

Capstone Project - Battle of Neighbourhoods in Edmonton, Canada

**-- A neighbourhood recommendation framework for
newcomers**

February, 2020

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Introduction to Edmonton

- **Canada's 5th largest municipality**
- **Supply and service hub for the province's crude oil industry and other northern resource industries**
- **Attractive destination city for migrating workers and small business owners**
- **Many dynamic and beautiful neighbourhoods**



Data Sources and Collection

Property Assessment Data

- Dataset was obtained from the City of Edmonton
- The average residential property values of each neighbourhood was calculated from the assessed value of each property in each neighbourhood

Neighbourhood Criminal Occurrence

- Dataset was obtained from Edmonton Police Service
- Criminal occurrence in each neighbourhood was reported on monthly, quarterly and annual basis
- Number of crimes in each neighbourhood can be calculated

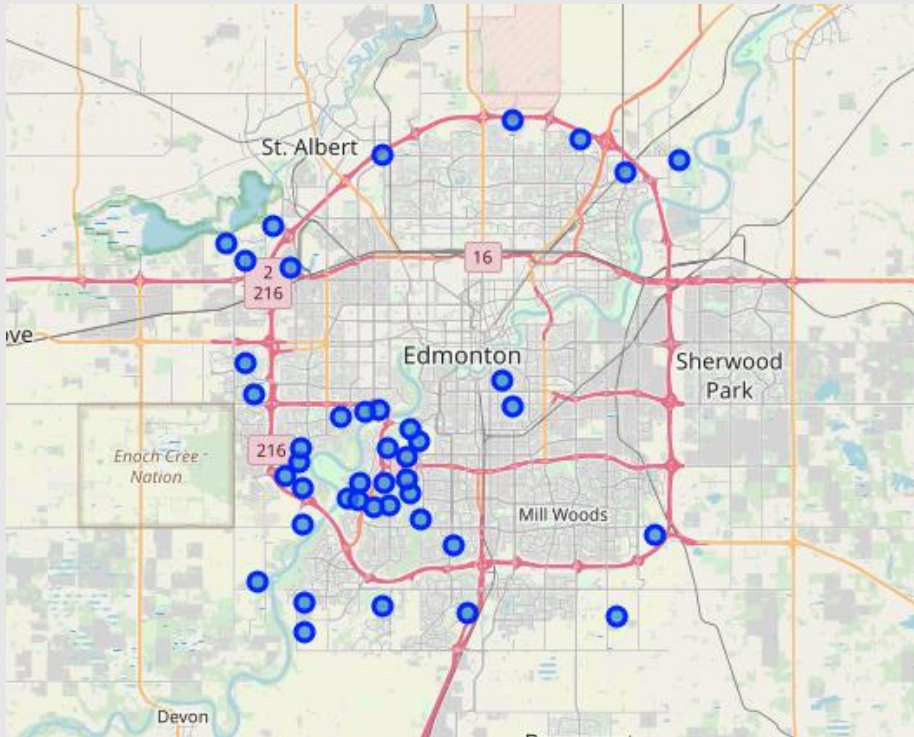
Foursquare API

- Data source to gain information about venues per neighbourhood
- Detailed data retrieved from Foursquare contained information of venues within a specified distance of a neighbourhood

Methodology — Data acquisition and cleansing

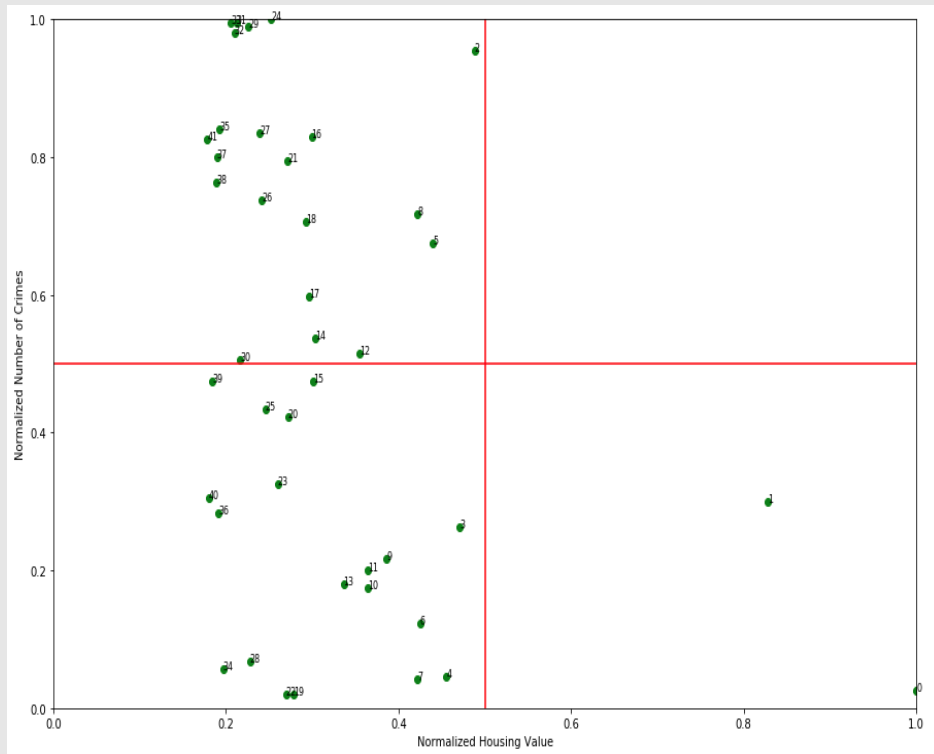
- 1 – Obtain the property assessed values in Edmonton, drop non-residential property data and get the average assessed housing value in each neighbourhood
- 2 – Obtain the crime dataset in Edmonton, drop crime data that occurred in non-residential neighbourhood and get the number of crimes in each neighbourhood from 2009 and 2019
- 3 – Select neighbourhoods that have great property values and lowest numbers of crimes for further analysis due to the request limits of Foursquare API free developer account
- 4 – Obtain and analyze the venues within these neighbourhoods

Methodology - Clustering Approach



- **Machine Learning Algorithm:** k-means clustering approach was used to cluster, segment, and group neighbourhoods featured by their near-by-venues
- **Neighbourhoods:** 42 neighbourhoods with good property values and low number of crimes
- **Neighbourhood Venues:** Foursquare API produced the venue information of 21 neighbourhoods of the 42 selected neighbourhoods

Results – Neighbourhoods' Property Value and Number of Crimes



Neighbourhoods normalized housing value and total crimes

- **Windermere Area** and **Rural West Big Lake** has the highest average property value (2.29 million Canadian Dollars and 1.9 million Canadian Dollars respectively) and lowest number of crimes (5 and 58 respectively)
- **Blackmud Creek Ravine, Anthony Henday Lake District, Anthony Henday Energy Park and River's Edge** have lowest number of crimes (4, 4, 13, and 11 respectively) and relatively cheap housing price (640, 620, 523, and 450 k Canadian Dollars respectively)

Results – Clustering of Neighbourhoods

Cluster 2 consists of six neighbourhoods, featured with parks, sports fields and arts gallery.

	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
3	MILL CREEK RAVINE NORTH	1.0	Water Park	Home Service	Park	Trail	Butcher	Campground	Hockey Arena	Health & Beauty Service	Gym	Golf Course
15	HENDERSON ESTATES	1.0	Park	Performing Arts Venue	Water Park	Home Service	Health & Beauty Service	Gym	Golf Course	Gas Station	Garden Center	Fast Food Restaurant
21	BROOKSIDE	1.0	Soccer Field	Park	Water Park	Electronics Store	Health & Beauty Service	Gym	Golf Course	Gas Station	Garden Center	Fast Food Restaurant
25	WEDGEWOOD HEIGHTS	1.0	Park	Water Park	Indian Restaurant	Hockey Arena	Health & Beauty Service	Gym	Golf Course	Gas Station	Garden Center	Fast Food Restaurant
27	WESTRIDGE	1.0	Park	Event Service	Dance Studio	Water Park	Hockey Arena	Health & Beauty Service	Gym	Golf Course	Gas Station	Garden Center
29	BULYEA HEIGHTS	1.0	Playground	Pizza Place	Baby Store	Park	Health & Beauty Service	Gym	Golf Course	Gas Station	Garden Center	Fast Food Restaurant

Results – Clustering of Neighbourhoods

Cluster 3 consists of eleven neighbourhoods, featured with parks, stores and restaurants.

	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	WHITEMUD CREEK RAVINE NORTH	2.0	Campground	Ski Chalet	Rest Area	Water Park	Electronics Store	Health & Beauty Service	Gym	Golf Course	Gas Station	Garden Center
13	MILL CREEK RAVINE SOUTH	2.0	Hockey Arena	Trail	Butcher	Liquor Store	Smoke Shop	Event Service	Health & Beauty Service	Gym	Golf Course	Gas Station
17	RURAL NORTH EAST SOUTH STURGEON	2.0	Golf Course	Garden Center	Water Park	Electronics Store	Hockey Arena	Health & Beauty Service	Gym	Gas Station	Fast Food Restaurant	Event Service
19	BLACKMUD CREEK RAVINE	2.0	Electronics Store	Movie Theater	Convenience Store	Event Service	Hockey Arena	Health & Beauty Service	Gym	Golf Course	Gas Station	Garden Center
20	DONSDALE	2.0	Italian Restaurant	Liquor Store	Coffee Shop	Pharmacy	Event Service	Health & Beauty Service	Gym	Golf Course	Gas Station	Garden Center
26	RIO TERRACE	2.0	Pub	Coffee Shop	Park	Convenience Store	Water Park	Event Service	Health & Beauty Service	Gym	Golf Course	Gas Station
31	POTTER GREENS	2.0	Steakhouse	Coffee Shop	Gas Station	Convenience Store	Water Park	Event Service	Hockey Arena	Health & Beauty Service	Gym	Golf Course
32	KINOKAMAU PLAINS AREA	2.0	Home Service	Electronics Store	Hockey Arena	Health & Beauty Service	Gym	Golf Course	Gas Station	Garden Center	Fast Food Restaurant	Event Service
33	BLUE QUILL ESTATES	2.0	Trail	Nature Preserve	Home Service	Hockey Arena	Health & Beauty Service	Gym	Golf Course	Gas Station	Garden Center	Fast Food Restaurant
38	FALCONER HEIGHTS	2.0	Asian Restaurant	Pizza Place	Coffee Shop	Fast Food Restaurant	Bakery	Gym	Indian Restaurant	Juice Bar	Liquor Store	Pet Store
40	HAWKS RIDGE	2.0	Pub	Water Park	Electronics Store	Hockey Arena	Health & Beauty Service	Gym	Golf Course	Gas Station	Garden Center	Fast Food Restaurant

Results – Clustering of Neighbourhoods

Cluster 1, 5 consist of one unique neighbourhood individually. Cluster 4 consists of two neighbourhoods

	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
35	WEBBER GREENS	0.0	Discount Store	Electronics Store	Hockey Arena	Health & Beauty Service	Gym	Golf Course	Gas Station	Garden Center	Fast Food Restaurant	Event Service

	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	ANTHONY HENDAY LAKE DISTRICT	4.0	Health & Beauty Service	Water Park	Electronics Store	Hockey Arena	Gym	Golf Course	Gas Station	Garden Center	Fast Food Restaurant	Event Service

	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	GRANDVIEW HEIGHTS	3.0	Construction & Landscaping	Water Park	Electronics Store	Hockey Arena	Health & Beauty Service	Gym	Golf Course	Gas Station	Garden Center	Fast Food Restaurant
39	STARLING	3.0	Construction & Landscaping	Spa	Water Park	Electronics Store	Hockey Arena	Health & Beauty Service	Gym	Golf Course	Gas Station	Garden Center

Discussion and Conclusion

Discussion

- Newcomers can gain information about housing value, criminal occurrence and the features of each neighbourhood's lifestyle and about what type of small business can be opened in each clustered neighbourhoods.
- For example, most of the venues in neighbourhoods of cluster 3 are parks, stores and restaurants.
- For some neighborhoods, such as Windermere Area, venue information isn't available, because it's a newly developed neighbourhood.

Conclusion

- Through the analysis of the Edmonton Property Assessment Data, Neighbourhood Criminal Occurrence datasets, and a k-means clustering of neighbourhoods' venues, the neighbourhoods in Edmonton were presented by the average housing value, numbers of crimes and features of venues.
- Newcomers can use this information to choose the neighbourhood that they like and wants to start a life at.

Thanks !