Segmenting and Clustering Neighbourhoods in Fredericton

Applied Data Science Capstone Project – Week 5

Motivation

1. Which Fredericton neighbourhoods have the highest crime count?

2. What is the count of the different crime types in Fredericton?

3. Which neighbourhoods are the safest in Fredericton?

4. What are the geographical coordinates of Fredericton and its neighbourhoods?

5. What insight about the different neighbourhoods can be obtained by using the Foursquare data?

Datasets

1. Crime by neighbourhood 2017 / Crime par quartier 2017
http://data-fredericton.opendata.arcgis.com/datasets/0ff4acd0a2a14096984f85c06fe4e38e_0

2.Fredericton - City, New Brunswick, Canada
http://www.city-data.com/canada/Fredericton-City.html

3. Fredericton - Wikipedia
https://en.wikipedia.org/wiki/Fredericton

4. Fredericton - City, New Brunswick, Canada
http://www.city-data.com/canada/Fredericton-City.html

Methodology

1. Import required libraries and packages.

2. Load each datasets.

3. Explore each datasets.

4. Use Foursquare data to explore specific locations of interests.

5. Perform K-means clustering algorithm.

6. Produce useful visualization of key results.

Dataset before cleaning

```
[12]: #import pandas as pd
      crime_df = pd.read_csv('Crime_by_neighbourhood_2017.csv')
      crime_df.head(10)
```

[12]:

	Neighbourhood	From_Date	To_Date	Crime_Code	Crime_Type	Ward	City	FID
0	Fredericton South	2017-01-05T00:00:00.000Z	2017-01-26T00:00:00.000Z	2120	B&E NON-RESIDNCE	7	Fredericton	1
1	Fredericton South	2017-03-04T00:00:00.000Z	2017-03-06T00:00:00.000Z	2120	B&E NON-RESIDNCE	7	Fredericton	2
2	Fredericton South	2017-05-07T00:00:00.000Z	NaN	2120	B&E NON-RESIDNCE	12	Fredericton	3
3	Fredericton South	2017-06-20T00:00:00.000Z	2017-06-21T00:00:00.000Z	2120	B&E NON-RESIDNCE	12	Fredericton	4
4	Fredericton South	2017-07-09T00:00:00.000Z	2017-07-10T00:00:00.000Z	2120	B&E NON-RESIDNCE	7	Fredericton	5
5	Fredericton South	2017-01-06T00:00:00.000Z	2017-01-09T00:00:00.000Z	2170	MISCHIEF TO PROP	7	Fredericton	6
6	Fredericton South	2017-02-04T00:00:00.000Z	NaN	2170	MISCHIEF TO PROP	7	Fredericton	7
7	Fredericton South	2017-03-08T00:00:00.000Z	NaN	2170	MISCHIEF TO PROP	11	Fredericton	8
8	Fredericton South	2017-04-03T00:00:00.000Z	NaN	2170	MISCHIEF TO PROP	7	Fredericton	9
9	Fredericton South	2017-04-13T00:00:00.000Z	2017-04-13T00:00:00.000Z	2170	MISCHIEF TO PROP	11	Fredericton	10

Dataset after some cleaning

```
[13]: crime_df.drop(['From_Date', 'To_Date'], axis=1,inplace=True)
      crime_df.head(10)
```

[13]:

	Neighbourhood	Crime_Code	Crime_Type	Ward	City	FID
0	Fredericton South	2120	B&E NON-RESIDNCE	7	Fredericton	1
1	Fredericton South	2120	B&E NON-RESIDNCE	7	Fredericton	2
2	Fredericton South	2120	B&E NON-RESIDNCE	12	Fredericton	3
3	Fredericton South	2120	B&E NON-RESIDNCE	12	Fredericton	4
4	Fredericton South	2120	B&E NON-RESIDNCE	7	Fredericton	5
5	Fredericton South	2170	MISCHIEF TO PROP	7	Fredericton	6
6	Fredericton South	2170	MISCHIEF TO PROP	7	Fredericton	7
7	Fredericton South	2170	MISCHIEF TO PROP	11	Fredericton	8
8	Fredericton South	2170	MISCHIEF TO PROP	7	Fredericton	9
9	Fredericton South	2170	MISCHIEF TO PROP	11	Fredericton	10

Crime Count by neighbourhood & Statistical description

CRIME COUNT BY NEIGHBOURHOOD

Here, we group the crime count by neighbourhood using the GroupBy command.

```
[14]: crime_data = crime_df.groupby(['Neighbourhood']).size().to_frame(name='Count').reset_index()
      crime_data
```

[14]:

	Neighbourhood	Count
0	Barkers Point	47
1	Brookside	54
2	Brookside Estates	9
3	Brookside Mini Home Park	5
4	College Hill	41
5	Colonial heights	9
6	Cotton Mill Creek	4
7	Diamond Street	1
8	Doak Road	1
9	Douglas	3
10	Downtown	127

Average crime count by neighbourhood is **66**

```
[15]: crime_data.describe()
```

[15]:

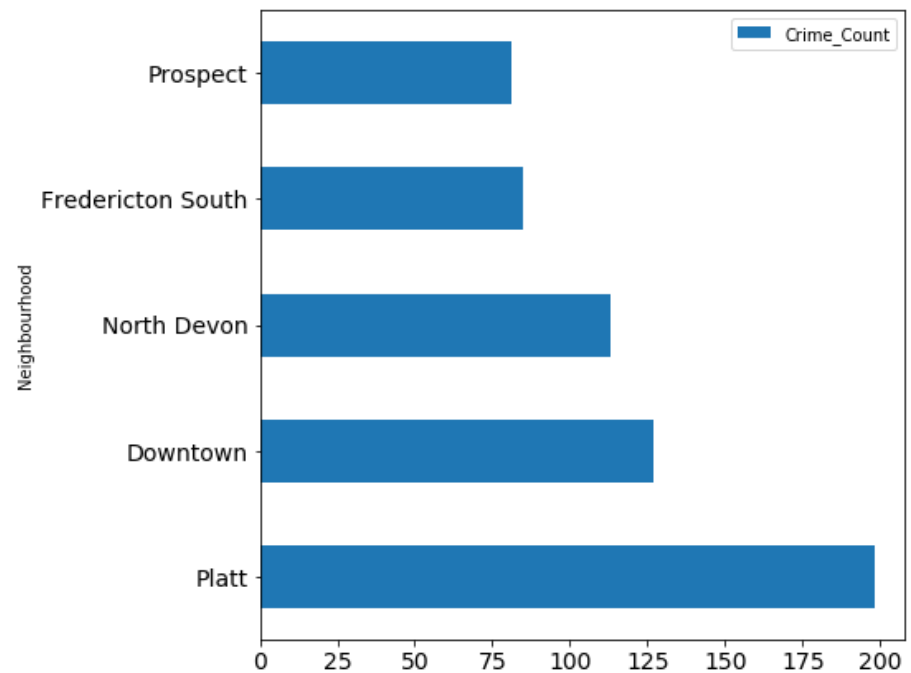|	Count
count	66.000000
mean	22.121212
std	34.879359
min	1.000000
25%	3.000000
50%	9.000000
75%	23.250000
max	198.000000

Top 5 neighbourhoods with highest crime count

1. Platt= 198
2. Downtown = 127
3. North Devon = 113
4. Fredericton South = 85
5. Prospect = 81

Extract top 5 neighbourhoods with high crime count

```
[28]: top_crime_count = crime_data.nlargest(5, "Crime_Count")

top_crime_count
```

[28]:

	Neighbourhood	Crime_Count
40	Platt	198
10	Downtown	127
38	North Devon	113
13	Fredericton South	85
42	Prospect	81

Frequency of different crime types & Statistical description

EXAMINE THE TYPES OF CRIMES

```
[73]: crimetype_data = crime_df.groupby(['Crime_Type']).size().to_frame(name='Count').reset_index()
      crimetype_data
```

[73]:

	Crime_Type	Count
0		4
1	ARSON	5
2	ARSON BY NEG	1
3	ARSON-DAM.PROP.	4
4	B&E NON-RESIDNCE	51
5	B&E OTHER	58
6	B&E RESIDENCE	151
7	B&E STEAL FIREAR	3
8	MISCHIEF OBS USE	1
9	MISCHIEF TO PROP	246
10	MISCHIEF-DATA	2

```
[75]: crimetype_data.describe()
```

[75]:

	Count
count	19.000000
mean	76.842105
std	133.196706
min	1.000000
25%	2.500000
50%	5.000000
75%	60.500000
max	458.000000

Neighbourhoods with least crime count in 2017

Neighbouhoods the least crime count

The following 10 neighbourhoods had the least crime count in 2017, with a crime

```
[46]:  small_crime_count = crime_data.nsmallest(10, "Crime_Count")

       small_crime_count
```

[46]:

	Neighbourhood	Crime_Count
7	Diamond Street	1
8	Doak Road	1
19	Grasse Circle	1
24	Kelly's Court Minihome Park	1
26	Knowledge Park	1
37	Nethervue Minihome Park	1
44	Regiment Creek	1
47	Saint Thomas University	1
55	Springhill	1
61	Wesbett / Case	1

These 10 neighbourhoods witnessed only a single crime incident in 2017. As a result, they were presumed to be the safest then.

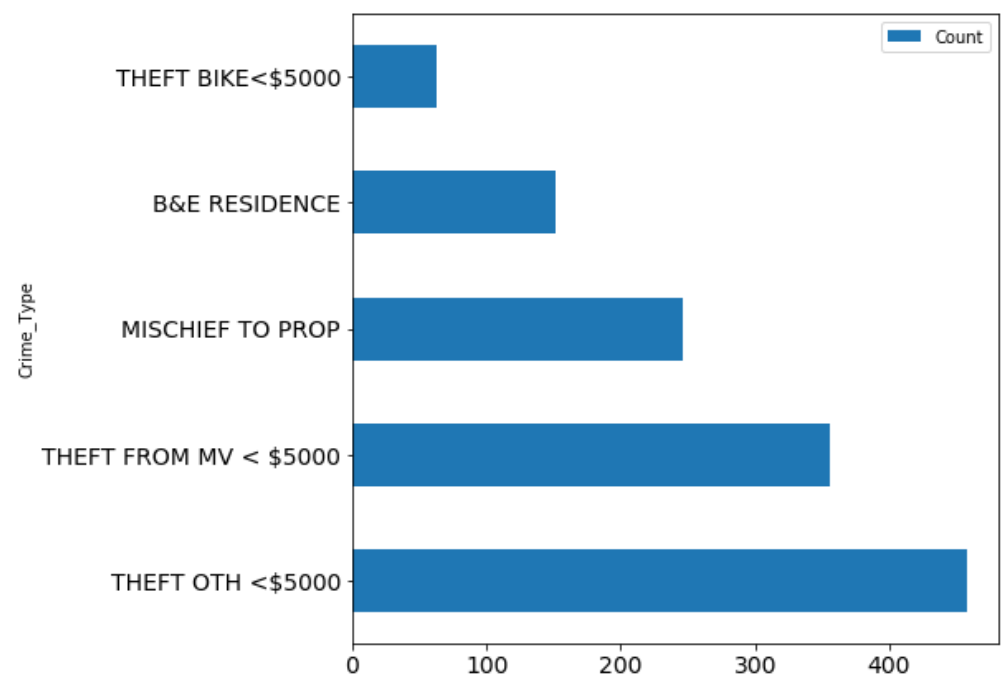# Top 5 frequent crime types in Fredericton neighbourhoods

Proportion of different crime types that occurred in 2017
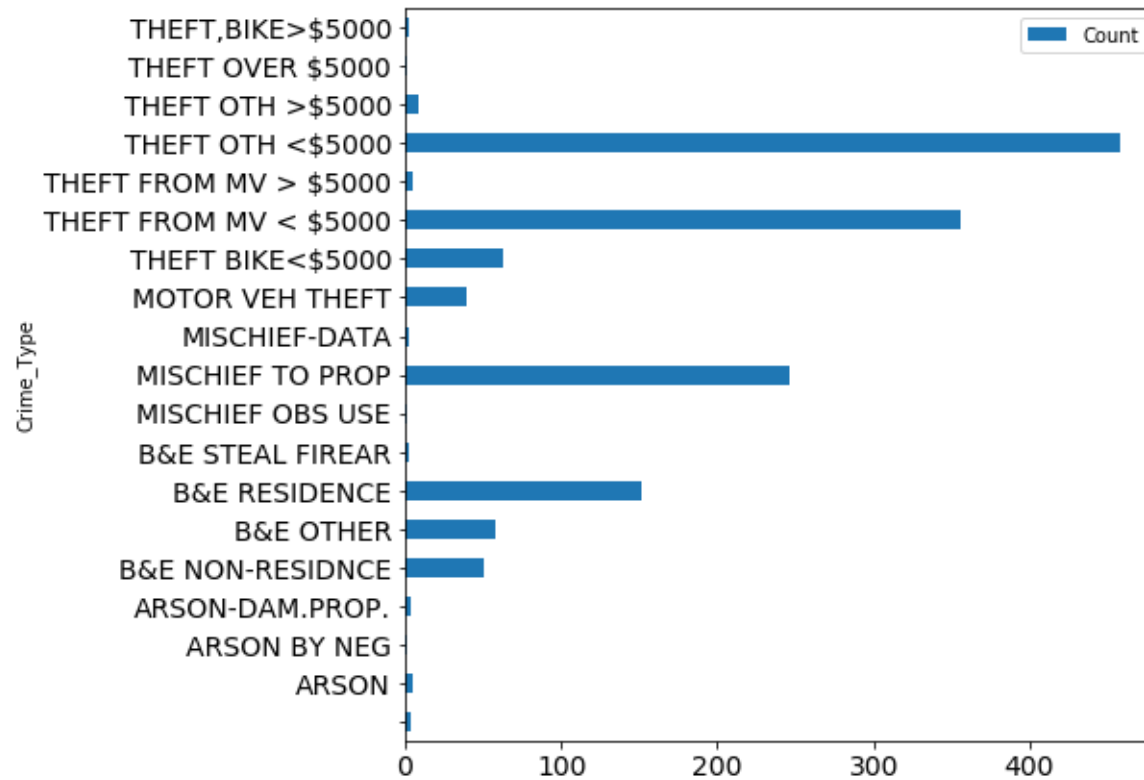
Specific locations in Fredericton & their geographical coordinates

EXAMINE SPECIFIC LOCATIONS IN FREDERICTON

```
[83]:  location_df = pd.read_csv('Fredericton_Locations.csv')
       location_df
```

[83]:

	Location	Latitude	Longitude
0	Knowledge Park	45.931143	-66.652700
1	Fredericton Downtown	45.963026	-66.383550
2	Fredericton Hill	45.948512	-66.656045
3	Nashwaaksis	45.983382	-66.644856
4	University of New Brunswick	45.948121	-66.641406
5	Devon	45.968802	-66.622738
6	New Maryland	45.892795	-66.683673
7	Marysville	45.978913	-66.589491
8	Skyline Acres	45.931827	-66.640339
9	Hanwell	45.902315	-66.755113

Conclusion

- This work mainly explored the "Crime by Neighbourhood 2017" open dataset provided by the City of Fredericton coupled with the Foursquare data.

- We also explored the geographical coordinates of the neighbourhoods of Fredericton.

- Identified crime count and frequency of crime type count by neighbourhoods.

- Identified top 5 neighbourhoods with the highest crime counts in 2017.

- Identified 10 neighbourhoods with least crime counts in 2017. Hence, these neighbourhoods were presumed to be the safest in then.