unaffordable_rate (per 100000 people) | unemployment_rate (per 100000 people) | venues clustername |
|---|---|---|---|---|---|
| 10 | Princess-Rosethorn | 533.36 | 19455.25 | 6000 | park |
| 11 | Eringate-Centennial-West Deane | 616.62 | 22684.17 | 7400 | Multiple Social Venues |
| 12 | Markland Wood | 491.79 | 24622.53 | 6200 | Multiple Social Venues |
| 15 | Kingsway South | 880.16 | 19134.08 | 7500 | Cafe & others |
| 16 | Stonegate-Queensway | 692.70 | 27303.42 | 6700 | Cafe & others |
| 20 | Alderwood | 699.14 | 21800.43 | 6100 | Multiple Social Venues |
| 39 | Bedford Park-Nortown | 911.25 | 27008.15 | 5500 | Cafe & others |
| 41 | Bridle Path-Sunnybrook-York Mills | 886.34 | 22839.51 | 8000 | Cafe & others |
| 56 | Leaside Bennington | 644.68 | 22023.35 | 6900 | Cafe & others |
| 59 | Danforth - East York | 628.02 | 27084.82 | 6900 | Cafe & Danforth |
| 68 | North Riverdale | 676.66 | 26152.30 | 5300 | Cafe & others |
| 89 | Runnymede-Bloor West Village | 935.63 | 21073.30 | 5100 | Cafe & Runthers |
| 103 | Lawrence Park South | 518.30 | 22929.38 | 7500 | Cafe & others |
| 105 | Lawrence Park North | 516.78 | 22437.67 | 6400 | Cafe & others |
| 114 | Lambton Baby Point | 580.09 | 23200.00 | 7600 | park |
| 133 | Centennial Scarborough | 359.96 | 17505.72 | 7600 | park |
| 134 | Highland Creek | 914.76 | 24357.24 | 8500 | Cafe & others |
| 140 | Guildwood | 762.35 | 24060.15 | 7900 | Multiple Social Venues |

# Recommendation list

The final integrated recommendation lists are shown above

## Discussion

This report only considered 4 factors:crime rate, unaffordable rate,unemployment rate and venues in recommendation. However, there are other factors that may make sense. For example, many people regard transportation and education as important factors for their decision. Therefore, further studies should be made according to a broader range of data.

## Conclusion

In conclusion, neighbourhoods located in some parts of eastern , central and western Toronto have lower crime rate, unemployment rate and unaffordable rate. New imigrants and residents who decide to move may consider these neighbourhoods.Moreover, park venues in our recommendation lists are mainly located in western Toronto, while Cafes venues are mainly located in central Toronto. People looking for a better environment may take these results as a reference.

THANK YOU
FOR WATCHING