Do surroundings influence the nature of crime in a city ?

CAPSTONE PROJECT

-NUTAN

Among other variables, Surrounding venues have a clear impact on the nature of the crimes in Toronto

"Houses in the western and eastern suburbs and near parks are related to more Break and Enter Crimes"

"Black Creek , West hill neighborhoods in the North Western & eastern Toronto have a higher proportion of Robbery especially around Fast Food restaurants , Pizza Places & Grocery stores"

"~60% of all Assault cases in Toronto , happen near the downtown area and 40% of those happen close to coffee shop. Sundays & Commercial premises add to the factors which impact the likelihood of Assault"

Structure & Agenda

Problem & Approach

Methodology & Algorithms Used

Exploratory Data Analysis

Clustering

Next Steps & Further Analysis possibilities

Problem & Approach

Problem
- Analyse & understand the relationship of how the surrounding venues impact the nature of the crime in a city

Targeted Towards
- Toronto Police -to equip them with quantitative information so crime can be better understood and averted
- New residents & Commercial property owners - to safeguard themselves better
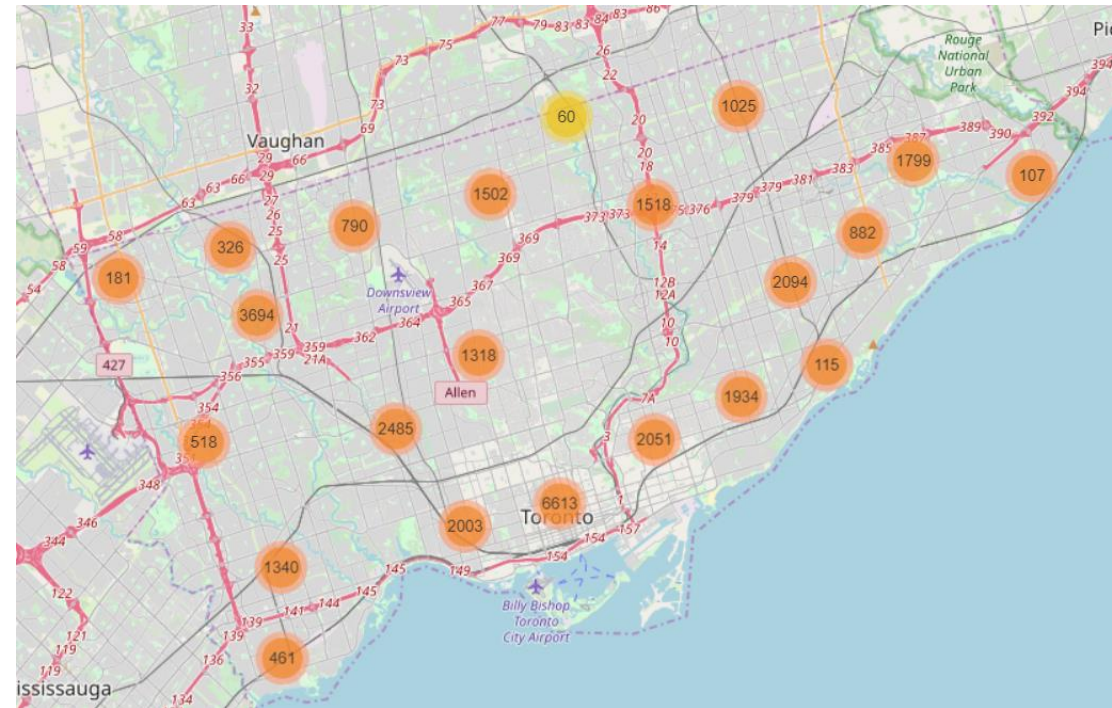
Approach
- Data from Toronto Police on Major crimes combined with venue data from foursquare.
- This combined data with details of the crime and the venues surrounding the crime scene is put through unsupervised clustering algorithm
- Results are analysed to build an understanding of the relationship between venues and nature of crime

Methodology & Algorithms Used

MCI or Major Crime Indicator data from Toronto Police has the crime scene location, which was used to fetch surrounding venues within a 300m radius

After restricting to 2016 data only , there were 32K crimes listed in the city , with ~16% of those around the down town area and rest spread out across the city

EDA tells us – Assault as a crime was the most frequent. Midnight and Weekends were more prone

Basic EDA resulted in the following observations

Assault is a very prevalent crime and is almost 3X more frequent than the next frequent crime – Break and Enter.
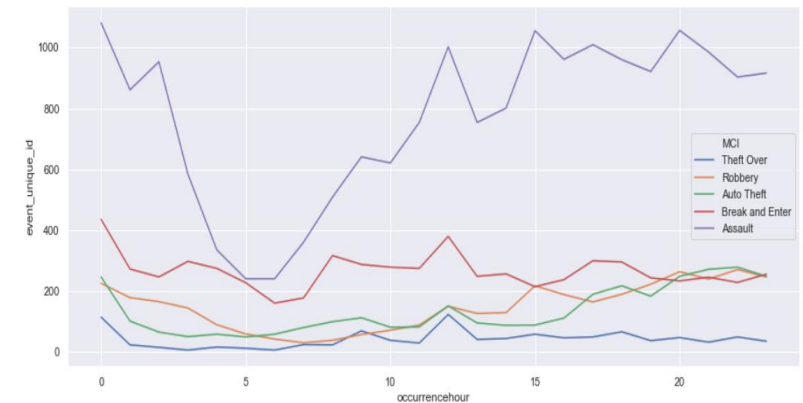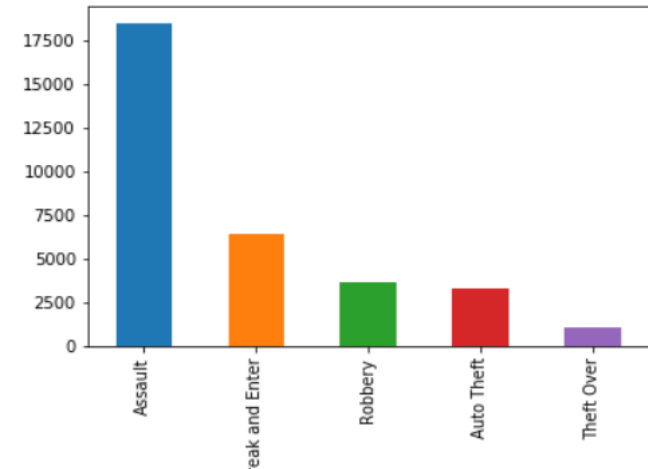
Summer months have a higher crime rate than the winter months, with the exception of October

Weekends have a higher crime rate in general except for Break & Enter which peaked on Friday only

Assault is highest at midnight, but is also higher in the evenings & nights

Break & Enter has a different pattern, its relatively flat all through out the day but has a high during midnight(possibly as lesser number of people would be around)

Auto Theft, Robbery are more frequent during evenings and nights

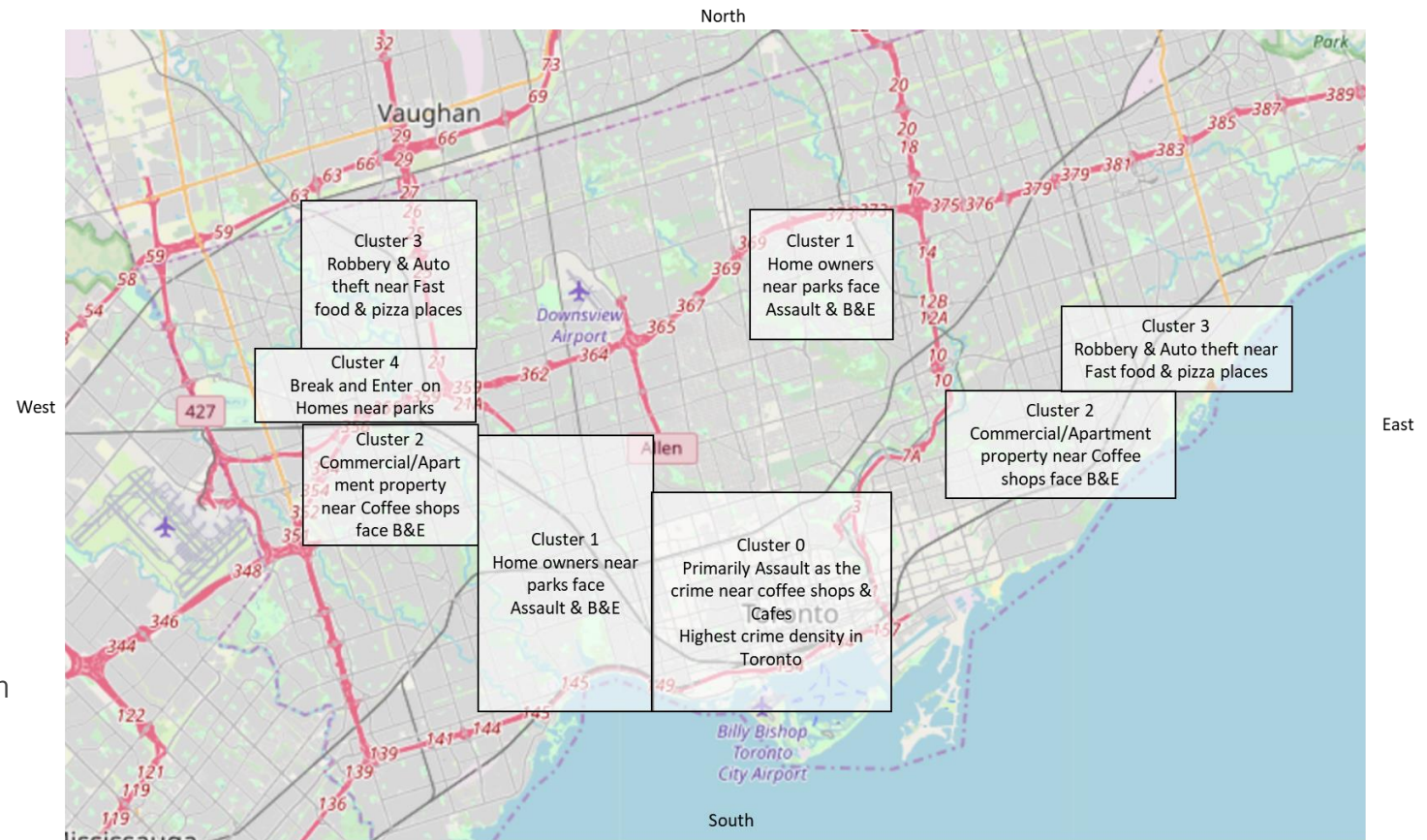# Clustering Algorithm resulted in 5 clusters with distinct patterns

Cluster 0 – Centred around down town, Almost all MCI Crime types are higher in absolute numbers. Crime scenes largely are around Coffee shops and Cafes

Cluster 1 – Assault, Break and Enter are relatively higher with the risk majorly around homes near parks

Cluster 2 – Comparable to cluster 1 in some ways with difference in the targets of crime. Focusses on Apartments and Commercial spaces with Coffee shops in the neighbourhood.

Cluster 3 –Robbery and Auto Theft around Fast Food joints and Pizza places seem to be relatively higher

Cluster 4 – Largely Break and enter crimes on homes in the western suburbs of Toronto. Parks seem to be closest to these crime scene

Next Steps & Further Analysis possibilities

This can be extended with more attributes from the Toronto Open data portal.

Simple addition of demographics data to the existing Neighbourhood data and then clustering will help us understand if senior resident areas have a crime vs areas with working parents.

Economic and Well being indicators can also be added to further analyse and understand the reasons for the crime and how it can be fundamentally addressed.