

The most desirable neighborhood to live in Calgary Alberta

Capstone Project - The Battle of Neighborhoods

IBM Applied Data Science Capstone

July 2021

1. Introduction

1.1 Description & Discussion of the Background

Calgary Alberta in Canada is the largest city in the province which is home to 1.34 million people, and has been selected in the top 10 most livable city in the world from 2009 to 2019 by the Economist Intelligence Unit. A combination of wildlife landscape, urban sprawl and downtown commercialism made Calgary an attractive city for many international newcomers and Canadians seeking to relocate.

However, if you are new to the place, moving to a different city can be challenging. There are many things to consider when you are choosing where you are going to live. Do you want a big house with a big backyard outside of the inner city ? Do you want to enjoy entertainment and nightlife? What is your budget to buy a house ?

The purpose of this project is to help people to explore the communities to determine which neighborhoods in Calgary would be the desirable place to buy a house for those who are interested in moving to Calgary. This project attempts to answer the questions "Where would be an affordable neighbourhood to buy a house?" and "What venues would be available in each neighbourhood ?"

1.2 Data Description

For neighborhood venue analysis, a table named " [List of postal codes of Canada:T](#) " from Wikipedia was used to obtain a list of the neighborhood information including postal codes, borough, neighborhood, latitude and longitude. These data was scraped using BeautifulSoup, and put in a dataframe. Then available venues for each neighborhood were obtained using Foursquare API as shown in the table below.

	Neighborhood	American Restaurant	Arts & Crafts Store	Asian Restaurant	Auto Dealership	BBQ Joint	Bakery	Bank	Bar	Bistro	...	Sushi Restaurant	Tapas Restaurant	Tattoo Parlor	Thai Restaurant	Theater	Vegetarian / Vegan Restaurant	Video Store	Viet Re:
0	Braeside, Cedarbrae, Woodbine	0.000000	0.000000	0.000000	0.0	0.0	0.000000	0.000000	0.000000	0.000000	...	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0
1	Brentwood, Collingwood, Nose Hill	0.000000	0.000000	0.000000	0.0	0.0	0.000000	0.000000	0.000000	0.000000	...	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0
2	Bridgeland, Greenview, Zoo, YYC	0.000000	0.000000	0.041667	0.0	0.0	0.000000	0.083333	0.000000	0.000000	...	0.041667	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0
3	City Centre, Calgary Tower, Connaught,	0.000000	0.000000	0.000000	0.0	0.0	0.071429	0.000000	0.071429	0.000000	...	0.071429	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0

For housing market analysis, property values provided by City of Calgary was used instead of the current housing market data so that the entire neighborhood values can be obtained to compare the values between neighborhoods. A dataset named " [2021 Assessed Property Values](#) " from the City of Calgary's Open Data Portal was used for this analysis. Address, assessed value, assessment class description, community name, land use, latitude and longitude data were collected to create a data frame.

	ADDRESS	ASSESSED_VALUE	ASSESSMENT_CLASS_DESCRIPTION	COMM_NAME	LAND_USE_DESIGNATION	LATITUDE	LONGITUDE
149	4607 88 AV NE	447000.0	Residential	SADDLE RIDGE	R-G,C-N1,M-X2	51.131562	-113.967843
156	4908 84 AV NE	447000.0	Residential	SADDLE RIDGE	R-G,S-SPR	51.129820	-113.963482
159	4612 84 AV NE	1650000.0	Residential	SADDLE RIDGE	R-G,S-SPR	51.129822	-113.967844
170	6827 89 AV NE	3310000.0	Residential	SADDLE RIDGE	R-G,R-Gm	51.133209	-113.936082
171	6819 89 AV NE	3120000.0	Residential	SADDLE RIDGE	R-G	51.133208	-113.937442

2. Methodology

Two data sources were mainly used for this project.

The first data was from Wikipedia contained all the required data such as name of boroughs and neighborhoods, postal codes and location information to create a table for neighbourhood venues analysis. However, there were missing values in latitude and longitude, as well as some 'Not assigned' values were found in " Borough " so these rows were dropped from the

table. Also some communities that are outside of Calgary were listed in the table. Since only Calgary neighbourhoods were focused in this project these rows were removed from the table as well. After all the data was collected and cleaned, a data frame were created as shown in the table below.

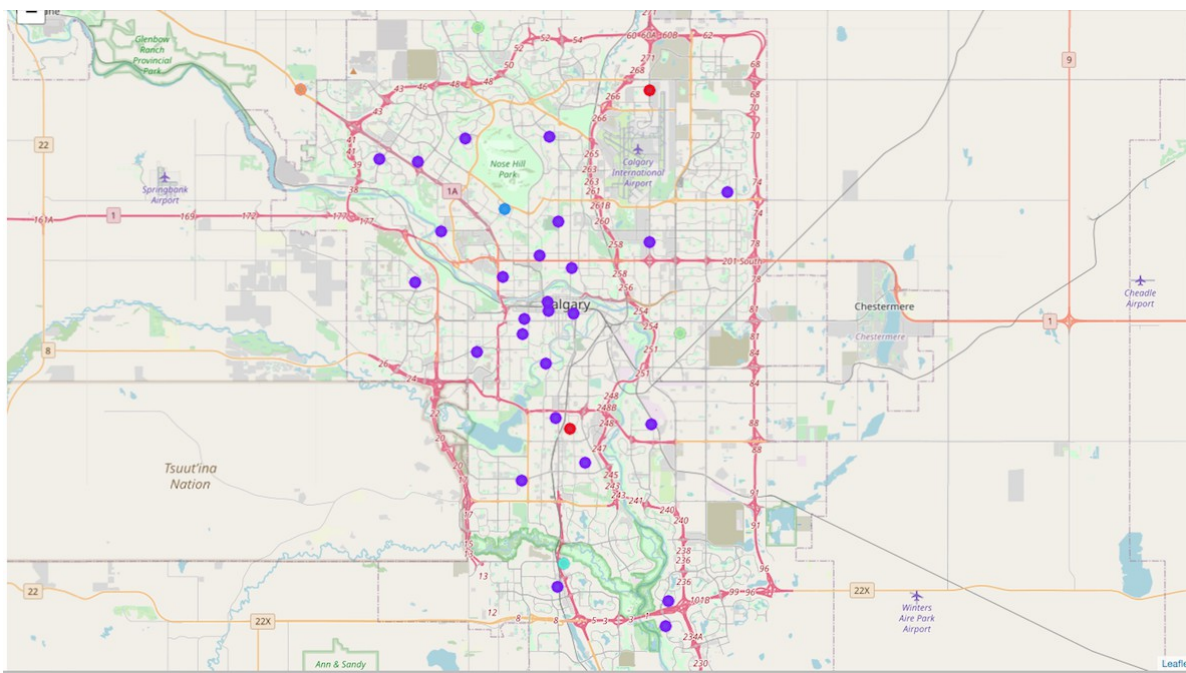
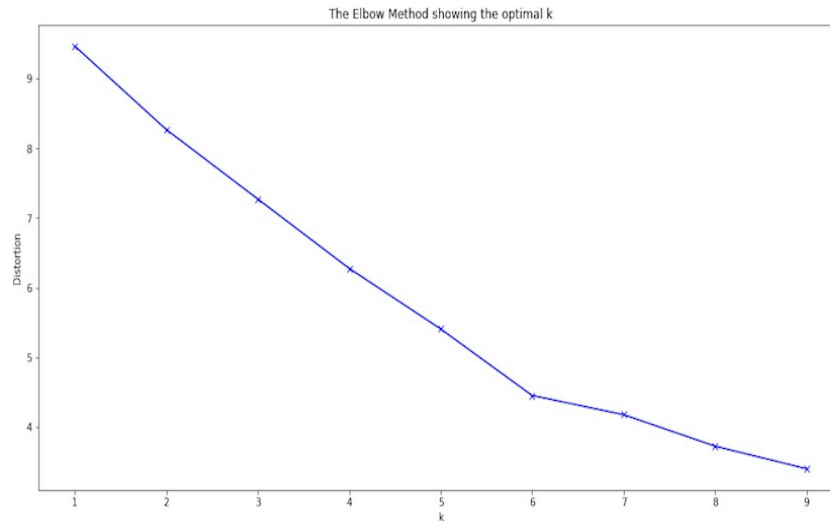
	Postal Code	Borough	Neighborhood	Latitude	Longitude	Cluster Labels
145	T2W	Calgary	Braeside, Cedarbrae, Woodbine	50.9604	-114.1001	1
73	T2L	Calgary	Brentwood, Collingwood, Nose Hill	51.0917	-114.1127	2
28	T2E	Calgary	Bridgeland, Greenview, Zoo, YYC	51.0632	-114.0614	1
100	T2P	Calgary	City Centre, Calgary Tower	51.0472	-114.0802	1
109	T2R	Calgary	Connaught, West Victoria Park	51.0426	-114.0791	1
83	T3M	Calgary	Cranston, Auburn Bay, Mahogany	50.8902	-113.9892	1
2	T3A	Calgary	Dalhousie, Edgemont, Hamptons, Hidden Valley	51.126060	-114.143158	1
47	T3H	Calgary	Discovery Ridge, Signal Hill, West Springs, Ch...	51.0566	-114.1815	1
172	T2Z	Calgary	Douglas Glen, McKenzie Lake, Copperfield, East...	50.9023	-113.9873	1
118	T2S	Calgary	Elbow Park, Britannia, Parkhill, Mission	51.0171	-114.0812	1
10	T2B	Calgary	Forest Lawn, Dover, Erin Woods	51.0318	-113.9786	4
38	T3G	Calgary	Hawkwood, Arbour Lake, Citadel, Ranchlands, Ro...	51.1147	-114.1796	1
46	T2H	Calgary	Highfield, Burns Industrial	50.9857	-114.0631	0
37	T2G	Calgary	Inglewood, Burnsland, Chinatown, East Victoria...	51.0415	-114.0599	1
91	T2N	Calgary	Kensington, Westmont, Parkdale, University	51.0591	-114.1146	1
29	T3E	Calgary	Lakeview, Glendale, Killarney, Glamorgan	51.0227	-114.1342	1
19	T2C	Calgary	Lynnwood Ridge, Ogden, Foothills Industrial, G...	50.9878	-114.0001	1

To get nearby venues for each neighborhood, Foursquare API was used. After all the venues were extracted, one hot encoding technique was applied so that the data was transformed to numerical data from categorical data. Now the 'Venues Category' was shown as a frequency to display how many of the venues were located for each neighborhood.

After creating the Foursquare venue data, the top 10 most common venues were selected, and the top 10 venues were merged into the neighborhood data above to create new dataframe.

calgary_area_venue.head()																	
	index	Postal Code	Borough	Neighborhood	Latitude	Longitude	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
0	145	T2W	Calgary	Braeside, Cedarbrae, Woodbine	50.9604	-114.1001	1	Coffee Shop	Pub	Gas Station	Hockey Rink	Ice Cream Shop	Convenience Store	Pharmacy	Pizza Place	Gym	Board Shop
1	73	T2L	Calgary	Brentwood, Collingwood, Nose Hill	51.0917	-114.1127	1	Asian Restaurant	Electronics Store	Yoga Studio	Falafel Restaurant	Convenience Store	Cosmetics Shop	Curling Ice	Deli / Bodega	Department Store	Dim Sum Restaurant
2	28	T2E	Calgary	Bridgeland, Greenview, Zoo, YYC	51.0632	-114.0614	1	Bank	Fast Food Restaurant	Fried Chicken Joint	Seafood Restaurant	Convenience Store	Chinese Restaurant	Noodle House	Dim Sum Restaurant	Pharmacy	Indian Restaurant
3	100	T2P	Calgary	City Centre, Calgary Tower	51.0472	-114.0802	1	Coffee Shop	Bakery	Bar	Sushi Restaurant	Pub	Restaurant	Mediterranean Restaurant	Sandwich Place	Brewery	Moroccan Restaurant
4	109	T2R	Calgary	Connaught, West Victoria Park	51.0426	-114.0791	1	Coffee Shop	Bar	French Restaurant	Brewery	Yoga Studio	Restaurant	Burger Joint	Pizza Place	Camera Store	Nightclub

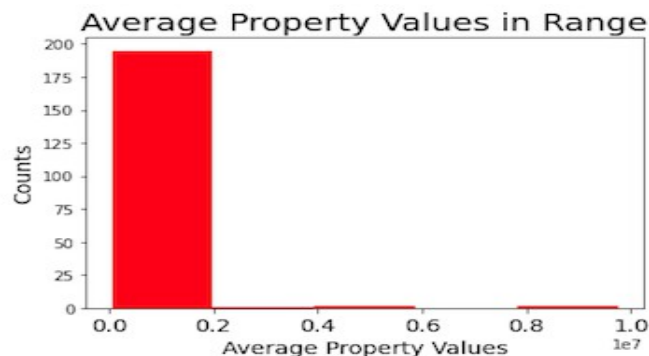
K-means algorithm was used to cluster the similar frequency of the venues. To find out how many clusters the venues should be divided into, elbow method was used. As the result showed that $k=6$ was optimal the venues were divided into 6 clusters. Then a map was created using the Folium package in Python to display each neighborhood with the cluster label.



The second dataset " 2021 Assessed Property Values " provided by City of Calgary was imported for property value analysis, and only necessary information such as assessed values, type of property, community name, latitude and longitude were collected. According to "Land use districts of Calgary", a land type starts with 'R' indicates residential and 'M' indicates multi-residential property. Therefore, only the rows were kept where the values in "LAND_USE_DESIGNATION" column starts with 'R' or 'M' since this project focuses on only residential properties. Also the rows were dropped where there were no property values or location information available. After creating a table with property values for each residential property, the average property values by the neighborhood were calculated.

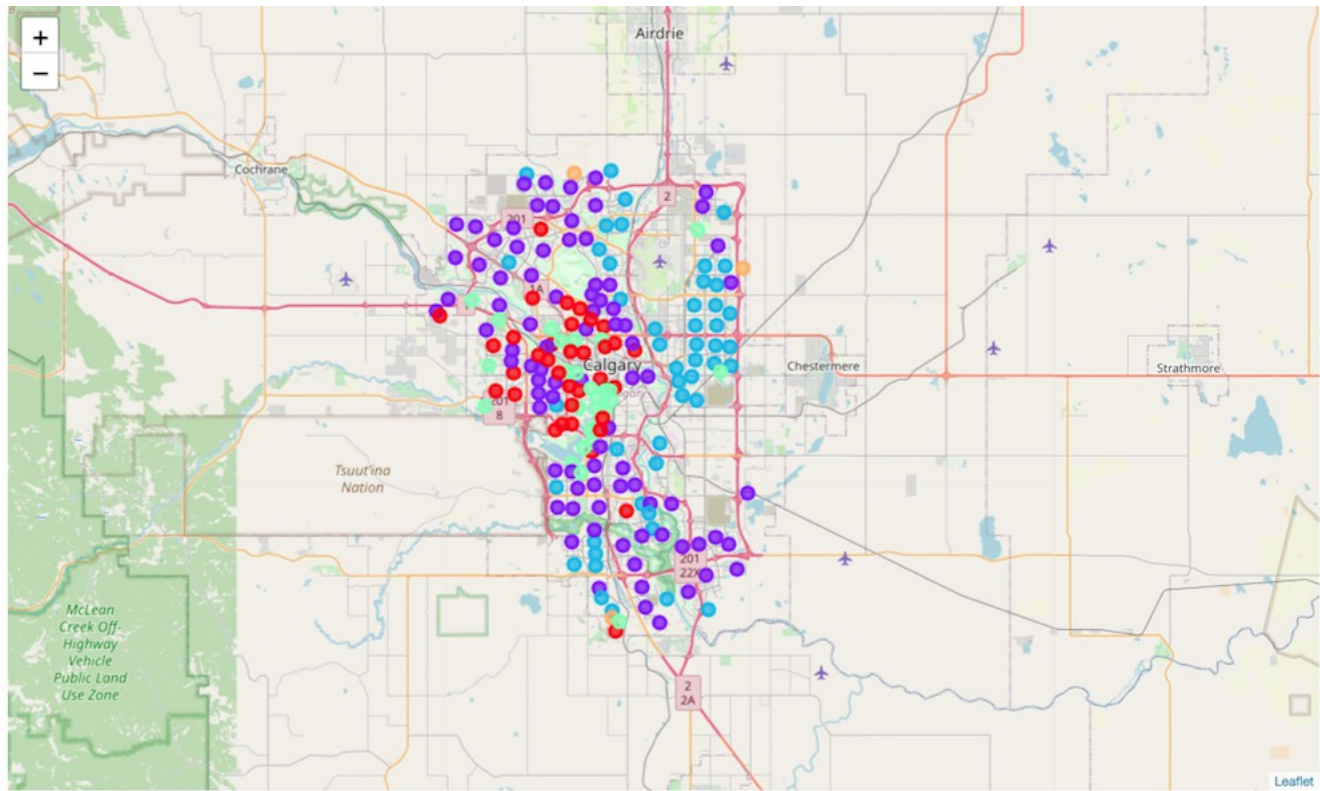
	LATITUDE	LONGITUDE	Roundup_Average_Value
COMM_NAME			
ABBEYDALE	51.058959	-113.929288	280220.0
ACADIA	50.970638	-114.053825	409830.0
ALBERT PARK/RADISSON HEIGHTS	51.043208	-113.991105	332238.0
ALTADORE	51.014911	-114.104051	877634.0
AMBLETON	51.184674	-114.108960	100850.0

A histogram is a simple way to display the data value in bars to show the frequency of data items in equal interval size and makes it easier to see the dispersion and central tendency. After a table with property values of neighborhood was created, a histogram was used to show a frequency of distribution in different ranges. Each range was defined as 'Low -1', 'Mid-1', 'Mid-2', 'High-1' and 'High-2' based on the values of property. As those are categorical data, one hot encoding was used to transform to numeric data as a preparation of kmeans clustering.



The residential properties were divided into 5 different groups, 'Low -1', 'Mid-1', 'Mid-2', 'High-1' and 'High-2'. Therefore 5 clusters were created and shown on a map with the cluster labels.

index		COMM_NAME	Cluster Labels	LATITUDE	LONGITUDE	Roundup_Average_Value	Value_level_label
0	0	ABBEYDALE	2	51.058959	-113.929288	280220.0	Mid-1
1	1	ACADIA	1	50.970638	-114.053825	409830.0	Mid-2
2	2	ALBERT PARK/RADISSON HEIGHTS	2	51.043208	-113.991105	332238.0	Mid-1
3	3	ALTADORE	3	51.014911	-114.104051	877634.0	High-2
4	4	AMBLETON	4	51.184674	-114.108960	100850.0	Low-1
5	5	APPLEWOOD PARK	2	51.045039	-113.928229	345952.0	Mid-1
6	6	ARBOUR LAKE	1	51.136006	-114.201109	518080.0	Mid-2
7	7	ASPEN WOODS	3	51.044836	-114.208418	977167.0	High-2
8	8	AUBURN BAY	1	50.892268	-113.956901	517433.0	Mid-2
9	9	BANFF TRAIL	0	51.074750	-114.112397	620164.0	High-1



3.Results

3.1 Neighborhood venue analysis

Total of 296 unique venues were returned by Foursquare, and the numbers of venues for each neighbourhoods were displayed as shown in the table below.

	Neighborhood Latitude	Neighborhood Longitude	Venue	Venue Latitude	Venue Longitude	Venue Category
Neighborhood						
Braeside, Cedarbrae, Woodbine	9	9	9	9	9	9
Brentwood, Collingwood, Nose Hill	1	1	1	1	1	1
Bridgeland, Greenview, Zoo, YYC	24	24	24	24	24	24
City Centre, Calgary Tower	28	28	28	28	28	28
Connaught, West Victoria Park	30	30	30	30	30	30
Cranston, Auburn Bay, Mahogany	3	3	3	3	3	3
Dalhousie, Edgemont, Hamptons, Hidden Valley	4	4	4	4	4	4
Discovery Ridge, Signal Hill, West Springs, Christie Estates, Patterson, Cougar Ridge	5	5	5	5	5	5
Douglas Glen, McKenzie Lake, Copperfield, East Shepard	8	8	8	8	8	8
Elbow Park, Britannia, Parkhill, Mission	4	4	4	4	4	4
Forest Lawn, Dover, Erin Woods	3	3	3	3	3	3
Hawkwood, Arbour Lake, Citadel, Ranchlands, Royal Oak, Rocky Ridge	3	3	3	3	3	3
Highfield, Burns Industrial	1	1	1	1	1	1
Inglewood, Burnsland, Chinatown, East Victoria Park, Saddledome	30	30	30	30	30	30
Kensington, Westmont, Parkdale, University	4	4	4	4	4	4
Lakeview, Glendale, Killarney, Glamorgan	3	3	3	3	3	3
Lynnwood Ridge, Ogden, Foothills Industrial, Great Plains	4	4	4	4	4	4
Martindale, Taradale, Falconridge, Saddle Ridge	3	3	3	3	3	3
Midnapore, Sundance	1	1	1	1	1	1
Millrise, Somerset, Bridlewood, Evergreen	15	15	15	15	15	15
Montgomery, Bowness, Silver Springs, Greenwood	4	4	4	4	4	4
Mount Pleasant, Capitol Hill, Banff Trail	14	14	14	14	14	14
Northeast Calgary	2	2	2	2	2	2
Northwest Calgary	1	1	1	1	1	1
Oak Ridge, Haysboro, Kingsland, Kelvin Grove, Windsor Park	30	30	30	30	30	30

The result shows that 3 neighborhoods had the most venues which were 30, and those neighborhoods were following:

- "Connaught, West Victoria Park"

- "Inglewood, Burnsland, Chinatown, East Victoria Park, Saddledome"

- "Oak Ridge, Haysboro, Kingsland, Kelvin Grove, Windsor Park"

The first and second neighbourhoods are located in the inner city area where is the center of entertainment and activities, and has a lot of restaurants, bars, shops and cafe, and the 3rd neighbourhood are located by one of the major street in Calgary called Macleod Trail.

Also the table shows that the most common venues category in entire Calgary was coffee shop, and the top 10 common venues in each neighborhoods were also display as shown in the table below.

```

Coffee Shop      17
Pizza Place     14
Pub             13
Convenience Store 11
Vietnamese Restaurant 9
..
Clothing Store   1
Tattoo Parlor    1
Dog Run          1
Auto Dealership  1
Fried Chicken Joint 1
Name: Venue Category, Length: 114, dtype: int64

```

	Neighborhood	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
0	Braeside, Cedarbrae, Woodbine	Gym	Gas Station	Convenience Store	Pub	Pizza Place	Pharmacy	Ice Cream Shop	Hockey Rink	Coffee Shop	Deli / Bodega
1	Brentwood, Collingwood, Nose Hill	Electronics Store	Yoga Studio	Convenience Store	Curling Ice	Deli / Bodega	Department Store	Dessert Shop	Dim Sum Restaurant	Diner	Dog Run
2	Bridgeland, Greenview, Zoo, YYC	Bank	Fast Food Restaurant	Sandwich Place	Falafel Restaurant	Chinese Restaurant	Dim Sum Restaurant	Noodle House	Pharmacy	Indian Restaurant	Poke Place
3	City Centre, Calgary Tower	Mediterranean Restaurant	Bakery	Pub	Restaurant	Coffee Shop	Sushi Restaurant	Bar	Moroccan Restaurant	Nightclub	Camera Store
4	Connaught, West Victoria Park	Bar	Mediterranean Restaurant	Coffee Shop	French Restaurant	Brewery	Moroccan Restaurant	Nightclub	Chinese Restaurant	Scandinavian Restaurant	Camera Store

Most of neighborhoods were included in cluster 1 and there was a total of 26 neighborhoods.

Convenience store had the highest number of 1st common venues in these neighborhoods.

```

Convenience Store 3
Bar               2
Coffee Shop       2
Hotel            2
Pizza Place       2
Park             2
Bank             2
Mediterranean Restaurant 1
Gym              1
Shop & Service    1
Indian Restaurant 1
Burger Joint     1
Wine Shop        1
Vietnamese Restaurant 1
Arts & Crafts Store 1
Grocery Store    1
Cosmetics Shop   1
American Restaurant 1
Name: 1st Most Common Venue, dtype: int64

```

In the cluster 0, there were 2 neighborhoods. " Highfield, Burns Industrial" are located in industrial area closer to downtown and Northeast Calgary is located at the end of city limit in North. Both neighbourhood had American Restaurant as the 1st most common venue.

In cluster 2, 3 and 5 there were only one neighborhood in each cluster. Only the difference from the other neighborhoods in cluster 1 and 0 was that 'Electronics store', ' Mobile phone shop' 'Smoke shop' and 'Flea Market' were listed as the 1st most common venue.

Each cluster were as shown in the table below:

Cluster 0

	Neighborhood	Longitude	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	Highfield, Burns Industrial	-114.0631	0	American Restaurant	Falafel Restaurant	Curling Ice	Deli / Bodega	Department Store	Dessert Shop	Dim Sum Restaurant	Diner	Dog Run	Donut Shop
22	Northeast Calgary	-114.0019	0	American Restaurant	Hotel	Falafel Restaurant	Curling Ice	Deli / Bodega	Department Store	Dessert Shop	Dim Sum Restaurant	Diner	Dog Run

Cluster 1

	Neighborhood	Longitude	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
0	Braeside, Cedarbrae, Woodbine	-114.100100	1	Convenience Store	Coffee Shop	Pub	Pizza Place	Pharmacy	Ice Cream Shop	Gas Station	Hockey Rink	Gym	Deli / Bodega
2	Bridgeland, Greenview, Zoo, YYC	-114.061400	1	Bank	Fast Food Restaurant	Sandwich Place	Seafood Restaurant	Chinese Restaurant	Dim Sum Restaurant	Noodle House	Pharmacy	Indian Restaurant	Poke Place
3	City Centre, Calgary Tower	-114.080200	1	Mediterranean Restaurant	Bakery	Pub	Restaurant	Bar	Sushi Restaurant	Coffee Shop	Japanese Restaurant	Moroccan Restaurant	Camera Store
4	Connaught, West Victoria Park	-114.079100	1	Coffee Shop	Bar	French Restaurant	Brewery	Yoga Studio	Indie Movie Theater	Salon / Barbershop	Restaurant	Ice Cream Shop	Donut Shop

Cluster 2

	Neighborhood	Longitude	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
1	Brentwood, Collingwood, Nose Hill	-114.1127	2	Electronics Store	Yoga Studio	Falafel Restaurant	Curling Ice	Deli / Bodega	Department Store	Dessert Shop	Dim Sum Restaurant	Diner	Dog Run

Cluster 3

	Neighborhood	Longitude	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
18	Midnapore, Sundance	-114.0674	3	Mobile Phone Shop	Yoga Studio	Health & Beauty Service	Curling Ice	Deli / Bodega	Department Store	Dessert Shop	Dim Sum Restaurant	Diner	Dog Run

Cluster 4

	Neighborhood	Longitude	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
10	Forest Lawn, Dover, Erin Woods	-113.9786	4	Smoke Shop	Bar	Convenience Store	Falafel Restaurant	Curling Ice	Deli / Bodega	Department Store	Dessert Shop	Dim Sum Restaurant	Diner
30	Symons Valley	-114.1333	4	Convenience Store	Yoga Studio	Falafel Restaurant	Curling Ice	Deli / Bodega	Department Store	Dessert Shop	Dim Sum Restaurant	Diner	Dog Run

Cluster 5

	Neighborhood	Longitude	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
23	Northwest Calgary	-114.2695	5	Flea Market	Yoga Studio	Falafel Restaurant	Curling Ice	Deli / Bodega	Department Store	Dessert Shop	Dim Sum Restaurant	Diner	Dog Run

3.2 Property Value Analysis

The average of property values were calculated for 200 neighborhoods, and those residential properties were grouped into 5 groups based on the values. There were 3 neighborhoods in a range of low level, 48 neighborhoods in a range of Mid-1 Level, 26 neighborhoods in a range of Mid-2 Level, 35 neighborhoods in a range of High-1 Level and 28 neighborhoods in a range of High-2 Level. Each cluster were as shown in the table below:

Cluster 0 (High-1 Level, \$ 600k-800k, red label)

	COMM_NAME	Cluster Labels	Roundup_Average_Value	Value_level_label
122	PARKDALE	0	791785.0	High-1
94	LOWER MOUNT ROYAL	0	774584.0	High-1
171	SPRINGBANK HILL	0	756386.0	High-1
137	RESIDUAL WARD 1 - SUB AREA 1L	0	750725.0	High-1
125	PATTERSON	0	749448.0	High-1
188	WEST HILLHURST	0	746163.0	High-1
168	SOUTH CALGARY	0	745438.0	High-1
81	HILLHURST	0	744298.0	High-1
31	CHRISTIE PARK	0	743497.0	High-1
91	LAKEVIEW	0	731536.0	High-1
189	WEST SPRINGS	0	711283.0	High-1
90	LAKE BONAVIDA	0	706828.0	High-1
66	GARRISON GREEN	0	700245.0	High-1
139	RESIDUAL WARD 13 - SUB AREA 13K	0	693000.0	High-1
67	GARRISON WOODS	0	685050.0	High-1

Cluster 1 (Mid-2 Level, \$ 400k-600k, purple label)

	COMM_NAME	Cluster Labels	Roundup_Average_Value	Value_level_label
136	RENFREW	1	599622.0	Mid-2
87	KILLARNEY/GLENGARRY	1	596366.0	Mid-2
174	STRATHCONA PARK	1	593896.0	Mid-2
10	BANKVIEW	1	588261.0	Mid-2
22	CAMBRIAN HEIGHTS	1	587430.0	Mid-2
...
105	MCKENZIE TOWNE	1	403879.0	Mid-2
49	DEER RUN	1	403458.0	Mid-2
37	COPPERFIELD	1	402622.0	Mid-2
17	BRAESIDE	1	402364.0	Mid-2
95	MACEWAN	1	401792.0	Mid-2

Cluster 2 (Mid-1 Level, \$ 200k-400k, blue label)

	COMM_NAME	Cluster Labels	Roundup_Average_Value	Value_level_label
103	MAYLAND HEIGHTS	2	395972.0	Mid-1
41	COUNTRY HILLS	2	395423.0	Mid-1
143	RIVERBEND	2	393479.0	Mid-1
75	HARVEST HILLS	2	391976.0	Mid-1
15	BONAVISTA DOWNS	2	391787.0	Mid-1
167	SOMERSET	2	391680.0	Mid-1
62	FAIRVIEW	2	391654.0	Mid-1
133	RANCHLANDS	2	390830.0	Mid-1
20	BRIDLEWOOD	2	385109.0	Mid-1
109	MILLRISE	2	383831.0	Mid-1
84	HUNTINGTON HILLS	2	378251.0	Mid-1
161	SHAWNESSY	2	377877.0	Mid-1
177	TARADALE	2	377207.0	Mid-1
48	DEER RIDGE	2	376040.0	Mid-1
110	MONTEREY PARK	2	374093.0	Mid-1

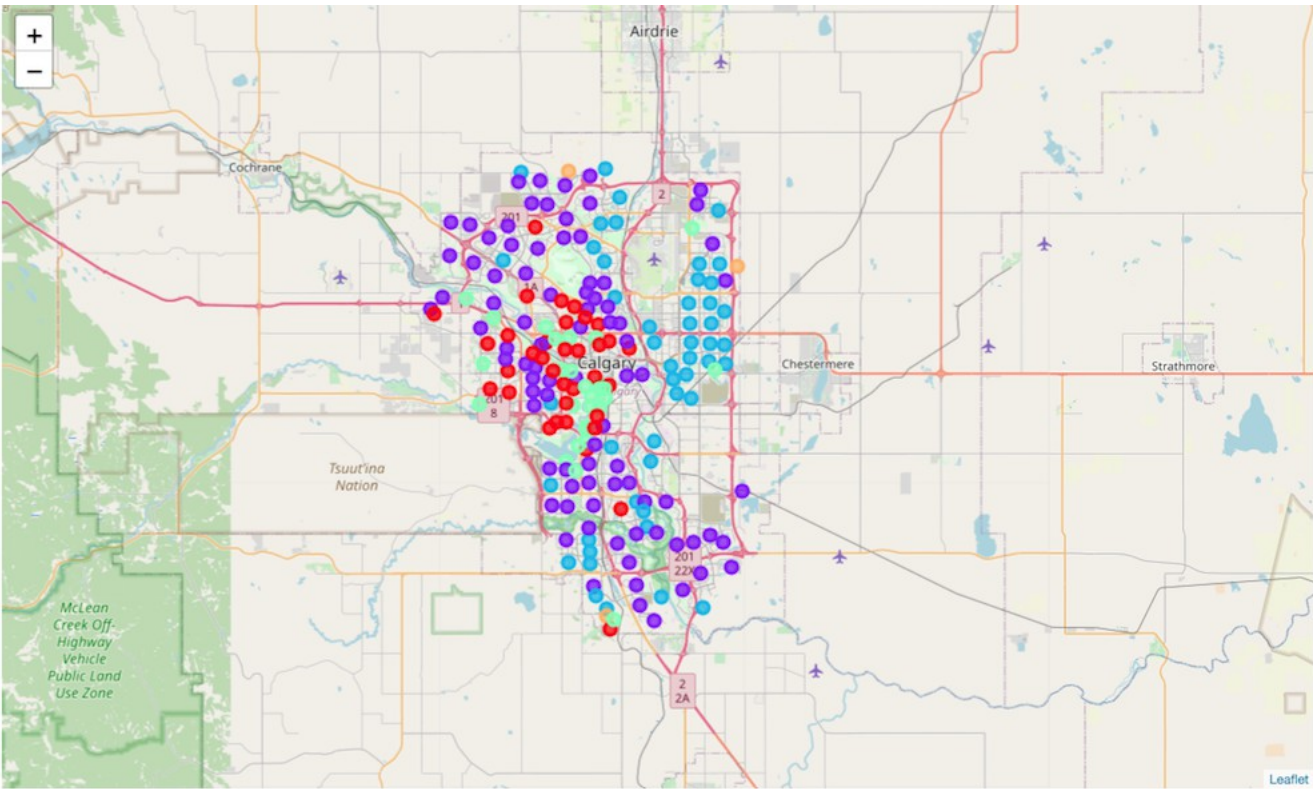
Cluster 3 (High-2 Level, over \$800k, green label)

	COMM_NAME	Cluster Labels	Roundup_Average_Value	Value_level_label
134	RED CARPET/MOUNTVIEW MOBILE PARK	3	9764000.0	High-2
33	CITYSCAPE	3	8645000.0	High-2
140	RESIDUAL WARD 13 - SUB AREA 13M	3	5080000.0	High-2
107	MEDICINE HILL	3	3950000.0	High-2
13	BEL-AIRE	3	2018688.0	High-2
21	BRITANNIA	3	1935659.0	High-2
54	EAGLE RIDGE	3	1750521.0	High-2
183	UPPER MOUNT ROYAL	3	1582976.0	High-2
142	RIDEAU PARK	3	1509092.0	High-2
56	ELBOW PARK	3	1443362.0	High-2
34	CLIFF BUNGALOW	3	1441600.0	High-2
73	GREENWOOD/GREENBRIAR	3	1408500.0	High-2

Cluster 4 (Low-1 Level, under \$ 200k, orange label)

	COMM_NAME	Cluster Labels	Roundup_Average_Value	Value_level_label
127	PINE CREEK	4	199897.0	Low-1
4	AMBLETON	4	100850.0	Low-1
82	HOMESTEAD	4	50713.0	Low-1

As the map with the cluster labels show in below, property values are higher in the centre of the city and lower at the end of city limit. Also the properties that are close to Elbow River which originates in the Canadian Rockies and flows through Calgary have higher values, and the properties that are close to industrial area have lower values.



4. Discussion

In neighborhood venue analysis, neighborhoods were clustered into 6 groups based on the frequency of occurrence of venue category, however, clear dissimilarities weren't observed in each cluster. This may be because each neighbourhood in Calgary often has own shopping area called 'plaza' with popular stores such as The Real Canadian Superstore, Walmart, Canadian tire, as well as some grocery stores, restaurants and banks etc., therefore residential areas typically have similar features. It makes sense that the cluster analysis indicated that the most of neighborhoods were included in the same cluster.

In property value analysis, there were a few factors were found that would determine the level of the values according to the cluster map. The neighbourhoods where are close to these areas tend to have higher values:

- Inner city
- Elbow River
- Area with Rocky mountain view
- University area

On the other hand, industrial area and new communities that are further out from the city centre tend to be lower values, and the rest of neighborhoods had the similar values.

5. Conclusion

City of Calgary's population has grown a lot over the past decade and the size of city has been expanding. More new communities have been built around the city limit and those communities are still attracting many families. Communities like these are still often under construction so it is possible that more venues will be available in a few years and also the property values will increase as the city expands more.

To determine where would be the desirable place to live in Calgary totally depends on your lifestyle, preferences and particular needs. Calgary offers affordable properties and plenty of options from single family homes to luxury penthouse condominiums in the inner city, to gorgeous acreage properties just outside of the city.