**Segmenting and Clustering Neighborhoods in Fredericton, NB**

**Applied Data Science Capstone Week 5 Peer-Graded Project Report**

By Jason L. Urquhart December 20, 2018

**Introduction to the opportunity**

Fredericton is the Capital City of the only Canadian fully-bilingual Province of New Brunswick and is beautifully located on the banks of the Saint John River. While one of the least populated provincial capital cities with a population base of less than 60 thousand residents, it oﬀers a wide spectrum of venues and is a governement, university and cultural hub.

As the city grows and develops, it becomes increasingly important to examine and understand it quantitiatively. The City of Fredericton provides open data for everyone and encourages entrepreneurial use to develop services for the benefit of its ciitzens.

Developers, investors, policy makers and/or city planners have an interest in answering the following questions as the need for additional services and citizen protection:

1. What neighbourhoods have the highest crime?
2. Is population density correlated to crime level?
3. Using Foursquare data, what venues are most common in diﬀerent locations within the city?
4. Does the Knowledge Park really need a coﬀee shop?

Does the Open Data project have specific enough or thick enough data to empower decisions to be made or is it too aggregate to provide value in its current detail? Let's find out.

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**In [73]: from IPython.display import Image**

**from IPython.core.display import HTML**

**Image(url= "http://www.tourismfredericton.ca/sites/default/files/field/image/freder icton.jpg")**

**Out[73]:**



**Data**

To understand and explore we will need the following City of Fredericton Open Data:

1. Open Data Site: [http://data-fredericton.opendata.arcgis.com/ (http://data-fredericton.opendata.arcgis.com/)](http://data-fredericton.opendata.arcgis.com/)
2. [Fredericton Neighbourhoods: http://data-fredericton.opendata.arcgis.com/datasets/neighbourhoods--quartiers](http://data-fredericton.opendata.arcgis.com/datasets/neighbourhoods--quartiers) [(http://data-fredericton.opendata.arcgis.com/datasets/neighbourhoods--quartiers)](http://data-fredericton.opendata.arcgis.com/datasets/neighbourhoods--quartiers)
3. [Fredericton Crime by Neighbourhood: http://data-fredericton.opendata.arcgis.com/datasets/crime-by-neighbourhood-2017--crime-par-quartier-2017 (http://data-fredericton.opendata.arcgis.com/datasets/crime-by-neighbourhood-2017--](http://data-fredericton.opendata.arcgis.com/datasets/crime-by-neighbourhood-2017--crime-par-quartier-2017) [crime-par-quartier-2017)](http://data-fredericton.opendata.arcgis.com/datasets/crime-by-neighbourhood-2017--crime-par-quartier-2017)
4. [Fredericton Census Tract Demographics: http://data-fredericton.opendata.arcgis.com/datasets/census-tract-demographics--donn%C3%A9es-d%C3%A9mographiques-du-secteur-de-recensement (http://data-fredericton.opendata.arcgis.com/datasets/census-tract-demographics--donn%C3%A9es-d%C3%A9mographiques-du-secteur-de-recensement)](http://data-fredericton.opendata.arcgis.com/datasets/census-tract-demographics--donn%C3%A9es-d%C3%A9mographiques-du-secteur-de-recensement)
5. [Fredericton locations of interest: https://github.com/JasonLUrquhart/Applied-Data-Science-Capstone/blob/master/Fredericton%20Locations.xlsx (https://github.com/JasonLUrquhart/Applied-Data-Science-Capstone/blob/master/Fredericton%20Locations.xlsx)](https://github.com/JasonLUrquhart/Applied-Data-Science-Capstone/blob/master/Fredericton%20Locations.xlsx)
6. Foursquare Developers Access to venue data: [https://foursquare.com/ (https://foursquare.com/)](https://foursquare.com/)



Using this data will allow exploration and examination to answer the questions. The neighbourhood data will enable us to properly group crime by neighbourhood. The Census data will enable us to then compare the population density to examine if areas of highest crime are also most densely populated. Fredericton locations of interest will then allow us to cluster and quantitatively understand the venues most common to that location.

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**Methodology**

All steps are referenced beleow in the Appendix: Analysis section.

The methodology will include:

1. Loading each data set
2. Examine the crime frequency by neighbourhood
3. Study the crime types and then pivot analysis of crime type frequency by neighbourhood
4. Understand correlation between crimes and population density
5. Perform k-means statisical analysis on venues by locations of interest based on findings from crimes and neighbourhood
6. Determine which venues are most common statistically in the region of greatest crime count then in all other locations of interest.
7. Determine if an area, such as the Knowledge Park needs a coﬀee shop.

**Loading the data**

After loading the applicable libraries, the referenced geojson neighbourhood data was loaded from the City of Fredericton Open Data site. This dataset uses block polygon shape coordinates which are better for visualization and comparison. The City also uses Ward data but the Neighbourhood location data is more accurate and includes more details. The same type of dataset was then loaded for the population density from the Stats Canada Census tracts.

The third dataset, an excel file, "Crime by Neighbourhood 2017" downloaded from the City of Fredericton Open Data site is found under the Public Safety domain. This dataset was then uploaded for the analysis. It's interesting to note the details of this dataset are aggregated by neighbourhood. It is not an exhaustive set by not including all crimes (violent oﬀenses) nor specific location data of the crime but is referenced by neighbourhood.

This means we can gain an understanding of the crime volume by type by area but not specific enough to understand the distribution properties. Valuable questions such as, "are these crimes occuring more often in a specific area and at a certain time by a specific demographic of people?" cannot be answered nor explored due to what is reasonably assumed to be personal and private information with associated legal risks.

There is value to the city to explore the detailed crime data using data science to predict frequency, location, timing and conditions to best allocated resources for the benefit of its citizens and it's police force. However, human behaviour is complex requiring thick profile data by individual and the conditions surrounding the event(s). To be suﬃcient for reliable future prediction it would need to demonstrate validity, currency, reliability and suﬃciency.

**Exploring the data**

Exploring the count of crimes by neighbourhood gives us the first glimpse into the distribution.

One note is the possibility neighbourhoods names could change at diﬀerent times. The crime dataset did not mention which specific neighbourhood naming dataset it was using but we assumed the neighbourhood data provided aligned with the neighbourhoods used in the crime data. It may be beneficial for the City to note and timestamp neighbourhood naming in the future or simply reference with neighbourhood naming file it used for the crime dataset.

An example of data errors: There was an error found in the naming of the neighbourhood "Platt". The neighbourhood data stated "Plat" while the crime data stated "Platt". Given the crime dataset was most simple to manipulate it was modified to "Plat". The true name of the neighbourhood is "Platt".

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**First Visualization of Crime**

Once the data was prepared, a choropleth map was created to view the crime count by neighbourhood. As expected the region of greatest crime count was found in the downtown and Platt neighbourhoods.

Examining the crime types enables us to learn the most frequent occuring crimes which we then plot as a bar chart to see most frequenty type.

Theft from motor vehicles is most prevalent in the same area as the most frequent crimes. It's interesting to note this area is mostly residential and most do not have garages. It would be interesting to further examine if surveillance is a deterant for motor vehicle crimes in the downtown core compared to low surveillance in the Platt neighbourhood.

**Examining 2nd most common crime given it is specific: theft from vehicles**

After exploring the pivot table showing Crime\_Type by Neighbourhood, we drill into a specific type of crime, theft from vehicles and plot the choropleth map to see which area has the greatest frequency.

Again, the Platt neighbourhood appears as the most frequent.

Is this due to population density?

**Introducing the Census data to explore the correlation between crime frequency and population density.**

Visualising the population density enables us to determine that the Platt neighbourhood has lower correlation to crime frequency than I would have expected.

It would be interesting to further study the Census data and if this captures the population that is renting or more temporary/transient poplution, given the City is a University hub.

**Look at specific locations to understand the connection to venues using Foursquare data**

Loading the "Fredericton Locations" data enables us to perform a statistical analysis on the most common venues by location.

We might wonder if the prevalence of bars and clubs in the downtown region has something to do with the higher crime rate in the near Platt region.

Plotting the latitude and longitude coordinates of the locations of interest onto the crime choropleth map enables us to now study the most common venues by using the Foursquare data.

**Analysing each Location**

Grouping rows by location and the mean of the frequency of occurance of each category we venue categories we study the top five most common venues.

Putting this data into a pandas dataframe we can then determine the most common venues by location and plot onto a map.

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**Results**

The analysis enabled us to discover and describe visually and quantitatively:

1. Neighbourhoods in Fredericton
2. Crime freqency by neighbourhood
3. Crime type frequency and statistics. The mean crime count in the City of Fredericton is 22.
4. Crime type count by neighbourhood.

Theft from motor vehicles is most prevalent in the same area as the most frequent crimes. It's interesting to note this area is mostly residential and most do not have garages. It would be interesting to further examine if surveillance is a deterant for motor vehicle crimes in the downtown core compared to low surveillance in the Platt neighbourhood.

1. Motor Vehicle crimes less than $5000 analysis by neighbourhood and resulting statistics.

The most common crime is **Other Theft less than 5k** followed by **Motor Vehicle Theft less than 5k**. There is a mean of 6 motor vehicle thefts less than 5k by neighbourhood in the City.

1. That population density and resulting visual correlation is not strongly correlated to crime frequency. Causation for crime is not able to be determined given lack of open data specificity by individual and environment.
2. Using k-menas, we were able to determine the top 10 most common venues within a 1 km radius of the centroid of the highest crime neighbourhood. **The most common venues in the highest crime neighbourhood are coﬀee shops** **followed by Pubs and Bars**.

While, it is not valid, consistent, reliable or suﬃcient to assume a higher concentration of the combination of coﬀee shops, bars and clubs predicts the amount of crime occurance in the City of Fredericton, this may be a part of the model needed to be able to in the future.

1. We were able to determine the top 10 most common venues by location of interest.
2. Statisically, we determined there are no coﬀee shops within the Knowledge Park clusters.

**Discussion and Recommendations**

The City of Fredericton Open Data enables us to gain an understanding of the crime volume by type by area but not specific enough to understand the distribution properties. Valuable questions such as, "are these crimes occuring more often in a specific area and at a certain time by a specific demographic of people?" cannot be answered nor explored due to what is reasonably assumed to be personal and private information with associated legal risks.

There is value to the city to explore the detailed crime data using data science to predict frequency, location, timing and conditions to best allocated resources for the benefit of its citizens and it's police force. However, human behaviour is complex requiring thick profile data by individual and the conditions surrounding the event(s). To be suﬃcient for reliable future prediction it would need to demonstrate validity, currency, reliability and suﬃciency.

A note of caution is the possibility neighbourhoods names could change. The crime dataset did not mention which specific neighbourhood naming dataset it was using but we assumed the neighbourhood data provided aligned with the neighbourhoods used in the crime data. It may be beneficial for the City to note and timestamp neighbourhood naming in the future or simply reference with neighbourhood naming file it used for the crime dataset.

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Errors exist in the current open data. An error was found in the naming of the neighbourhood "Platt". The neighbourhood data stated "Plat" while the crime data stated "Platt". Given the crime dataset was most simple to manipulate it was modified to "Plat". The true name of the neighbourhood is "Platt".

Theft from motor vehicles is most prevalent in the same area as the most frequent crimes. It is interesting to note this area is mostly residential and most do not have garages. It would be interesting to further examine if surveillance is a deterant for motor vehicle crimes in the downtown core compared to low surveillance in the Platt neighbourhood.

It would be interesting to further study the Census data and if this captures the population that is renting or more temporary/transient poplution, given the City is a University hub.

Given the findings of the top 10 most frequent venues by locations of interest, the Knowledge Park does not have Coﬀee Shops in the top 10 most common venues as determined from the Foursquare dataset. Given this area has the greatest concentration of stores and shops as venues, it would be safe to assume a coﬀee shop would be beneficial to the business community and the citizens of Fredericton.

**Conclusion**

Using a combination of datasets from the City of Fredericton Open Data project and Foursquare venue data we were able to analyse, discover and describe neighbhourhoods, crime, population density and statistically describe quantitatively venues by locations of interest.

While overall, the City of Fredericton Open Data is interesting, it misses the details required for true valued quantitiatve analysis and predictive analytics which would be most valued by investors and developers to make appropriate investments and to minimize risk.

The Open Data project is a great start and empowers the need for a "Citizens Like Me" model to be developed where citizens of digital Fredericton are able to share their data as they wish for detailed analysis that enables the creation of valued services.

**APPENDIX: Analysis**

**Load Libraries**

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**In [74]: import numpy as np *# library to handle data in a vectorized manner***

**import pandas as pd *# library for data analysis***

**pd.set\_option('display.max\_columns', None)**

**pd.set\_option('display.max\_rows', None)**

**import json *# library to handle JSON files***

**!conda install -c conda-forge geopy --yes # uncomment this line if you haven't comp leted the Foursquare API lab**

**from geopy.geocoders import Nominatim *# convert an address into latitude and longit* *ude values***

**import requests *# library to handle requests***

**from pandas.io.json import json\_normalize *# tranform JSON file into a pandas datafr* *ame***

* ***Matplotlib and associated plotting modules* import matplotlib.cm as cm**

**import matplotlib.colors as colors**

* ***import k-means from clustering stage***

**from sklearn.cluster import KMeans**

* ***for webscraping import Beautiful Soup* from bs4 import BeautifulSoup**

**import xml**

**!conda install -c conda-forge folium=0.5.0 --yes**

**import folium *# map rendering library***

**print('Libraries imported.')**

**Solving environment: done**

* **All requested packages already installed. Solving environment: done**
* **All requested packages already installed. Libraries imported.**



**In [3]: pwd**

**Out[3]: '/Users/jasonkristaurquhart/Documents/GitHub/Coursera-IBM-Applied-Data-Science-Cap**

**stone-Project'**



**In [75]: r = requests.get('https://opendata.arcgis.com/datasets/823d86e17a6d47808c6e4f1c2dd9 7928\_0.geojson')**

**fredericton\_geo = r.json()**



**In [76]: neighborhoods\_data = fredericton\_geo['features']**

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**In [77]: neighborhoods\_data[0]**

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**Out[77]: {'type': 'Feature',**

**'properties': {'FID': 1,**

**'OBJECTID': 1,**

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**'Shape\_Leng': 40412.2767429,**

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**'coordinates': [[[-66.6193489311946, 45.8688925859664], [-66.5986068312843, 45.8934317575498], [-66.5998465063764, 45.8962889533894], [-66.6005561754508, 45.8987959122414], [-66.6007627879662, 45.9004150599189], [-66.6005112596866, 45.9020341603803], [-66.5993703992758, 45.9049409211054], [-66.5983912356161, 45.9066536507875], [-66.5950405196063, 45.9110977503182], [-66.5924713378938, 45.9137165396725], [-66.5975198697905, 45.9151915074375], [-66.6016161874861, 45.9165914405789], [-66.6063862416448, 45.9184662957134], [-66.6102310310608, 45.9201848572716], [-66.6193938469588, 45.9264149777787], [-66.6194297795702, 45.9243466803461], [-66.6206694546623, 45.9221345790227], [-66.6241459348118, 45.9181100781124], [-66.6249634017204, 45.9177976046497], [-66.6258796833102, 45.917910095299], [-66.6292124330143, 45.9200348758374], [-66.632733828928, 45.9225720071846], [-66.6356353872957, 45.924409167803], [-66.6362731911474, 45.9249840491044], [-66.6381955858555, 45.9258900999313], [-66.6400281490351, 45.9272147820915], [-66.6469721261813, 45.9309512150791], [-66.6492628301558, 45.9324257247173], [-66.6501521622871, 45.9331254782868], [-66.6504306400252, 45.9337564984884], [-66.6505653873178, 45.9347436246005], [-66.6503587748024, 45.9357182382069], [-66.6520745569951, 45.9352246860213], [-66.6532513500173, 45.9350872403269], [-66.6541855979128, 45.9351122304785], [-66.6557756159657, 45.9353808738969], [-66.6597461695215, 45.9365616400027], [-66.6692323789218, 45.9408659130747], [-66.6702205257343, 45.9411720097543], [-66.6705888350008, 45.9415718069541], [-66.6717027459531, 45.9418654061867], [-66.6805601346545, 45.9456570693391], [-66.6808206460869, 45.945613344883], [-66.690998558256, 45.9498794400526], [-66.6932353633134, 45.9503791076107], [-66.6956697977334, 45.9504478115476], [-66.6955530167465, 45.9498607024316], [-66.695014027576, 45.9498607024316], [-66.6956248819692, 45.948261735435], [-66.699766115429, 45.9452510552052], [-66.6993978061625, 45.9450511702315], [-66.6996762839006, 45.9448512845371], [-66.6992271262585, 45.9446139193389], [-66.7022364824603, 45.9407722096716], [-66.7041049782513, 45.9393666396225], [-66.7046080348104, 45.9387919073835], [-66.7061441539463, 45.9390980155132],**

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**In [78]: g = requests.get('https://opendata.arcgis.com/datasets/6179d35eacb144a5b5fdcc869f86 dfb5\_0.geojson')**

**demog\_geo = g.json()**



**In [79]: demog\_data = demog\_geo['features']**

**demog\_data[0]**

**Out[79]: {'type': 'Feature',**

**'properties': {'FID': 1,**

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**In [ ]:** 

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**In [80]: import os**

**os.listdir('.')**

**Out[80]: ['Capstone Project Course.ipynb',**

**'Fredericton\_Census\_Tract\_Demographics.csv',**

**'.DS\_Store',**

**'Fredericton\_Census\_Tract\_Demographics.xlsx',**

**'Crime\_by\_neighbourhood\_2017.xlsx',**

**'Capstone Fredericton Crime and Police Station Location.ipynb', 'Boston\_Neighborhoods (1).geojson', 'Fredericton Locations.xlsx',**

**'Week 3 Capstone - Segmenting and Clustering Neighbourhoods in Toronto\_Part 2.ipy nb',**

**'Fredericton.jpg',**

**'Week 3 Capstone - Segmenting and Clustering Neighbourhoods in Toronto\_Part 2.pd f',**

**'Boston\_Neighborhoods.geojson',**

**'.ipynb\_checkpoints',**

**'.git',**

**'Week 3 Capstone - Segmenting and Clustering Neighbourhoods in Toronto.ipynb', 'Week 4 Capstone - Segmenting and Clustering Neighbourhoods in Boston.ipynb', 'Week 3 Capstone - Segmenting and Clustering Neighbourhoods in Toronto\_Part 2.ht**

**m',**

**'Week 4 Capstone - Segmenting and Clustering Neighbourhoods in Fredericton.ipyn b',**

**'Week 4 Capstone - Segmenting and Clustering Neighbourhoods in Fredericton - Gith ub submit.ipynb',**

**'Week 3 Capstone - Segmenting and Clustering Neighbourhoods in Toronto\_Part 2\_fil es']**



**In [81]: opencrime = 'Crime\_by\_neighbourhood\_2017.xlsx'**



**In [82]: workbook = pd.ExcelFile(opencrime)**

**print(workbook.sheet\_names)**

**['Crime\_by\_neighbourhood\_2017']**



**In [83]: crime\_df = workbook.parse('Crime\_by\_neighbourhood\_2017')**

**crime\_df.head()**

**Out[83]:**

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | **Neighbourhood** | **From\_Date** | **To\_Date** | **Crime\_Code** | **Crime\_Type Ward** | | **City** | **FID** |  |
| **0** | Fredericton | 2017-01- | 2017-01- | 2120 | B&E NON- | 7 | Fredericton | 1 |  |
| South | 05T00:00:00.000Z | 26T00:00:00.000Z | RESIDNCE |  |
|  |  |  |  |  |  |
| **1** | Fredericton | 2017-03- | 2017-03- | 2120 | B&E NON- | 7 | Fredericton | 2 |  |
| South | 04T00:00:00.000Z | 06T00:00:00.000Z | RESIDNCE |  |
|  |  |  |  |  |  |
| **2** | Fredericton | 2017-05- | NaN | 2120 | B&E NON- | 12 | Fredericton | 3 |  |
| South | 07T00:00:00.000Z | RESIDNCE |  |
|  |  |  |  |  |  |  |
| **3** | Fredericton | 2017-06- | 2017-06- | 2120 | B&E NON- | 12 | Fredericton | 4 |  |
| South | 20T00:00:00.000Z | 21T00:00:00.000Z | RESIDNCE |  |
|  |  |  |  |  |  |
| **4** | Fredericton | 2017-07- | 2017-07- | 2120 | B&E NON- | 7 | Fredericton | 5 |  |
| South | 09T00:00:00.000Z | 10T00:00:00.000Z | RESIDNCE |  |
|  |  |  |  |  |  |



**In [84]: crime\_df.drop(['From\_Date', 'To\_Date'], axis=1,inplace=True)**

**What is the crime count by neighbourhood?**

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**In [128]: crime\_data = crime\_df.groupby(['Neighbourhood']).size().to\_frame(name='Count').rese t\_index()**

**crime\_data**

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**Out[128]:**

**0**

**1**

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|  |  |
| --- | --- |
| **Neighbourhood** | **Count** |
| Barkers Point | 47 |
| Brookside | 54 |
| Brookside Estates | 9 |
| Brookside Mini Home Park | 5 |
| College Hill | 41 |
| Colonial heights | 9 |
| Cotton Mill Creek | 4 |
| Diamond Street | 1 |
| Doak Road | 1 |
| Douglas | 3 |
| Downtown | 127 |
| Dun's Crossing | 18 |
| Forest Hill | 12 |
| Fredericton South | 85 |
| Fulton Heights | 36 |
| Garden Creek | 13 |
| Garden Place | 4 |
| Gilridge Estates | 3 |
| Golf Club | 7 |
| Grasse Circle | 1 |
| Greenwood Minihome Park | 2 |
| Hanwell North | 8 |
| Heron Springs | 3 |
| Highpoint Ridge | 5 |
| Kelly's Court Minihome Park | 1 |
| Knob Hill | 4 |
| Knowledge Park | 1 |
| Lian / Valcore | 7 |
| Lincoln | 13 |
| Lincoln Heights | 14 |
| Main Street | 78 |
| Marysville | 39 |
| McKnight | 4 |
| McLeod Hill | 3 |
| Monteith / Talisman | 12 |
| Montogomery / Prospect East | 16 |
| Nashwaaksis | 25 |
| Nethervue Minihome Park | 1 |
| North Devon | 113 |



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|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| 12/20/2018 |  |  |  | Capstone\_Week5 |
|  |  | **Neighbourhood** | **Count** | |
|  |  |  |  |  |
| **39** | | Northbrook Heights | 10 |  |
| **40** | | Plat | 198 |  |
| **41** | | Poet's Hill | 4 |  |
| **42** | | Prospect | 81 |  |
| **43** | | Rail Side | 3 |  |
| **44** | | Regiment Creek | 1 |  |
| **45** | | Royal Road | 7 |  |
| **46** | | Saint Mary's First Nation | 25 |  |
| **47** | | Saint Thomas University | 1 |  |
| **48** | | Sandyville | 9 |  |
| **49** | | Serenity Lane | 2 |  |
| **50** | | Shadowood Estates | 5 |  |
| **51** | | Silverwood | 12 |  |
| **52** | | Skyline Acrea | 27 |  |
| **53** | | South Devon | 68 |  |
| **54** | | Southwood Park | 16 |  |
| **55** | | Springhill | 1 |  |
| **56** | | Sunshine Gardens | 10 |  |
| **57** | | The Hill | 44 |  |
| **58** | | The Hugh John Flemming Forestry Center | 3 |  |
| **59** | | University Of New Brunswick | 15 |  |
| **60** | | Waterloo Row | 9 |  |
| **61** | | Wesbett / Case | 1 |  |
| **62** | | West Hills | 5 |  |
| **63** | | Williams / Hawkins Area | 17 |  |
| **64** | | Woodstock Road | 41 |  |
| **65** | | Youngs Crossing | 16 |  |



**In [153]: crime\_data.describe()**

**Out[153]:**

**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

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**In [86]: crime\_data.rename(index=str, columns={'Neighbourhood':'Neighbourh','Count':'Crime\_C ount'}, inplace=True)**

**crime\_data**

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**Out[86]:**

**0**

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| --- | --- |
|  | Capstone\_Week5 |
| **Neighbourh** | **Crime\_Count** |
| Barkers Point | 47 |
| Brookside | 54 |
| Brookside Estates | 9 |
| Brookside Mini Home Park | 5 |
| College Hill | 41 |
| Colonial heights | 9 |
| Cotton Mill Creek | 4 |
| Diamond Street | 1 |
| Doak Road | 1 |
| Douglas | 3 |
| Downtown | 127 |
| Dun's Crossing | 18 |
| Forest Hill | 12 |
| Fredericton South | 85 |
| Fulton Heights | 36 |
| Garden Creek | 13 |
| Garden Place | 4 |
| Gilridge Estates | 3 |
| Golf Club | 7 |
| Grasse Circle | 1 |
| Greenwood Minihome Park | 2 |
| Hanwell North | 8 |
| Heron Springs | 3 |
| Highpoint Ridge | 5 |
| Kelly's Court Minihome Park | 1 |
| Knob Hill | 4 |
| Knowledge Park | 1 |
| Lian / Valcore | 7 |
| Lincoln | 13 |
| Lincoln Heights | 14 |
| Main Street | 78 |
| Marysville | 39 |
| McKnight | 4 |
| McLeod Hill | 3 |
| Monteith / Talisman | 12 |
| Montogomery / Prospect East | 16 |
| Nashwaaksis | 25 |
| Nethervue Minihome Park | 1 |
| North Devon | 113 |



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|  |  |  |
| --- | --- | --- |
|  | **Neighbourh** | **Crime\_Count** |
|  |  |  |
| **39** | Northbrook Heights | 10 |
| **40** | Plat | 198 |
| **41** | Poet's Hill | 4 |
| **42** | Prospect | 81 |
| **43** | Rail Side | 3 |
| **44** | Regiment Creek | 1 |
| **45** | Royal Road | 7 |
| **46** | Saint Mary's First Nation | 25 |
| **47** | Saint Thomas University | 1 |
| **48** | Sandyville | 9 |
| **49** | Serenity Lane | 2 |
| **50** | Shadowood Estates | 5 |
| **51** | Silverwood | 12 |
| **52** | Skyline Acrea | 27 |
| **53** | South Devon | 68 |
| **54** | Southwood Park | 16 |
| **55** | Springhill | 1 |
| **56** | Sunshine Gardens | 10 |
| **57** | The Hill | 44 |
| **58** | The Hugh John Flemming Forestry Center | 3 |
| **59** | University Of New Brunswick | 15 |
| **60** | Waterloo Row | 9 |
| **61** | Wesbett / Case | 1 |
| **62** | West Hills | 5 |
| **63** | Williams / Hawkins Area | 17 |
| **64** | Woodstock Road | 41 |
| **65** | Youngs Crossing | 16 |

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**In [87]: crime\_data.rename({'Platt': 'Plat'},inplace=True)**

**crime\_data.rename(index=str, columns={'Neighbourhood':'Neighbourh','Count':'Crime\_C**

**ount'}, inplace=True)**

**crime\_data**

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**Out[87]:**

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| --- | --- |
|  | Capstone\_Week5 |
| **Neighbourh** | **Crime\_Count** |
| Barkers Point | 47 |
| Brookside | 54 |
| Brookside Estates | 9 |
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| Fredericton South | 85 |
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| Garden Creek | 13 |
| Garden Place | 4 |
| Gilridge Estates | 3 |
| Golf Club | 7 |
| Grasse Circle | 1 |
| Greenwood Minihome Park | 2 |
| Hanwell North | 8 |
| Heron Springs | 3 |
| Highpoint Ridge | 5 |
| Kelly's Court Minihome Park | 1 |
| Knob Hill | 4 |
| Knowledge Park | 1 |
| Lian / Valcore | 7 |
| Lincoln | 13 |
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| Main Street | 78 |
| Marysville | 39 |
| McKnight | 4 |
| McLeod Hill | 3 |
| Monteith / Talisman | 12 |
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|  |  |  |
| --- | --- | --- |
|  | **Neighbourh** | **Crime\_Count** |
|  |  |  |
| **39** | Northbrook Heights | 10 |
| **40** | Plat | 198 |
| **41** | Poet's Hill | 4 |
| **42** | Prospect | 81 |
| **43** | Rail Side | 3 |
| **44** | Regiment Creek | 1 |
| **45** | Royal Road | 7 |
| **46** | Saint Mary's First Nation | 25 |
| **47** | Saint Thomas University | 1 |
| **48** | Sandyville | 9 |
| **49** | Serenity Lane | 2 |
| **50** | Shadowood Estates | 5 |
| **51** | Silverwood | 12 |
| **52** | Skyline Acrea | 27 |
| **53** | South Devon | 68 |
| **54** | Southwood Park | 16 |
| **55** | Springhill | 1 |
| **56** | Sunshine Gardens | 10 |
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| **59** | University Of New Brunswick | 15 |
| **60** | Waterloo Row | 9 |
| **61** | Wesbett / Case | 1 |
| **62** | West Hills | 5 |
| **63** | Williams / Hawkins Area | 17 |
| **64** | Woodstock Road | 41 |
| **65** | Youngs Crossing | 16 |

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**In [88]: address = 'Fredericton, Canada'**

**geolocator = Nominatim()**

**location = geolocator.geocode(address)**

**latitude = location.latitude**

**longitude = location.longitude**

**print('The geograpical coordinate of Fredericton, New Brunswick is {}, {}.'.format( latitude, longitude))**

**/anaconda3/lib/python3.7/site-packages/ipykernel\_launcher.py:3: DeprecationWarnin**

1. **Using Nominatim with the default "geopy/1.18.1" `user\_agent` is strongly discou raged, as it violates Nominatim's ToS https://operations.osmfoundation.org/policie s/nominatim/ and may possibly cause 403 and 429 HTTP errors. Please specify a cust om `user\_agent` with `Nominatim(user\_agent="my-application")` or by overriding the default `user\_agent`: `geopy.geocoders.options.default\_user\_agent = "my-applicatio n"`. In geopy 2.0 this will become an exception.**

**This is separate from the ipykernel package so we can avoid doing imports until**

**The geograpical coordinate of Fredericton, New Brunswick is 45.966425, -66.645813.**



**In [89]: world\_geo = r'world\_countries.json' *# geojson file***

**fredericton\_1\_map = folium.Map(location=[45.97, -66.65], width=1000, height=750,zoo m\_start=12)**

**fredericton\_1\_map**

**Out[89]:**



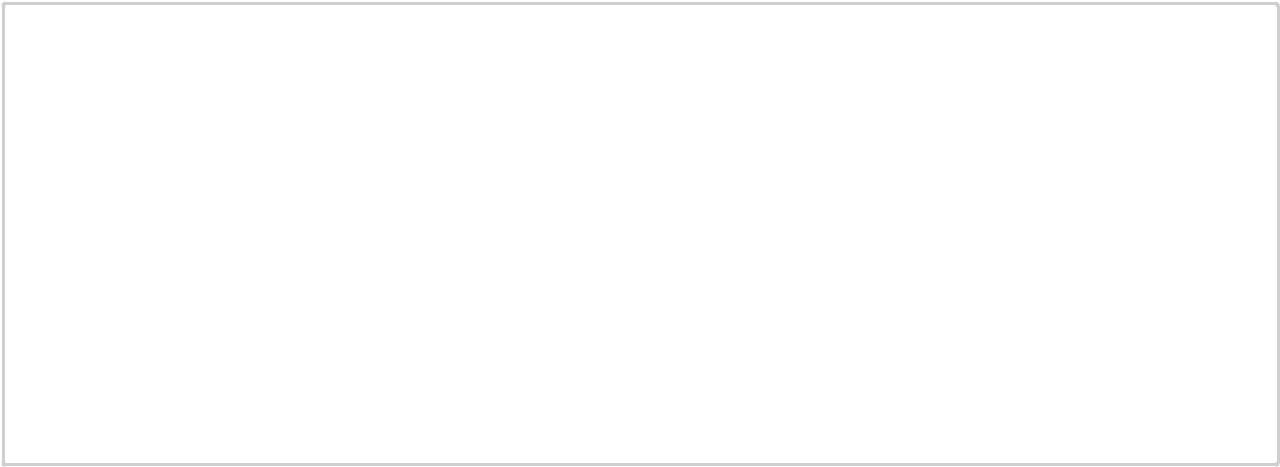
+

~~−~~



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**In [90]: fredericton\_geo = r.json()**

**threshold\_scale = np.linspace(crime\_data['Crime\_Count'].min(),crime\_data['Crime\_Cou nt'].max(), 6,dtype=int)**

**threshold\_scale = threshold\_scale.tolist()**

**threshold\_scale[-1] = threshold\_scale[-1]+1**

**fredericton\_1\_map.choropleth(geo\_data=fredericton\_geo, data=crime\_data,columns=['Ne ighbourh', 'Crime\_Count'],**

**key\_on='feature.properties.Neighbourh', threshold\_scale=threshold\_scale,fill\_co lor='YlOrRd', fill\_opacity=0.7,**

**line\_opacity=0.1, legend\_name='Fredericton Neighbourhoods')**

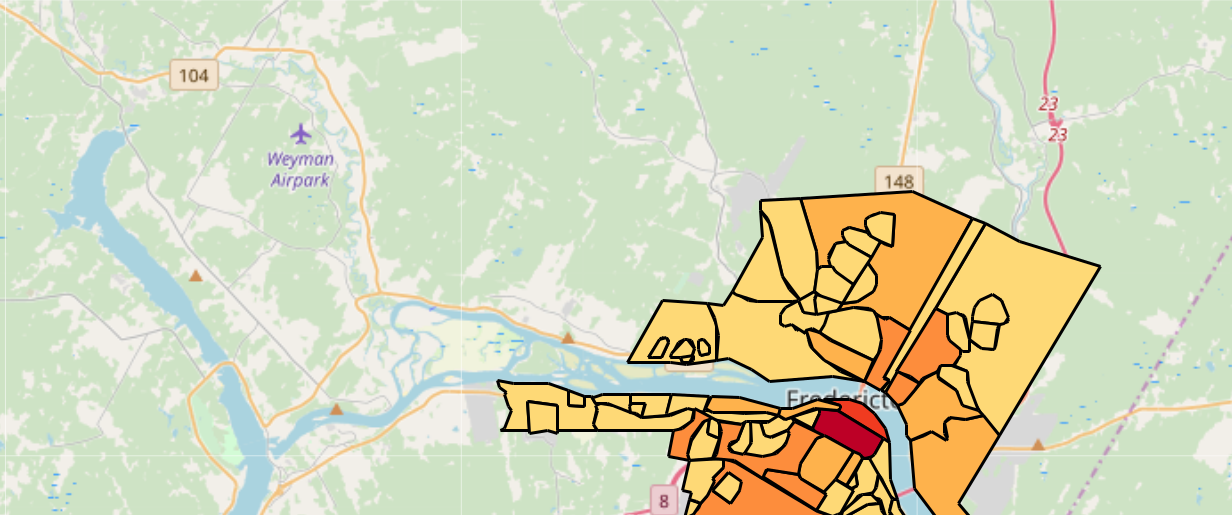
**fredericton\_1\_map**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Out[90]:** | + | 1 | 40 |  |
|  |  |
|  |  |  |  |



Fredericton Neighbourh

~~−~~



**Examine Crime Types**

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**In [131]: crimetype\_data = crime\_df.groupby(['Crime\_Type']).size().to\_frame(name='Count').res et\_index()**

**crimetype\_data**

**Out[131]:**

|  |  |  |
| --- | --- | --- |
|  | **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 |
| **11** | MOTOR VEH THEFT | 40 |
| **12** | THEFT BIKE<$5000 | 63 |
| **13** | THEFT FROM MV < $5000 | 356 |
| **14** | THEFT FROM MV > $5000 | 5 |
| **15** | THEFT OTH <$5000 | 458 |
| **16** | THEFT OTH >$5000 | 9 |
| **17** | THEFT OVER $5000 | 1 |
| **18** | THEFT,BIKE>$5000 | 2 |



**In [154]: crimetype\_data.describe()**

**Out[154]:**

**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

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**In [140]: crimepivot = crime\_df.pivot\_table(index='Neighbourhood', columns='Crime\_Type', aggf unc=pd.Series.count, fill\_value=0)**

**crimepivot**

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**Out[140]:**

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | **City** |  |  |  |  |  |  |  |  |
| **Crime\_Type** | **ARSON** | **ARSON-** | **B&E NON-** | **B&E** | **B&E** | **B&E** | **MISCHIEF** | **MISCHI** |  |
| **ARSON BY** | **DAM.PROP.** | **RESIDNCE** | **OTHER** | **RESIDENCE** | **STEAL** | **OBS USE** | **TO PRO** |  |
|  | **NEG** | **FIREAR** |  |
| **Neighbourhood** |  |  |  |  |  |  |  |  |  |



**Barkers Point**

**Brookside**

**Brookside**

**Estates**

**Brookside Mini**

**Home Park**

**College Hill**

**Colonial**

**heights**

**Cotton Mill**

**Creek**

**Diamond**

**Street**

**Doak Road**

**Douglas**

**Downtown**

**Dun's Crossing**

**Forest Hill**

**Fredericton**

**South**

**Fulton Heights**

**Garden Creek**

**Garden Place**

**Gilridge**

**Estates**

**Golf Club**

**Grasse Circle**

**Greenwood**

**Minihome Park**

**Hanwell North**

**Heron Springs**

**Highpoint**

**Ridge**

**Kelly's Court**

**Minihome Park**

**Knob Hill**

**Knowledge**

**Park**

**Lian / Valcore**

**Lincoln**

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| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 0 | 0 | 0 | 0 | 2 | 7 | 7 | 1 | 0 |
| 0 | 0 | 0 | 0 | 2 | 0 | 0 | 0 | 0 |
| 0 | 0 | 0 | 0 | 1 | 1 | 0 | 0 | 0 |
| 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 |
| 0 | 2 | 0 | 0 | 0 | 2 | 13 | 0 | 0 |
| 0 | 0 | 0 | 0 | 0 | 0 | 3 | 0 | 0 |
| 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 0 | 1 | 0 | 1 | 7 | 0 | 3 | 0 | 0 |
| 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 |
| 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 |
| 1 | 0 | 0 | 0 | 6 | 1 | 1 | 0 | 0 |
| 0 | 0 | 0 | 0 | 1 | 0 | 6 | 0 | 0 |
| 0 | 0 | 0 | 0 | 2 | 1 | 1 | 0 | 0 |
| 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 |
| 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 |
| 0 | 0 | 0 | 0 | 0 | 1 | 2 | 0 | 0 |
| 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 |
| 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 |
| 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 0 | 0 | 0 | 0 | 2 | 2 | 2 | 0 | 0 |

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| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 12/20/2018 |  |  | Capstone\_Week5 | |  |  |  |  |  |
|  | **City** |  |  |  |  |  |  |  |  |
| **Crime\_Type** | **ARSON** | **ARSON-** | **B&E NON-** | **B&E** | **B&E** | **B&E** | **MISCHIEF** | **MISCHI** |  |
| **ARSON BY** | **DAM.PROP.** | **RESIDNCE** | **OTHER** | **RESIDENCE** | **STEAL** | **OBS USE** | **TO PRO** |  |
|  | **NEG** | **FIREAR** |  |

**Neighbourhood**



**Lincoln**

**Heights**

**Main Street**

**Marysville**

**McKnight**

**McLeod Hill**

**Monteith /**

**Talisman**

**Montogomery /**

**Prospect East**

**Nashwaaksis**

**Nethervue**

**Minihome Park**

**North Devon**

**Northbrook**

**Heights**

**Plat**

**Poet's Hill**

**Prospect**

**Rail Side**

**Regiment**

**Creek**

**Royal Road**

**Saint Mary's**

**First Nation**

**Saint Thomas**

**University**

**Sandyville**

**Serenity Lane**

**Shadowood**

**Estates**

**Silverwood**

**Skyline Acrea**

**South Devon**

**Southwood**

**Park**

**Springhill**

**Sunshine**

**Gardens**

**The Hill**

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 0 | 0 | 0 | 0 | 0 | 1 | 1 | 0 | 0 |
| 0 | 0 | 0 | 1 | 2 | 4 | 8 | 0 | 1 |
| 0 | 1 | 0 | 0 | 1 | 2 | 5 | 0 | 0 |
| 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 0 | 0 | 0 | 0 | 2 | 2 | 4 | 0 | 0 |
| 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 0 | 0 | 0 | 1 | 2 | 0 | 3 | 0 | 0 |
| 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 0 | 0 | 0 | 0 | 5 | 4 | 11 | 0 | 0 |
| 0 | 0 | 0 | 0 | 0 | 0 | 2 | 0 | 0 |
| 0 | 0 | 0 | 0 | 4 | 10 | 18 | 0 | 0 |
| 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 |
| 0 | 0 | 0 | 0 | 1 | 0 | 2 | 0 | 0 |
| 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 0 | 0 | 0 | 0 | 3 | 2 | 2 | 0 | 0 |
| 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 |
| 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 0 | 0 | 0 | 0 | 0 | 2 | 2 | 0 | 0 |
| 0 | 0 | 0 | 0 | 1 | 1 | 0 | 0 | 0 |
| 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 0 | 0 | 0 | 0 | 0 | 0 | 3 | 0 | 0 |
| 0 | 1 | 0 | 0 | 1 | 1 | 2 | 0 | 0 |
| 0 | 0 | 1 | 0 | 0 | 6 | 16 | 0 | 0 |
| 0 | 0 | 0 | 0 | 0 | 0 | 2 | 0 | 0 |
| 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 |
| 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 |
| 0 | 0 | 0 | 0 | 2 | 1 | 12 | 1 | 0 |

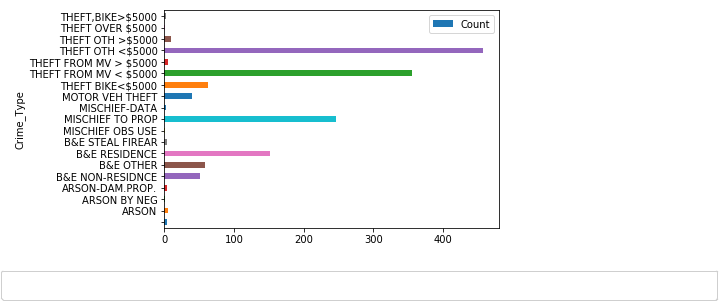
http://localhost:8888/nbconvert/html/Documents/GitHub/Coursera-IBM-Applied-Data-Science-Capstone-Project/Capstone\_Week5.ipynb?download=false 27/72

|  |  |  |  |  |  |  |  |  |  |  |  |  |
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| 12/20/2018 |  |  |  |  |  | Capstone\_Week5 | |  |  |  |  |  |
|  |  | **City** |  |  |  |  |  |  |  |  |  |  |
|  | **Crime\_Type** | **ARSON** | | **ARSON** | **ARSON-** | **B&E NON-** | **B&E** | **B&E** | **B&E** | **MISCHIEF** | **MISCHI** |  |
|  | **BY** | **DAM.PROP.** | **RESIDNCE** | **OTHER** | **RESIDENCE** | **STEAL** | **OBS USE** | **TO PRO** |  |
|  |  |  |  | **NEG** | **FIREAR** |  |
|  | **Neighbourhood** |  |  |  |  |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |  |  |  |  |  |
|  | **The Hugh John** |  |  |  |  |  |  |  |  |  |  |  |
|  | **Flemming** | 0 | 0 | 0 | 0 | 1 | 2 | 0 | 0 | 0 |  |  |
|  | **Forestry** |  |  |  |  |  |  |  |  |  |  |  |
|  | **Center** |  |  |  |  |  |  |  |  |  |  |  |
|  | **University Of** | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 |  |  |
|  | **New** |  |  |
|  | **Brunswick** |  |  |  |  |  |  |  |  |  |  |  |
|  | **Waterloo Row** | 0 | 0 | 0 | 0 | 0 | 1 | 2 | 0 | 0 |  |  |
|  | **Wesbett / Case** | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |  |  |
|  | **West Hills** | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 0 | 0 |  |  |
|  | **Williams /** | 0 | 0 | 0 | 0 | 0 | 1 | 2 | 0 | 0 |  |  |
|  | **Hawkins Area** |  |  |  |  |  |  |  |  |  |  |  |
|  | **Woodstock** | 0 | 0 | 0 | 0 | 2 | 0 | 5 | 0 | 0 |  |  |
|  | **Road** |  |  |  |  |  |  |  |  |  |  |  |
|  | **Youngs** | 0 | 0 | 0 | 1 | 0 | 0 | 2 | 0 | 0 |  |  |
|  | **Crossing** |  |  |  |  |  |  |  |  |  |  |  |



**In [92]: crimetype\_data.plot(x='Crime\_Type', y='Count', kind='barh')**

**Out[92]: <matplotlib.axes.\_subplots.AxesSubplot at 0x11682a860>**



**In [ ]:**

**Let's examine theft from vehicles**

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**In [93]: mvcrime\_df = crime\_df.loc[crime\_df['Crime\_Type'] == 'THEFT FROM MV < $5000'] mvcrime\_df**

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**Out[93]:**

|  |  |  |  |  |  |  |
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|  | **Neighbourhood** | **Crime\_Code** | **Crime\_Type** | **Ward** | **City** | **FID** |
| **18** | Fredericton South | 2142 | THEFT FROM MV < $5000 | 7 | Fredericton | 19 |
| **19** | Fredericton South | 2142 | THEFT FROM MV < $5000 | 7 | Fredericton | 20 |
| **20** | Fredericton South | 2142 | THEFT FROM MV < $5000 | 7 | Fredericton | 21 |
| **21** | Fredericton South | 2142 | THEFT FROM MV < $5000 | 12 | Fredericton | 22 |
| **22** | Fredericton South | 2142 | THEFT FROM MV < $5000 | 12 | Fredericton | 23 |
| **23** | Fredericton South | 2142 | THEFT FROM MV < $5000 | 7 | Fredericton | 24 |
| **24** | Fredericton South | 2142 | THEFT FROM MV < $5000 | 7 | Fredericton | 25 |
| **25** | Fredericton South | 2142 | THEFT FROM MV < $5000 | 7 | Fredericton | 26 |
| **26** | Fredericton South | 2142 | THEFT FROM MV < $5000 | 11 | Fredericton | 27 |
| **27** | Fredericton South | 2142 | THEFT FROM MV < $5000 | 11 | Fredericton | 28 |
| **28** | Fredericton South | 2142 | THEFT FROM MV < $5000 | 12 | Fredericton | 29 |
| **29** | Fredericton South | 2142 | THEFT FROM MV < $5000 | 12 | Fredericton | 30 |
| **30** | Fredericton South | 2142 | THEFT FROM MV < $5000 | 7 | Fredericton | 31 |
| **51** | Barkers Point | 2142 | THEFT FROM MV < $5000 | 6 | Fredericton | 52 |
| **52** | Barkers Point | 2142 | THEFT FROM MV < $5000 | 6 | Fredericton | 53 |
| **53** | Barkers Point | 2142 | THEFT FROM MV < $5000 | 6 | Fredericton | 54 |
| **54** | Barkers Point | 2142 | THEFT FROM MV < $5000 | 6 | Fredericton | 55 |
| **55** | Barkers Point | 2142 | THEFT FROM MV < $5000 | 6 | Fredericton | 56 |
| **56** | Barkers Point | 2142 | THEFT FROM MV < $5000 | 6 | Fredericton | 57 |
| **57** | Barkers Point | 2142 | THEFT FROM MV < $5000 | 6 | Fredericton | 58 |
| **58** | Barkers Point | 2142 | THEFT FROM MV < $5000 | 6 | Fredericton | 59 |
| **100** | Sandyville | 2142 | THEFT FROM MV < $5000 | 5 | Fredericton | 101 |
| **107** | South Devon | 2142 | THEFT FROM MV < $5000 | 4 | Fredericton | 108 |
| **108** | South Devon | 2142 | THEFT FROM MV < $5000 | 4 | Fredericton | 109 |
| **109** | South Devon | 2142 | THEFT FROM MV < $5000 | 4 | Fredericton | 110 |
| **110** | South Devon | 2142 | THEFT FROM MV < $5000 | 4 | Fredericton | 111 |
| **111** | South Devon | 2142 | THEFT FROM MV < $5000 | 4 | Fredericton | 112 |
| **112** | South Devon | 2142 | THEFT FROM MV < $5000 | 4 | Fredericton | 113 |
| **113** | South Devon | 2142 | THEFT FROM MV < $5000 | 4 | Fredericton | 114 |
| **114** | South Devon | 2142 | THEFT FROM MV < $5000 | 4 | Fredericton | 115 |
| **115** | South Devon | 2142 | THEFT FROM MV < $5000 | 4 | Fredericton | 116 |
| **116** | South Devon | 2142 | THEFT FROM MV < $5000 | 4 | Fredericton | 117 |
| **117** | South Devon | 2142 | THEFT FROM MV < $5000 | 4 | Fredericton | 118 |
| **118** | South Devon | 2142 | THEFT FROM MV < $5000 | 4 | Fredericton | 119 |
| **119** | South Devon | 2142 | THEFT FROM MV < $5000 | 4 | Fredericton | 120 |
| **120** | South Devon | 2142 | THEFT FROM MV < $5000 | 4 | Fredericton | 121 |
| **121** | South Devon | 2142 | THEFT FROM MV < $5000 | 4 | Fredericton | 122 |
| **122** | South Devon | 2142 | THEFT FROM MV < $5000 | 4 | Fredericton | 123 |
| **123** | South Devon | 2142 | THEFT FROM MV < $5000 | 4 | Fredericton | 124 |

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| 12/20/2018 |  |  |  | Capstone\_Week5 |  |  |  |
|  |  | **Neighbourhood** | **Crime\_Code** | **Crime\_Type** | **Ward** | **City** | **FID** |
|  |  |  |  |  |  |  |  |
| **124** | | South Devon | 2142 | THEFT FROM MV < $5000 | 4 | Fredericton | 125 |
| **125** | | South Devon | 2142 | THEFT FROM MV < $5000 | 4 | Fredericton | 126 |
| **126** | | South Devon | 2142 | THEFT FROM MV < $5000 | 4 | Fredericton | 127 |
| **127** | | South Devon | 2142 | THEFT FROM MV < $5000 | 4 | Fredericton | 128 |
| **128** | | South Devon | 2142 | THEFT FROM MV < $5000 | 4 | Fredericton | 129 |
| **151** | | Sandyville | 2142 | THEFT FROM MV < $5000 | 5 | Fredericton | 152 |
| **156** | | Knob Hill | 2142 | THEFT FROM MV < $5000 | 5 | Fredericton | 157 |
| **165** | | Youngs Crossing | 2142 | THEFT FROM MV < $5000 | 4 | Fredericton | 166 |
| **166** | | Youngs Crossing | 2142 | THEFT FROM MV < $5000 | 4 | Fredericton | 167 |
| **167** | | Youngs Crossing | 2142 | THEFT FROM MV < $5000 | 4 | Fredericton | 168 |
| **168** | | Youngs Crossing | 2142 | THEFT FROM MV < $5000 | 4 | Fredericton | 169 |
| **169** | | Youngs Crossing | 2142 | THEFT FROM MV < $5000 | 4 | Fredericton | 170 |
| **170** | | Youngs Crossing | 2142 | THEFT FROM MV < $5000 | 4 | Fredericton | 171 |
| **201** | | Marysville | 2142 | THEFT FROM MV < $5000 | 5 | Fredericton | 202 |
| **252** | | Marysville | 2142 | THEFT FROM MV < $5000 | 5 | Fredericton | 253 |
| **278** | | Douglas | 2142 | THEFT FROM MV < $5000 | 1 | Fredericton | 279 |
| **280** | | McLeod Hill | 2142 | THEFT FROM MV < $5000 | 2 | Fredericton | 281 |
| **281** | | McLeod Hill | 2142 | THEFT FROM MV < $5000 | 2 | Fredericton | 282 |
| **301** | | Marysville | 2142 | THEFT FROM MV < $5000 | 0 | Fredericton | 302 |
| **302** | | Marysville | 2142 | THEFT FROM MV < $5000 | 5 | Fredericton | 303 |
| **303** | | Marysville | 2142 | THEFT FROM MV < $5000 | 5 | Fredericton | 304 |
| **304** | | Marysville | 2142 | THEFT FROM MV < $5000 | 5 | Fredericton | 305 |
| **305** | | Marysville | 2142 | THEFT FROM MV < $5000 | 5 | Fredericton | 306 |
| **306** | | Marysville | 2142 | THEFT FROM MV < $5000 | 5 | Fredericton | 307 |
| **307** | | Marysville | 2142 | THEFT FROM MV < $5000 | 5 | Fredericton | 308 |
| **308** | | Marysville | 2142 | THEFT FROM MV < $5000 | 5 | Fredericton | 309 |
| **330** | | Saint Mary's First Nation | 2142 | THEFT FROM MV < $5000 | 3 | Fredericton | 331 |
| **349** | | Sandyville | 2142 | THEFT FROM MV < $5000 | 5 | Fredericton | 350 |
| **354** | | Nashwaaksis | 2142 | THEFT FROM MV < $5000 | 1 | Fredericton | 355 |
| **355** | | Nashwaaksis | 2142 | THEFT FROM MV < $5000 | 1 | Fredericton | 356 |
| **356** | | Nashwaaksis | 2142 | THEFT FROM MV < $5000 | 1 | Fredericton | 357 |
| **357** | | Nashwaaksis | 2142 | THEFT FROM MV < $5000 | 1 | Fredericton | 358 |
| **358** | | Nashwaaksis | 2142 | THEFT FROM MV < $5000 | 1 | Fredericton | 359 |
| **359** | | Nashwaaksis | 2142 | THEFT FROM MV < $5000 | 1 | Fredericton | 360 |
| **360** | | Nashwaaksis | 2142 | THEFT FROM MV < $5000 | 1 | Fredericton | 361 |
| **361** | | Nashwaaksis | 2142 | THEFT FROM MV < $5000 | 1 | Fredericton | 362 |
| **362** | | Nashwaaksis | 2142 | THEFT FROM MV < $5000 | 1 | Fredericton | 363 |
| **377** | | Northbrook Heights | 2142 | THEFT FROM MV < $5000 | 2 | Fredericton | 378 |
| **378** | | Northbrook Heights | 2142 | THEFT FROM MV < $5000 | 2 | Fredericton | 379 |

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| 12/20/2018 |  |  |  | Capstone\_Week5 |  |  |  |
|  |  | **Neighbourhood** | **Crime\_Code** | **Crime\_Type** | **Ward** | **City** | **FID** |
|  |  |  |  |  |  |  |  |
| **379** | | Northbrook Heights | 2142 | THEFT FROM MV < $5000 | 1 | Fredericton | 380 |
| **380** | | Northbrook Heights | 2142 | THEFT FROM MV < $5000 | 2 | Fredericton | 381 |
| **381** | | Northbrook Heights | 2142 | THEFT FROM MV < $5000 | 2 | Fredericton | 382 |
| **388** | | Heron Springs | 2142 | THEFT FROM MV < $5000 | 2 | Fredericton | 389 |
| **389** | | Heron Springs | 2142 | THEFT FROM MV < $5000 | 2 | Fredericton | 390 |
| **400** | | Downtown | 2142 | THEFT FROM MV < $5000 | 10 | Fredericton | 401 |
| **401** | | Downtown | 2142 | THEFT FROM MV < $5000 | 11 | Fredericton | 402 |
| **402** | | Downtown | 2142 | THEFT FROM MV < $5000 | 11 | Fredericton | 403 |
| **403** | | Downtown | 2142 | THEFT FROM MV < $5000 | 10 | Fredericton | 404 |
| **404** | | Downtown | 2142 | THEFT FROM MV < $5000 | 10 | Fredericton | 405 |
| **405** | | Downtown | 2142 | THEFT FROM MV < $5000 | 10 | Fredericton | 406 |
| **408** | | Downtown | 2142 | THEFT FROM MV < $5000 | 10 | Fredericton | 409 |
| **410** | | Downtown | 2142 | THEFT FROM MV < $5000 | 10 | Fredericton | 411 |
| **411** | | Downtown | 2142 | THEFT FROM MV < $5000 | 10 | Fredericton | 412 |
| **412** | | Downtown | 2142 | THEFT FROM MV < $5000 | 10 | Fredericton | 413 |
| **413** | | Downtown | 2142 | THEFT FROM MV < $5000 | 10 | Fredericton | 414 |
| **414** | | Downtown | 2142 | THEFT FROM MV < $5000 | 10 | Fredericton | 415 |
| **415** | | Downtown | 2142 | THEFT FROM MV < $5000 | 10 | Fredericton | 416 |
| **416** | | Downtown | 2142 | THEFT FROM MV < $5000 | 10 | Fredericton | 417 |
| **417** | | Downtown | 2142 | THEFT FROM MV < $5000 | 10 | Fredericton | 418 |
| **418** | | Downtown | 2142 | THEFT FROM MV < $5000 | 10 | Fredericton | 419 |
| **419** | | Downtown | 2142 | THEFT FROM MV < $5000 | 10 | Fredericton | 420 |
| **420** | | Downtown | 2142 | THEFT FROM MV < $5000 | 10 | Fredericton | 421 |
| **421** | | Downtown | 2142 | THEFT FROM MV < $5000 | 10 | Fredericton | 422 |
| **422** | | Downtown | 2142 | THEFT FROM MV < $5000 | 10 | Fredericton | 423 |
| **506** | | Downtown | 2142 | THEFT FROM MV < $5000 | 10 | Fredericton | 507 |
| **520** | | Fulton Heights | 2142 | THEFT FROM MV < $5000 | 3 | Fredericton | 521 |
| **521** | | Fulton Heights | 2142 | THEFT FROM MV < $5000 | 3 | Fredericton | 522 |
| **522** | | Fulton Heights | 2142 | THEFT FROM MV < $5000 | 3 | Fredericton | 523 |
| **523** | | Fulton Heights | 2142 | THEFT FROM MV < $5000 | 3 | Fredericton | 524 |
| **524** | | Fulton Heights | 2142 | THEFT FROM MV < $5000 | 2 | Fredericton | 525 |
| **525** | | Fulton Heights | 2142 | THEFT FROM MV < $5000 | 3 | Fredericton | 526 |
| **526** | | Fulton Heights | 2142 | THEFT FROM MV < $5000 | 3 | Fredericton | 527 |
| **527** | | Fulton Heights | 2142 | THEFT FROM MV < $5000 | 3 | Fredericton | 528 |
| **528** | | Fulton Heights | 2142 | THEFT FROM MV < $5000 | 3 | Fredericton | 529 |
| **529** | | Fulton Heights | 2142 | THEFT FROM MV < $5000 | 2 | Fredericton | 530 |
| **530** | | Fulton Heights | 2142 | THEFT FROM MV < $5000 | 3 | Fredericton | 531 |
| **531** | | Fulton Heights | 2142 | THEFT FROM MV < $5000 | 3 | Fredericton | 532 |
| **569** | | Main Street | 2142 | THEFT FROM MV < $5000 | 2 | Fredericton | 570 |

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| 12/20/2018 |  |  |  | Capstone\_Week5 |  |  |  |
|  |  | **Neighbourhood** | **Crime\_Code** | **Crime\_Type** | **Ward** | **City** | **FID** |
|  |  |  |  |  |  |  |  |
| **570** | | Main Street | 2142 | THEFT FROM MV < $5000 | 3 | Fredericton | 571 |
| **571** | | Main Street | 2142 | THEFT FROM MV < $5000 | 2 | Fredericton | 572 |
| **572** | | Main Street | 2142 | THEFT FROM MV < $5000 | 2 | Fredericton | 573 |
| **573** | | Main Street | 2142 | THEFT FROM MV < $5000 | 3 | Fredericton | 574 |
| **574** | | Main Street | 2142 | THEFT FROM MV < $5000 | 2 | Fredericton | 575 |
| **575** | | Main Street | 2142 | THEFT FROM MV < $5000 | 2 | Fredericton | 576 |
| **576** | | Main Street | 2142 | THEFT FROM MV < $5000 | 2 | Fredericton | 577 |
| **577** | | Main Street | 2142 | THEFT FROM MV < $5000 | 2 | Fredericton | 578 |
| **578** | | Main Street | 2142 | THEFT FROM MV < $5000 | 2 | Fredericton | 579 |
| **604** | | Golf Club | 2142 | THEFT FROM MV < $5000 | 12 | Fredericton | 605 |
| **614** | | Gilridge Estates | 2142 | THEFT FROM MV < $5000 | 1 | Fredericton | 615 |
| **622** | | Nethervue Minihome Park | 2142 | THEFT FROM MV < $5000 | 12 | Fredericton | 623 |
| **625** | | Monteith / Talisman | 2142 | THEFT FROM MV < $5000 | 12 | Fredericton | 626 |
| **626** | | Monteith / Talisman | 2142 | THEFT FROM MV < $5000 | 12 | Fredericton | 627 |
| **631** | | Garden Creek | 2142 | THEFT FROM MV < $5000 | 12 | Fredericton | 632 |
| **640** | | Highpoint Ridge | 2142 | THEFT FROM MV < $5000 | 12 | Fredericton | 641 |
| **641** | | Highpoint Ridge | 2142 | THEFT FROM MV < $5000 | 12 | Fredericton | 642 |
| **642** | | Highpoint Ridge | 2142 | THEFT FROM MV < $5000 | 12 | Fredericton | 643 |
| **643** | | Highpoint Ridge | 2142 | THEFT FROM MV < $5000 | 12 | Fredericton | 644 |
| **650** | | Golf Club | 2142 | THEFT FROM MV < $5000 | 12 | Fredericton | 651 |
| **651** | | Golf Club | 2142 | THEFT FROM MV < $5000 | 12 | Fredericton | 652 |
| **653** | | Golf Club | 2142 | THEFT FROM MV < $5000 | 12 | Fredericton | 654 |
| **752** | | Golf Club | 2142 | THEFT FROM MV < $5000 | 12 | Fredericton | 753 |
| **764** | | Woodstock Road | 2142 | THEFT FROM MV < $5000 | 12 | Fredericton | 765 |
| **765** | | Woodstock Road | 2142 | THEFT FROM MV < $5000 | 12 | Fredericton | 766 |
| **766** | | Woodstock Road | 2142 | THEFT FROM MV < $5000 | 12 | Fredericton | 767 |
| **767** | | Woodstock Road | 2142 | THEFT FROM MV < $5000 | 12 | Fredericton | 768 |
| **768** | | Woodstock Road | 2142 | THEFT FROM MV < $5000 | 12 | Fredericton | 769 |
| **769** | | Woodstock Road | 2142 | THEFT FROM MV < $5000 | 12 | Fredericton | 770 |
| **770** | | Woodstock Road | 2142 | THEFT FROM MV < $5000 | 12 | Fredericton | 771 |
| **771** | | Woodstock Road | 2142 | THEFT FROM MV < $5000 | 12 | Fredericton | 772 |
| **772** | | Woodstock Road | 2142 | THEFT FROM MV < $5000 | 12 | Fredericton | 773 |
| **773** | | Woodstock Road | 2142 | THEFT FROM MV < $5000 | 12 | Fredericton | 774 |
| **774** | | Woodstock Road | 2142 | THEFT FROM MV < $5000 | 12 | Fredericton | 775 |
| **775** | | Woodstock Road | 2142 | THEFT FROM MV < $5000 | 12 | Fredericton | 776 |
| **776** | | Woodstock Road | 2142 | THEFT FROM MV < $5000 | 0 | Fredericton | 777 |
| **777** | | Woodstock Road | 2142 | THEFT FROM MV < $5000 | 12 | Fredericton | 778 |
| **778** | | Woodstock Road | 2142 | THEFT FROM MV < $5000 | 12 | Fredericton | 779 |
| **779** | | Woodstock Road | 2142 | THEFT FROM MV < $5000 | 12 | Fredericton | 780 |

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| 12/20/2018 |  |  |  | Capstone\_Week5 |  |  |  |
|  |  | **Neighbourhood** | **Crime\_Code** | **Crime\_Type** | **Ward** | **City** | **FID** |
|  |  |  |  |  |  |  |  |
| **780** | | Woodstock Road | 2142 | THEFT FROM MV < $5000 | 12 | Fredericton | 781 |
| **781** | | Woodstock Road | 2142 | THEFT FROM MV < $5000 | 12 | Fredericton | 782 |
| **787** | | Sunshine Gardens | 2142 | THEFT FROM MV < $5000 | 10 | Fredericton | 788 |
| **788** | | Sunshine Gardens | 2142 | THEFT FROM MV < $5000 | 10 | Fredericton | 789 |
| **789** | | Sunshine Gardens | 2142 | THEFT FROM MV < $5000 | 10 | Fredericton | 790 |
| **790** | | Sunshine Gardens | 2142 | THEFT FROM MV < $5000 | 10 | Fredericton | 791 |
| **791** | | Sunshine Gardens | 2142 | THEFT FROM MV < $5000 | 10 | Fredericton | 792 |
| **792** | | Sunshine Gardens | 2142 | THEFT FROM MV < $5000 | 10 | Fredericton | 793 |
| **793** | | Sunshine Gardens | 2142 | THEFT FROM MV < $5000 | 10 | Fredericton | 794 |
| **809** | | Plat | 2142 | THEFT FROM MV < $5000 | 0 | Fredericton | 810 |
| **810** | | Plat | 2142 | THEFT FROM MV < $5000 | 11 | Fredericton | 811 |
| **811** | | Plat | 2142 | THEFT FROM MV < $5000 | 11 | Fredericton | 812 |
| **812** | | Plat | 2142 | THEFT FROM MV < $5000 | 10 | Fredericton | 813 |
| **813** | | Plat | 2142 | THEFT FROM MV < $5000 | 11 | Fredericton | 814 |
| **814** | | Plat | 2142 | THEFT FROM MV < $5000 | 10 | Fredericton | 815 |
| **815** | | Plat | 2142 | THEFT FROM MV < $5000 | 10 | Fredericton | 816 |
| **816** | | Plat | 2142 | THEFT FROM MV < $5000 | 10 | Fredericton | 817 |
| **817** | | Plat | 2142 | THEFT FROM MV < $5000 | 10 | Fredericton | 818 |
| **818** | | Plat | 2142 | THEFT FROM MV < $5000 | 10 | Fredericton | 819 |
| **819** | | Plat | 2142 | THEFT FROM MV < $5000 | 11 | Fredericton | 820 |
| **820** | | Plat | 2142 | THEFT FROM MV < $5000 | 10 | Fredericton | 821 |
| **821** | | Plat | 2142 | THEFT FROM MV < $5000 | 10 | Fredericton | 822 |
| **822** | | Plat | 2142 | THEFT FROM MV < $5000 | 10 | Fredericton | 823 |
| **823** | | Plat | 2142 | THEFT FROM MV < $5000 | 10 | Fredericton | 824 |
| **824** | | Plat | 2142 | THEFT FROM MV < $5000 | 10 | Fredericton | 825 |
| **825** | | Plat | 2142 | THEFT FROM MV < $5000 | 0 | Fredericton | 826 |
| **826** | | Plat | 2142 | THEFT FROM MV < $5000 | 11 | Fredericton | 827 |
| **827** | | Plat | 2142 | THEFT FROM MV < $5000 | 10 | Fredericton | 828 |
| **828** | | Plat | 2142 | THEFT FROM MV < $5000 | 10 | Fredericton | 829 |
| **829** | | Plat | 2142 | THEFT FROM MV < $5000 | 10 | Fredericton | 830 |
| **830** | | Plat | 2142 | THEFT FROM MV < $5000 | 11 | Fredericton | 831 |
| **831** | | Plat | 2142 | THEFT FROM MV < $5000 | 11 | Fredericton | 832 |
| **832** | | Plat | 2142 | THEFT FROM MV < $5000 | 10 | Fredericton | 833 |
| **833** | | Plat | 2142 | THEFT FROM MV < $5000 | 11 | Fredericton | 834 |
| **835** | | Plat | 2142 | THEFT FROM MV < $5000 | 10 | Fredericton | 836 |
| **836** | | Plat | 2142 | THEFT FROM MV < $5000 | 11 | Fredericton | 837 |
| **837** | | Plat | 2142 | THEFT FROM MV < $5000 | 10 | Fredericton | 838 |
| **838** | | Plat | 2142 | THEFT FROM MV < $5000 | 10 | Fredericton | 839 |
| **839** | | Plat | 2142 | THEFT FROM MV < $5000 | 11 | Fredericton | 840 |

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| --- | --- | --- | --- | --- | --- | --- | --- |
| 12/20/2018 |  |  |  | Capstone\_Week5 |  |  |  |
|  |  | **Neighbourhood** | **Crime\_Code** | **Crime\_Type** | **Ward** | **City** | **FID** |
|  |  |  |  |  |  |  |  |
| **840** | | Plat | 2142 | THEFT FROM MV < $5000 | 10 | Fredericton | 841 |
| **841** | | Plat | 2142 | THEFT FROM MV < $5000 | 10 | Fredericton | 842 |
| **842** | | Plat | 2142 | THEFT FROM MV < $5000 | 10 | Fredericton | 843 |
| **843** | | Plat | 2142 | THEFT FROM MV < $5000 | 10 | Fredericton | 844 |
| **844** | | Plat | 2142 | THEFT FROM MV < $5000 | 10 | Fredericton | 845 |
| **845** | | Plat | 2142 | THEFT FROM MV < $5000 | 11 | Fredericton | 846 |
| **846** | | Plat | 2142 | THEFT FROM MV < $5000 | 10 | Fredericton | 847 |
| **847** | | Plat | 2142 | THEFT FROM MV < $5000 | 10 | Fredericton | 848 |
| **848** | | Plat | 2142 | THEFT FROM MV < $5000 | 11 | Fredericton | 849 |
| **849** | | Plat | 2142 | THEFT FROM MV < $5000 | 10 | Fredericton | 850 |
| **855** | | Southwood Park | 2142 | THEFT FROM MV < $5000 | 7 | Fredericton | 856 |
| **856** | | Southwood Park | 2142 | THEFT FROM MV < $5000 | 7 | Fredericton | 857 |
| **857** | | Southwood Park | 2142 | THEFT FROM MV < $5000 | 7 | Fredericton | 858 |
| **865** | | Lincoln Heights | 2142 | THEFT FROM MV < $5000 | 7 | Fredericton | 866 |
| **866** | | Lincoln Heights | 2142 | THEFT FROM MV < $5000 | 7 | Fredericton | 867 |
| **867** | | Lincoln Heights | 2142 | THEFT FROM MV < $5000 | 7 | Fredericton | 868 |
| **868** | | Lincoln Heights | 2142 | THEFT FROM MV < $5000 | 7 | Fredericton | 869 |
| **869** | | Lincoln Heights | 2142 | THEFT FROM MV < $5000 | 7 | Fredericton | 870 |
| **871** | | Lincoln Heights | 2142 | THEFT FROM MV < $5000 | 7 | Fredericton | 872 |
| **875** | | Lincoln Heights | 2142 | THEFT FROM MV < $5000 | 7 | Fredericton | 876 |
| **880** | | Skyline Acrea | 2142 | THEFT FROM MV < $5000 | 8 | Fredericton | 881 |
| **881** | | Lincoln Heights | 2142 | THEFT FROM MV < $5000 | 7 | Fredericton | 882 |
| **886** | | Skyline Acrea | 2142 | THEFT FROM MV < $5000 | 8 | Fredericton | 887 |
| **887** | | Lincoln Heights | 2142 | THEFT FROM MV < $5000 | 7 | Fredericton | 888 |
| **892** | | Skyline Acrea | 2142 | THEFT FROM MV < $5000 | 8 | Fredericton | 893 |
| **893** | | Lincoln Heights | 2142 | THEFT FROM MV < $5000 | 7 | Fredericton | 894 |
| **898** | | Skyline Acrea | 2142 | THEFT FROM MV < $5000 | 8 | Fredericton | 899 |
| **899** | | Skyline Acrea | 2142 | THEFT FROM MV < $5000 | 8 | Fredericton | 900 |
| **900** | | Skyline Acrea | 2142 | THEFT FROM MV < $5000 | 8 | Fredericton | 901 |
| **901** | | Skyline Acrea | 2142 | THEFT FROM MV < $5000 | 8 | Fredericton | 902 |
| **902** | | Skyline Acrea | 2142 | THEFT FROM MV < $5000 | 8 | Fredericton | 903 |
| **903** | | Skyline Acrea | 2142 | THEFT FROM MV < $5000 | 8 | Fredericton | 904 |
| **904** | | Skyline Acrea | 2142 | THEFT FROM MV < $5000 | 8 | Fredericton | 905 |
| **905** | | Skyline Acrea | 2142 | THEFT FROM MV < $5000 | 8 | Fredericton | 906 |
| **906** | | Skyline Acrea | 2142 | THEFT FROM MV < $5000 | 8 | Fredericton | 907 |
| **907** | | Skyline Acrea | 2142 | THEFT FROM MV < $5000 | 8 | Fredericton | 908 |
| **913** | | Poet's Hill | 2142 | THEFT FROM MV < $5000 | 8 | Fredericton | 914 |
| **914** | | Poet's Hill | 2142 | THEFT FROM MV < $5000 | 8 | Fredericton | 915 |
| **922** | | Dun's Crossing | 2142 | THEFT FROM MV < $5000 | 8 | Fredericton | 923 |

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| --- | --- | --- | --- | --- | --- | --- | --- |
| 12/20/2018 |  |  |  | Capstone\_Week5 |  |  |  |
|  |  | **Neighbourhood** | **Crime\_Code** | **Crime\_Type** | **Ward** | **City** | **FID** |
|  |  |  |  |  |  |  |  |
| **923** | | Dun's Crossing | 2142 | THEFT FROM MV < $5000 | 8 | Fredericton | 924 |
| **924** | | Dun's Crossing | 2142 | THEFT FROM MV < $5000 | 8 | Fredericton | 925 |
| **925** | | Dun's Crossing | 2142 | THEFT FROM MV < $5000 | 8 | Fredericton | 926 |
| **926** | | Dun's Crossing | 2142 | THEFT FROM MV < $5000 | 8 | Fredericton | 927 |
| **927** | | Dun's Crossing | 2142 | THEFT FROM MV < $5000 | 8 | Fredericton | 928 |
| **928** | | Dun's Crossing | 2142 | THEFT FROM MV < $5000 | 8 | Fredericton | 929 |
| **929** | | Dun's Crossing | 2142 | THEFT FROM MV < $5000 | 8 | Fredericton | 930 |
| **930** | | Dun's Crossing | 2142 | THEFT FROM MV < $5000 | 8 | Fredericton | 931 |
| **938** | | Southwood Park | 2142 | THEFT FROM MV < $5000 | 7 | Fredericton | 939 |
| **939** | | Southwood Park | 2142 | THEFT FROM MV < $5000 | 7 | Fredericton | 940 |
| **940** | | Southwood Park | 2142 | THEFT FROM MV < $5000 | 7 | Fredericton | 941 |
| **941** | | Southwood Park | 2142 | THEFT FROM MV < $5000 | 7 | Fredericton | 942 |
| **946** | | The Hill | 2142 | THEFT FROM MV < $5000 | 9 | Fredericton | 947 |
| **947** | | The Hill | 2142 | THEFT FROM MV < $5000 | 9 | Fredericton | 948 |
| **948** | | The Hill | 2142 | THEFT FROM MV < $5000 | 9 | Fredericton | 949 |
| **949** | | The Hill | 2142 | THEFT FROM MV < $5000 | 10 | Fredericton | 950 |
| **950** | | The Hill | 2142 | THEFT FROM MV < $5000 | 10 | Fredericton | 951 |
| **951** | | The Hill | 2142 | THEFT FROM MV < $5000 | 11 | Fredericton | 952 |
| **952** | | The Hill | 2142 | THEFT FROM MV < $5000 | 9 | Fredericton | 953 |
| **954** | | The Hill | 2142 | THEFT FROM MV < $5000 | 10 | Fredericton | 955 |
| **955** | | The Hill | 2142 | THEFT FROM MV < $5000 | 10 | Fredericton | 956 |
| **956** | | The Hill | 2142 | THEFT FROM MV < $5000 | 9 | Fredericton | 957 |
| **957** | | The Hill | 2142 | THEFT FROM MV < $5000 | 9 | Fredericton | 958 |
| **969** | | Forest Hill | 2142 | THEFT FROM MV < $5000 | 8 | Fredericton | 970 |
| **970** | | Forest Hill | 2142 | THEFT FROM MV < $5000 | 8 | Fredericton | 971 |
| **971** | | Forest Hill | 2142 | THEFT FROM MV < $5000 | 8 | Fredericton | 972 |
| **972** | | Forest Hill | 2142 | THEFT FROM MV < $5000 | 8 | Fredericton | 973 |
| **973** | | Forest Hill | 2142 | THEFT FROM MV < $5000 | 8 | Fredericton | 974 |
| **974** | | Forest Hill | 2142 | THEFT FROM MV < $5000 | 8 | Fredericton | 975 |
| **975** | | Forest Hill | 2142 | THEFT FROM MV < $5000 | 8 | Fredericton | 976 |
| **976** | | Forest Hill | 2142 | THEFT FROM MV < $5000 | 8 | Fredericton | 977 |
| **989** | | Lincoln Heights | 2142 | THEFT FROM MV < $5000 | 7 | Fredericton | 990 |
| **996** | | Diamond Street | 2142 | THEFT FROM MV < $5000 | 1 | Fredericton | 997 |
| **1027** | | College Hill | 2142 | THEFT FROM MV < $5000 | 11 | Fredericton | 1028 |
| **1028** | | College Hill | 2142 | THEFT FROM MV < $5000 | 11 | Fredericton | 1029 |
| **1029** | | College Hill | 2142 | THEFT FROM MV < $5000 | 11 | Fredericton | 1030 |
| **1030** | | College Hill | 2142 | THEFT FROM MV < $5000 | 11 | Fredericton | 1031 |
| **1031** | | College Hill | 2142 | THEFT FROM MV < $5000 | 11 | Fredericton | 1032 |
| **1032** | | College Hill | 2142 | THEFT FROM MV < $5000 | 11 | Fredericton | 1033 |

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|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| 12/20/2018 |  |  |  | Capstone\_Week5 |  |  |  |
|  |  | **Neighbourhood** | **Crime\_Code** | **Crime\_Type** | **Ward** | **City** | **FID** |
|  |  |  |  |  |  |  |  |
| **1033** | | College Hill | 2142 | THEFT FROM MV < $5000 | 11 | Fredericton | 1034 |
| **1034** | | College Hill | 2142 | THEFT FROM MV < $5000 | 11 | Fredericton | 1035 |
| **1035** | | College Hill | 2142 | THEFT FROM MV < $5000 | 11 | Fredericton | 1036 |
| **1036** | | College Hill | 2142 | THEFT FROM MV < $5000 | 11 | Fredericton | 1037 |
| **1060** | | Brookside Estates | 2142 | THEFT FROM MV < $5000 | 2 | Fredericton | 1061 |
| **1061** | | Brookside Estates | 2142 | THEFT FROM MV < $5000 | 2 | Fredericton | 1062 |
| **1062** | | Brookside Estates | 2142 | THEFT FROM MV < $5000 | 2 | Fredericton | 1063 |
| **1116** | | Lincoln | 2142 | THEFT FROM MV < $5000 | 7 | Fredericton | 1117 |
| **1124** | | Colonial heights | 2142 | THEFT FROM MV < $5000 | 12 | Fredericton | 1125 |
| **1125** | | Colonial heights | 2142 | THEFT FROM MV < $5000 | 12 | Fredericton | 1126 |
| **1126** | | Colonial heights | 2142 | THEFT FROM MV < $5000 | 12 | Fredericton | 1127 |
| **1127** | | Colonial heights | 2142 | THEFT FROM MV < $5000 | 12 | Fredericton | 1128 |
| **1128** | | Colonial heights | 2142 | THEFT FROM MV < $5000 | 11 | Fredericton | 1129 |
| **1129** | | Colonial heights | 2142 | THEFT FROM MV < $5000 | 11 | Fredericton | 1130 |
| **1131** | | Garden Place | 2142 | THEFT FROM MV < $5000 | 12 | Fredericton | 1132 |
| **1132** | | Garden Place | 2142 | THEFT FROM MV < $5000 | 12 | Fredericton | 1133 |
| **1133** | | Garden Place | 2142 | THEFT FROM MV < $5000 | 12 | Fredericton | 1134 |
| **1144** | | Waterloo Row | 2142 | THEFT FROM MV < $5000 | 11 | Fredericton | 1145 |
| **1145** | | Waterloo Row | 2142 | THEFT FROM MV < $5000 | 11 | Fredericton | 1146 |
| **1146** | | Waterloo Row | 2142 | THEFT FROM MV < $5000 | 11 | Fredericton | 1147 |
| **1151** | | University Of New Brunswick | 2142 | THEFT FROM MV < $5000 | 11 | Fredericton | 1152 |
| **1152** | | University Of New Brunswick | 2142 | THEFT FROM MV < $5000 | 11 | Fredericton | 1153 |
| **1153** | | University Of New Brunswick | 2142 | THEFT FROM MV < $5000 | 11 | Fredericton | 1154 |
| **1154** | | University Of New Brunswick | 2142 | THEFT FROM MV < $5000 | 11 | Fredericton | 1155 |
| **1163** | | Saint Thomas University | 2142 | THEFT FROM MV < $5000 | 11 | Fredericton | 1164 |
| **1173** | | Williams / Hawkins Area | 2142 | THEFT FROM MV < $5000 | 2 | Fredericton | 1174 |
| **1174** | | Williams / Hawkins Area | 2142 | THEFT FROM MV < $5000 | 2 | Fredericton | 1175 |
| **1175** | | Williams / Hawkins Area | 2142 | THEFT FROM MV < $5000 | 2 | Fredericton | 1176 |
| **1176** | | Williams / Hawkins Area | 2142 | THEFT FROM MV < $5000 | 2 | Fredericton | 1177 |
| **1177** | | Williams / Hawkins Area | 2142 | THEFT FROM MV < $5000 | 2 | Fredericton | 1178 |
| **1178** | | Williams / Hawkins Area | 2142 | THEFT FROM MV < $5000 | 2 | Fredericton | 1179 |
| **1181** | | McKnight | 2142 | THEFT FROM MV < $5000 | 2 | Fredricton | 1182 |
| **1187** | | Shadowood Estates | 2142 | THEFT FROM MV < $5000 | 2 | Fredericton | 1188 |
| **1188** | | Shadowood Estates | 2142 | THEFT FROM MV < $5000 | 2 | Fredericton | 1189 |
| **1240** | | Lian / Valcore | 2142 | THEFT FROM MV < $5000 | 12 | Fredericton | 1241 |
| **1284** | | North Devon | 2142 | THEFT FROM MV < $5000 | 4 | Fredericton | 1285 |
| **1285** | | North Devon | 2142 | THEFT FROM MV < $5000 | 4 | Fredericton | 1286 |
| **1286** | | North Devon | 2142 | THEFT FROM MV < $5000 | 4 | Fredericton | 1287 |
| **1287** | | North Devon | 2142 | THEFT FROM MV < $5000 | 4 | Fredericton | 1288 |

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| --- | --- | --- | --- | --- | --- | --- | --- |
| 12/20/2018 |  |  |  | Capstone\_Week5 |  |  |  |
|  |  | **Neighbourhood** | **Crime\_Code** | **Crime\_Type** | **Ward** | **City** | **FID** |
|  |  |  |  |  |  |  |  |
| **1288** | | North Devon | 2142 | THEFT FROM MV < $5000 | 4 | Fredericton | 1289 |
| **1289** | | North Devon | 2142 | THEFT FROM MV < $5000 | 4 | Fredericton | 1290 |
| **1290** | | North Devon | 2142 | THEFT FROM MV < $5000 | 4 | Fredericton | 1291 |
| **1302** | | Rail Side | 2142 | THEFT FROM MV < $5000 | 12 | Fredericton | 1303 |
| **1306** | | Rail Side | 2142 | THEFT FROM MV < $5000 | 12 | Fredericton | 1307 |
| **1316** | | Silverwood | 2142 | THEFT FROM MV < $5000 | 12 | Fredericton | 1317 |
| **1317** | | Silverwood | 2142 | THEFT FROM MV < $5000 | 12 | Fredericton | 1318 |
| **1339** | | Prospect | 2142 | THEFT FROM MV < $5000 | 9 | Fredericton | 1340 |
| **1340** | | Prospect | 2142 | THEFT FROM MV < $5000 | 9 | Fredericton | 1341 |
| **1341** | | Prospect | 2142 | THEFT FROM MV < $5000 | 9 | Fredericton | 1342 |
| **1342** | | Prospect | 2142 | THEFT FROM MV < $5000 | 9 | Fredericton | 1343 |
| **1343** | | Prospect | 2142 | THEFT FROM MV < $5000 | 9 | Fredericton | 1344 |
| **1344** | | Prospect | 2142 | THEFT FROM MV < $5000 | 9 | Fredericton | 1345 |
| **1345** | | Prospect | 2142 | THEFT FROM MV < $5000 | 11 | Fredericton | 1346 |
| **1346** | | Prospect | 2142 | THEFT FROM MV < $5000 | 9 | Fredericton | 1347 |
| **1347** | | Prospect | 2142 | THEFT FROM MV < $5000 | 9 | Fredericton | 1348 |
| **1348** | | Prospect | 2142 | THEFT FROM MV < $5000 | 9 | Fredericton | 1349 |
| **1349** | | Prospect | 2142 | THEFT FROM MV < $5000 | 9 | Fredericton | 1350 |
| **1369** | | North Devon | 2142 | THEFT FROM MV < $5000 | 3 | Fredericton | 1370 |
| **1370** | | North Devon | 2142 | THEFT FROM MV < $5000 | 3 | Fredericton | 1371 |
| **1371** | | North Devon | 2142 | THEFT FROM MV < $5000 | 3 | Fredericton | 1372 |
| **1372** | | North Devon | 2142 | THEFT FROM MV < $5000 | 3 | Fredericton | 1373 |
| **1377** | | North Devon | 2142 | THEFT FROM MV < $5000 | 3 | Fredericton | 1378 |
| **1380** | | Hanwell North | 2142 | THEFT FROM MV < $5000 | 12 | Fredericton | 1381 |
| **1381** | | Hanwell North | 2142 | THEFT FROM MV < $5000 | 12 | Fredericton | 1382 |
| **1382** | | Hanwell North | 2142 | THEFT FROM MV < $5000 | 12 | Fredericton | 1383 |
| **1387** | | Montogomery / Prospect East | 2142 | THEFT FROM MV < $5000 | 11 | Fredericton | 1388 |
| **1388** | | Montogomery / Prospect East | 2142 | THEFT FROM MV < $5000 | 11 | Fredericton | 1389 |
| **1389** | | Montogomery / Prospect East | 2142 | THEFT FROM MV < $5000 | 9 | Fredericton | 1390 |
| **1403** | | Fredericton South | 2142 | THEFT FROM MV < $5000 | 7 | Fredericton | 1404 |
| **1408** | | Fredericton South | 2142 | THEFT FROM MV < $5000 | 12 | Fredericton | 1409 |
| **1409** | | Fredericton South | 2142 | THEFT FROM MV < $5000 | 12 | Fredericton | 1410 |
| **1410** | | Fredericton South | 2142 | THEFT FROM MV < $5000 | 12 | Fredericton | 1411 |
| **1411** | | Fredericton South | 2142 | THEFT FROM MV < $5000 | 12 | Fredericton | 1412 |
| **1412** | | Fredericton South | 2142 | THEFT FROM MV < $5000 | 12 | Fredericton | 1413 |
| **1413** | | Fredericton South | 2142 | THEFT FROM MV < $5000 | 12 | Fredericton | 1414 |
| **1420** | | Woodstock Road | 2142 | THEFT FROM MV < $5000 | 12 | Fredericton | 1421 |
| **1421** | | Woodstock Road | 2142 | THEFT FROM MV < $5000 | 10 | Fredericton | 1422 |
| **1437** | | North Devon | 2142 | THEFT FROM MV < $5000 | 3 | Fredericton | 1438 |

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| 12/20/2018 |  |  |  | Capstone\_Week5 |  |  |  |
|  |  | **Neighbourhood** | **Crime\_Code** | **Crime\_Type** | **Ward** | **City** | **FID** |
|  |  |  |  |  |  |  |  |
| **1438** | | North Devon | 2142 | THEFT FROM MV < $5000 | 3 | Fredericton | 1439 |
| **1439** | | North Devon | 2142 | THEFT FROM MV < $5000 | 3 | Fredericton | 1440 |
| **1440** | | North Devon | 2142 | THEFT FROM MV < $5000 | 3 | Fredericton | 1441 |
| **1441** | | North Devon | 2142 | THEFT FROM MV < $5000 | 3 | Fredericton | 1442 |
| **1459** | | Monteith / Talisman | 2142 | THEFT FROM MV < $5000 | 12 | Fredericton | 1460 |

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**In [94]: mvcrime\_data = mvcrime\_df.groupby(['Neighbourhood']).size().to\_frame(name='Count'). reset\_index()**

**mvcrime\_data**

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**Out[94]:**

|  |  |  |
| --- | --- | --- |
|  | **Neighbourhood** | **Count** |
| **0** | Barkers Point | 8 |
| **1** | Brookside Estates | 3 |
| **2** | College Hill | 10 |
| **3** | Colonial heights | 6 |
| **4** | Diamond Street | 1 |
| **5** | Douglas | 1 |
| **6** | Downtown | 21 |
| **7** | Dun's Crossing | 9 |
| **8** | Forest Hill | 8 |
| **9** | Fredericton South | 20 |
| **10** | Fulton Heights | 12 |
| **11** | Garden Creek | 1 |
| **12** | Garden Place | 3 |
| **13** | Gilridge Estates | 1 |
| **14** | Golf Club | 5 |
| **15** | Hanwell North | 3 |
| **16** | Heron Springs | 2 |
| **17** | Highpoint Ridge | 4 |
| **18** | Knob Hill | 1 |
| **19** | Lian / Valcore | 1 |
| **20** | Lincoln | 1 |
| **21** | Lincoln Heights | 11 |
| **22** | Main Street | 10 |
| **23** | Marysville | 10 |
| **24** | McKnight | 1 |
| **25** | McLeod Hill | 2 |
| **26** | Monteith / Talisman | 3 |
| **27** | Montogomery / Prospect East | 3 |
| **28** | Nashwaaksis | 9 |
| **29** | Nethervue Minihome Park | 1 |
| **30** | North Devon | 17 |
| **31** | Northbrook Heights | 5 |
| **32** | Plat | 40 |
| **33** | Poet's Hill | 2 |
| **34** | Prospect | 11 |
| **35** | Rail Side | 2 |
| **36** | Saint Mary's First Nation | 1 |
| **37** | Saint Thomas University | 1 |
| **38** | Sandyville | 3 |

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|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| 12/20/2018 |  |  |  | Capstone\_Week5 |
|  |  | **Neighbourhood** | **Count** | |
|  |  |  |  |  |
| **39** | | Shadowood Estates | 2 |  |
| **40** | | Silverwood | 2 |  |
| **41** | | Skyline Acrea | 13 |  |
| **42** | | South Devon | 22 |  |
| **43** | | Southwood Park | 7 |  |
| **44** | | Sunshine Gardens | 7 |  |
| **45** | | The Hill | 11 |  |
| **46** | | University Of New Brunswick | 4 |  |
| **47** | | Waterloo Row | 3 |  |
| **48** | | Williams / Hawkins Area | 6 |  |
| **49** | | Woodstock Road | 20 |  |
| **50** | | Youngs Crossing | 6 |  |



**In [155]: mvcrime\_data.describe()**

**Out[155]:**

**MVCrime\_Count**



**count** 51.000000

**mean** 6.980392

**std** 7.457855

**min** 1.000000

**25%** 2.000000

**50%** 4.000000

**75%** 10.000000

**max** 40.000000

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**In [95]: mvcrime\_data.rename({'Platt': 'Plat'},inplace=True)**

**mvcrime\_data.rename(index=str, columns={'Neighbourhood':'Neighbourh','Count':'MVCri**

**me\_Count'}, inplace=True)**

**mvcrime\_data**

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**Out[95]:**

|  |  |  |
| --- | --- | --- |
|  | **Neighbourh** | **MVCrime\_Count** |
| **0** | Barkers Point | 8 |
| **1** | Brookside Estates | 3 |
| **2** | College Hill | 10 |
| **3** | Colonial heights | 6 |
| **4** | Diamond Street | 1 |
| **5** | Douglas | 1 |
| **6** | Downtown | 21 |
| **7** | Dun's Crossing | 9 |
| **8** | Forest Hill | 8 |
| **9** | Fredericton South | 20 |
| **10** | Fulton Heights | 12 |
| **11** | Garden Creek | 1 |
| **12** | Garden Place | 3 |
| **13** | Gilridge Estates | 1 |
| **14** | Golf Club | 5 |
| **15** | Hanwell North | 3 |
| **16** | Heron Springs | 2 |
| **17** | Highpoint Ridge | 4 |
| **18** | Knob Hill | 1 |
| **19** | Lian / Valcore | 1 |
| **20** | Lincoln | 1 |
| **21** | Lincoln Heights | 11 |
| **22** | Main Street | 10 |
| **23** | Marysville | 10 |
| **24** | McKnight | 1 |
| **25** | McLeod Hill | 2 |
| **26** | Monteith / Talisman | 3 |
| **27** | Montogomery / Prospect East | 3 |
| **28** | Nashwaaksis | 9 |
| **29** | Nethervue Minihome Park | 1 |
| **30** | North Devon | 17 |
| **31** | Northbrook Heights | 5 |
| **32** | Plat | 40 |
| **33** | Poet's Hill | 2 |
| **34** | Prospect | 11 |
| **35** | Rail Side | 2 |
| **36** | Saint Mary's First Nation | 1 |
| **37** | Saint Thomas University | 1 |
| **38** | Sandyville | 3 |

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|  |  |  |  |  |
| --- | --- | --- | --- | --- |
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|  |  | **Neighbourh** | **MVCrime\_Count** | |
|  |  |  |  |  |
| **39** | | Shadowood Estates | 2 |  |
| **40** | | Silverwood | 2 |  |
| **41** | | Skyline Acrea | 13 |  |
| **42** | | South Devon | 22 |  |
| **43** | | Southwood Park | 7 |  |
| **44** | | Sunshine Gardens | 7 |  |
| **45** | | The Hill | 11 |  |
| **46** | | University Of New Brunswick | 4 |  |
| **47** | | Waterloo Row | 3 |  |
| **48** | | Williams / Hawkins Area | 6 |  |
| **49** | | Woodstock Road | 20 |  |
| **50** | | Youngs Crossing | 6 |  |



**In [96]: world\_geo = r'world\_countries.json' *# geojson file***

**fredericton\_c\_map = folium.Map(location=[45.91, -66.65], width=1000, height=750,zoo m\_start=12)**

**fredericton\_c\_map**

**Out[96]:**

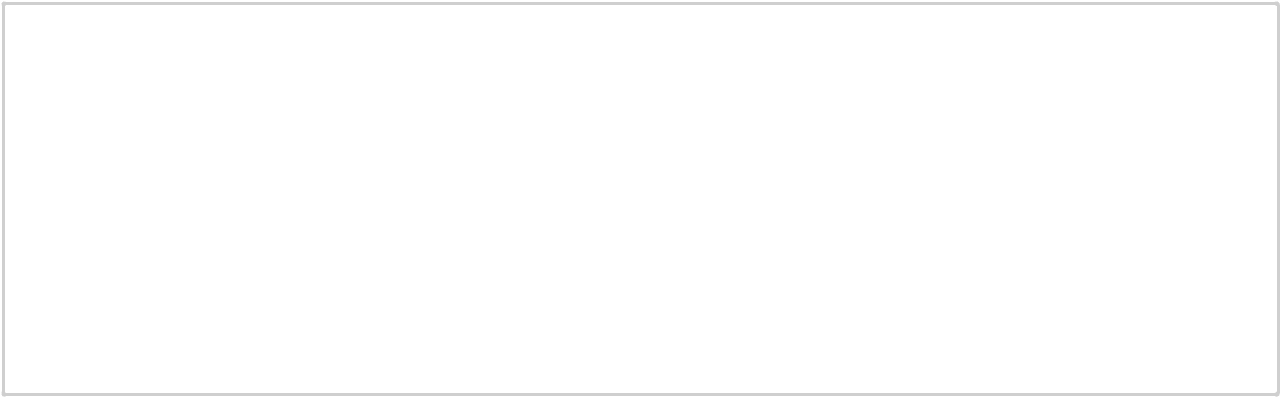


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**In [97]: *## Motor Vehicle Crime <$5000 Count***

**fredericton\_geo = r.json()**

**threshold\_scale = np.linspace(mvcrime\_data['MVCrime\_Count'].min(), mvcrime\_data['MV Crime\_Count'].max(),6,dtype=int)**

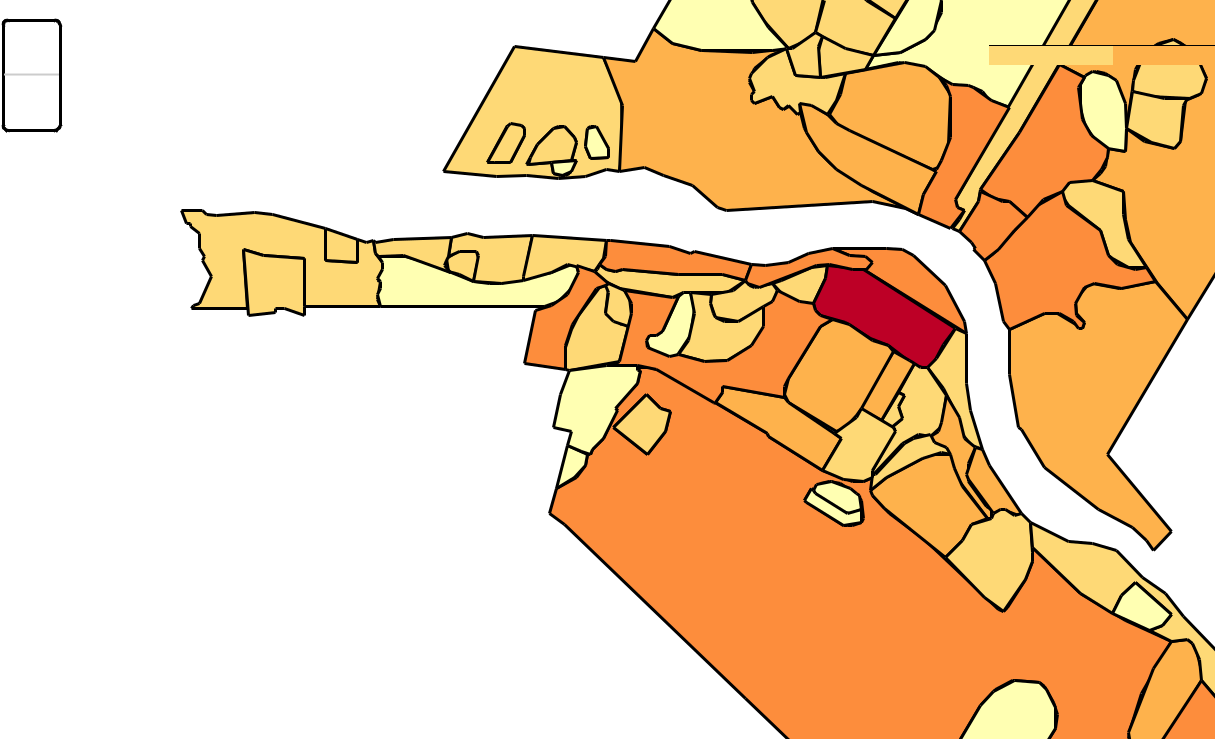
**threshold\_scale = threshold\_scale.tolist()**

**threshold\_scale[-1] = threshold\_scale[-1]+1**

**fredericton\_c\_map.choropleth(geo\_data=fredericton\_geo,data=mvcrime\_data,columns=['N eighbourh', 'MVCrime\_Count'],key\_on='feature.properties.Neighbourh',**

**threshold\_scale=threshold\_scale, fill\_color='YlOrRd',fill\_opacity=0.7,line\_opac ity=0.1,legend\_name='Fredericton Neighbourhoods') fredericton\_c\_map**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Out[97]:** | + | 1 | 8 |  |
|  |  |
|  |  |  |  |



Fredericton Neighbourh

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**Is it possible the higher rate of crime in the downtown area is due to population density?**



**In [98]: opendemog = 'Fredericton\_Census\_Tract\_Demographics.xlsx'**

**workbook = pd.ExcelFile(opendemog)**

**print(workbook.sheet\_names)**

**['Fredericton\_Census\_Tract\_Demogr']**

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**In [99]: demog\_df = workbook.parse('Fredericton\_Census\_Tract\_Demogr')**

**demog\_df.head()**

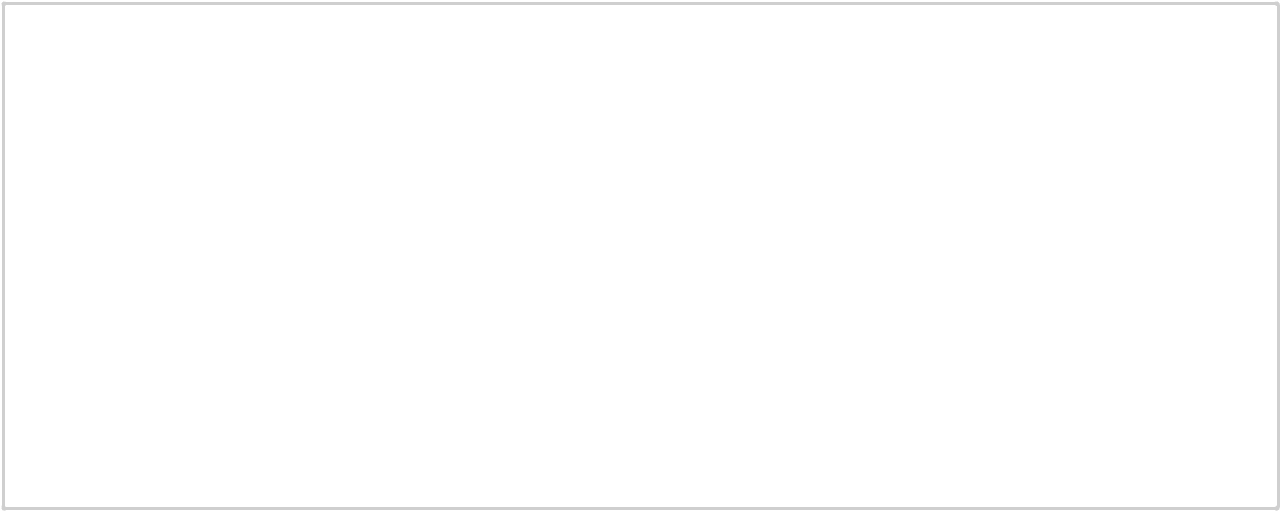
**Out[99]:**

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | **FID** | **OBJECTID** | **DBUID** | **DAUID** | **CDUID** | **CTUID** | **CTNAME** | **DBuid\_1** | **DBpop2011** | **DBtdwell20 D** |
| **0** | 1 | 501 | 1310024304 | 13100243 | 1310 | 3200002 | 2 | 1310024304 | 60 | 25 |
| **1** | 2 | 502 | 1310032004 | 13100320 | 1310 | 3200010 | 10 | 1310032004 | 15 | 3 |
| **2** | 3 | 503 | 1310017103 | 13100171 | 1310 | 3200014 | 14 | 1310017103 | 0 | 0 |
| **3** | 4 | 504 | 1310018301 | 13100183 | 1310 | 3200012 | 12 | 1310018301 | 108 | 60 |
| **4** | 5 | 505 | 1310022905 | 13100229 | 1310 | 3200007 | 7 | 1310022905 | 129 | 47 |



**In [ ]:**

**In [ ]:** 



**In [100]: *# Population Density***

**world\_geo = r'world\_countries.json' *# geojson file***

**fredericton\_d\_map = folium.Map(location=[45.94, -66.63], width=1200, height=750,zoo**

**m\_start=12)**

**fredericton\_d\_map**

**threshold\_scale = np.linspace(demog\_df['DBpop2011'].min(),demog\_df['DBpop2011'].max (),6,dtype=int)**

**threshold\_scale = threshold\_scale.tolist()**

**threshold\_scale[-1] = threshold\_scale[-1]+1**

**fredericton\_d\_map.choropleth(geo\_data=demog\_geo,data=demog\_df,columns=['OBJECTID', 'DBpop2011'],key\_on='feature.properties.OBJECTID',**

**threshold\_scale=threshold\_scale,fill\_color='PuBuGn',fill\_opacity=0.7, line\_opac ity=0.1,legend\_name='Fredericton Population Density') fredericton\_d\_map**

**Out[100]:**



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**Let's look at specific locations in Fredericton**



**In [101]: pointbook = 'Fredericton Locations.xlsx'**

**workbook\_2 = pd.ExcelFile(pointbook)**

**print(workbook\_2.sheet\_names)**

**['Sheet1']**



**In [102]: location\_df = workbook\_2.parse('Sheet1')**

**location\_df**

**Out[102]:**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | **Location** | **Neighbourh** | **Latitude** | **Longitude** |
| **0** | Knowledge Park | NaN | 45.931143 | -66.652700 |
| **1** | Fredericton Hill | NaN | 45.948512 | -66.656045 |
| **2** | Nashwaaksis | NaN | 45.983382 | -66.644856 |
| **3** | University of New Brunswick | NaN | 45.948121 | -66.641406 |
| **4** | Devon | NaN | 45.968802 | -66.622738 |
| **5** | New Maryland | NaN | 45.892795 | -66.683673 |
| **6** | Marysville | NaN | 45.978913 | -66.589491 |
| **7** | Skyline Acres | NaN | 45.931827 | -66.640339 |
| **8** | Hanwell | NaN | 45.902315 | -66.755113 |
| **9** | Downtown | NaN | 45.958327 | -66.647211 |



**In [103]: location\_df.drop(['Neighbourh'], axis=1,inplace=True)**

**location\_df**

**Out[103]:**

|  |  |  |  |
| --- | --- | --- | --- |
|  | **Location** | **Latitude** | **Longitude** |
| **0** | Knowledge Park | 45.931143 | -66.652700 |
| **1** | Fredericton Hill | 45.948512 | -66.656045 |

* Nashwaaksis 45.983382 -66.644856

|  |  |  |  |
| --- | --- | --- | --- |
| **3** | University of New Brunswick | 45.948121 | -66.641406 |
| **4** | Devon | 45.968802 | -66.622738 |
| **5** | New Maryland | 45.892795 | -66.683673 |
| **6** | Marysville | 45.978913 | -66.589491 |
| **7** | Skyline Acres | 45.931827 | -66.640339 |
| **8** | Hanwell | 45.902315 | -66.755113 |
| **9** | Downtown | 45.958327 | -66.647211 |

**Add location markers to map**

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**In [104]: for lat, lng, point in zip(location\_df['Latitude'], location\_df['Longitude'], locat ion\_df['Location']):**

**label = '{}'.format(point)**

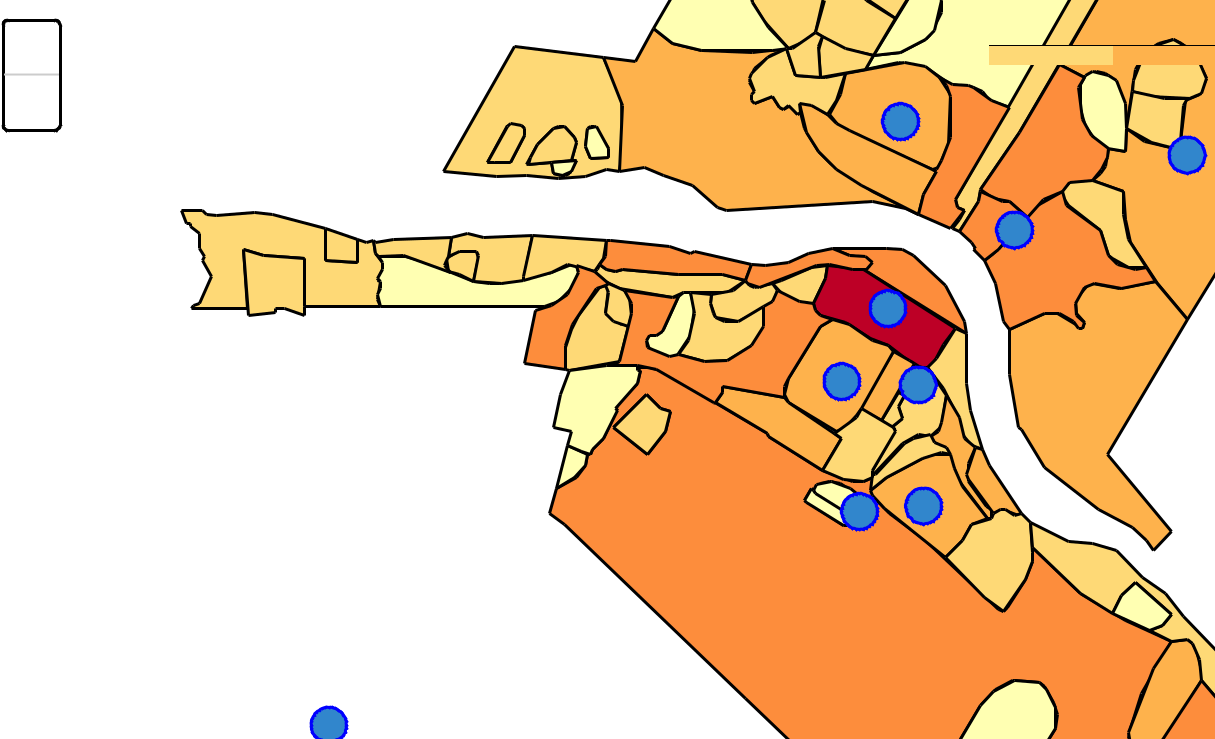
**label = folium.Popup(label, parse\_html=True)**

**folium.CircleMarker([lat, lng],radium=1,popup=label,color='blue',fill=True,fill \_color='#3186cc',fill\_opacity=0.7,**

**parse\_html=False).add\_to(fredericton\_c\_map)**

**fredericton\_c\_map**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Out[104]:** | + | 1 | 8 |  |
|  |  |
|  |  |  |  |



Fredericton Neighbourh

~~−~~



**In [ ]:**

**Explore Fredericton Neighbourhoods**

**Define Foursquare Credentials and Version**



**In [2]: CLIENT\_ID = 'Nope' *# your Foursquare ID***

**CLIENT\_SECRET = 'Secret' *# your Foursquare Secret***

**VERSION = '20181201' *# Foursquare API version***

**print('Your credentails:')**

**print('CLIENT\_ID: ' + CLIENT\_ID)**

**print('CLIENT\_SECRET:' + CLIENT\_SECRET)**

**Your credentails:**

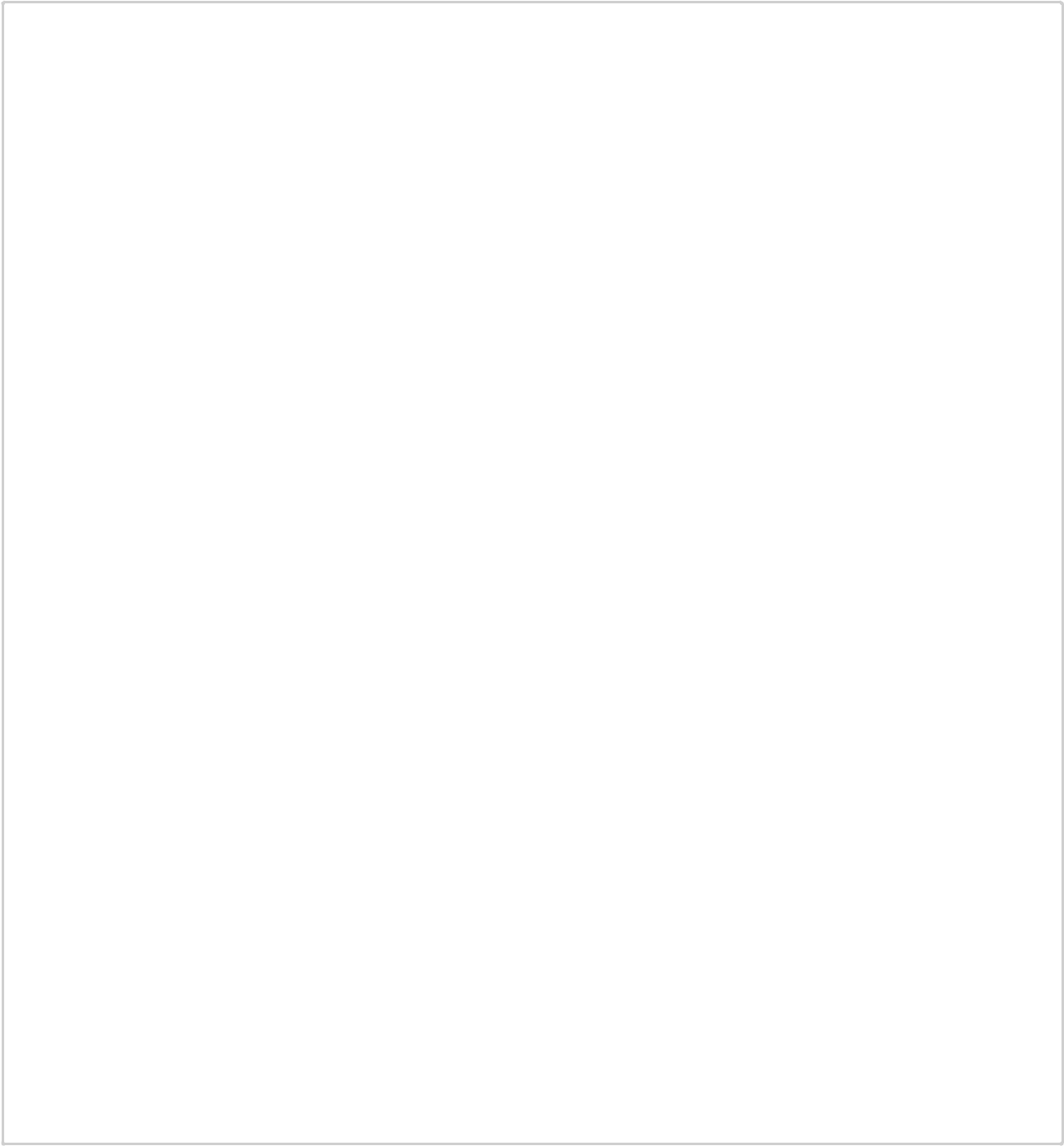
**CLIENT\_ID: Nope**

**CLIENT\_SECRET:Secret**

**Let's take a look at nearby venues**

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**In [106]: def getNearbyVenues(names, latitudes, longitudes, radius=1000, LIMIT=100):**

**venues\_list=[]**

**for name, lat, lng in zip(names, latitudes, longitudes):**

**print(name)**

***# create the API request URL***

**url = 'https://api.foursquare.com/v2/venues/explore?&client\_id={}&client\_se cret={}&v={}&ll={},{}&radius={}&limit={}'.format(**

**CLIENT\_ID,**

**CLIENT\_SECRET,**

**VERSION,**

**lat,**

**lng,**

**radius,**

**LIMIT)**

***# make the GET request***

**results = requests.get(url).json()["response"]['groups'][0]['items']**

* ***return only relevant information for each nearby venue* venues\_list.append([(**

**name,**

**lat,**

**lng,**

**v['venue']['name'], v['venue']['id'], v['venue']['location']['lat'], v['venue']['location']['lng'],**

**v['venue']['categories'][0]['name']) for v in results])**

**nearby\_venues = pd.DataFrame([item for venue\_list in venues\_list for item in ve nue\_list])**

**nearby\_venues.columns = ['Location',**

**'Location Latitude',**

**'Location Longitude',**

**'Venue',**

**'Venue id',**

**'Venue Latitude',**

**'Venue Longitude',**

**'Venue Category'**

**]**

**return(nearby\_venues)**



**In [107]: fredericton\_data\_venues = getNearbyVenues(names=location\_df['Location'],**

**latitudes=location\_df['Latitude'],**

**longitudes=location\_df['Longitude']**

**)**

**Knowledge Park**

**Fredericton Hill**

**Nashwaaksis**

**University of New Brunswick**

**Devon**

**New Maryland**

**Marysville**

**Skyline Acres**

**Hanwell**

**Downtown**

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**In [108]: print(fredericton\_data\_venues.shape)**

**fredericton\_data\_venues**

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**(166, 8)**

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**Out[108]:**

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | **Location** | **Location** | **Location** | **Venue** | **Venue id** | **Venue** | **Venue** |  |  |
|  | **Latitude** | **Longitude** | **Latitude** | **Longitude** | **Ca** |  |
|  |  |  |  |  |
|  |  |  |  |  |  |  |  |  |  |
| **0** | Knowledge | 45.931143 | -66.652700 | Costco | 4e18ab92183880768f43bﬀ6 | 45.927034 | -66.663447 | War |  |
|  | Park |  |  | Wholesale |  |  |  |  |  |
| **1** | Knowledge | 45.931143 | -66.652700 | PetSmart | 4bbca501a0a0c9b6078f1a0f | 45.929768 | -66.659939 | Pe |  |
|  | Park |  |  |  |  |  |  |  |  |
| **2** | Knowledge | 45.931143 | -66.652700 | Montana's | 4e50406e62844166699b0780 | 45.931511 | -66.662507 | Res |  |
|  | Park |  |  |  |  |  |  |  |  |
| **3** | Knowledge | 45.931143 | -66.652700 | Boston Pizza | 4b64944af964a52041bf2ae3 | 45.938123 | -66.660037 | Spo |  |
|  | Park |  |  |  |  |  |  |  |  |

* Knowledge Park
* Knowledge Park
* Knowledge Park
* Knowledge Park
* Knowledge Park
* Knowledge Park

1. Knowledge Park
2. Knowledge Park
3. Knowledge Park
4. Knowledge Park
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9. Knowledge Park
10. Knowledge Park
11. Knowledge Park
12. Knowledge Park
13. Knowledge Park
14. Knowledge Park
15. Knowledge Park

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| 45.931143 | -66.652700 | Michaels | 4c489858417b20a13b82e1a9 | 45.929965 | -66.659548 | Arts & |  |
|  |  |
| 45.931143 | -66.652700 | Alcool NB | 4b77335df964a5202c872ee3 | 45.930680 | -66.664180 | Liquo |  |
| Liquor |  |
|  |  |  |  |  |  |  |
| 45.931143 | -66.652700 | Best Buy | 5520124a498e0467bb6e81c8 | 45.937673 | -66.660380 | Elec |  |
|  |  |
| 45.931143 | -66.652700 | Wal-Mart | 4bad313ﬀ964a5208c373be3 | 45.934081 | -66.663539 | B |  |
|  |  |
| 45.931143 | -66.652700 | Booster | 4c42414e520fa59334f9caac | 45.935198 | -66.663602 | Sm |  |
| Juice |  |  |
|  |  |  |  |  |  |  |
| 45.931143 | -66.652700 | Dairy Queen | 4b86f05bf964a52009a731e3 | 45.938004 | -66.659442 | Fas |  |
| Res |  |
|  |  |  |  |  |  |  |
| 45.931143 | -66.652700 | H&M | 509c3265498efdﬀc5739a0f | 45.935196 | -66.663290 | C |  |
|  |  |
| 45.931143 | -66.652700 | Dairy Queen | 4cc6123cbde8f04d9ce0b44b | 45.934520 | -66.663988 | Fas |  |
| (Treat) | Res |  |
|  |  |  |  |  |  |
| 45.931143 | -66.652700 | Winners | 4caa46a744a8224b96e42640 | 45.930427 | -66.659758 | C |  |
|  |  |
| 45.931143 | -66.652700 | East Side | 4b55d89bf964a520a2f227e3 | 45.931376 | -66.663417 |  |  |
| Mario's | Res |  |
|  |  |  |  |  |  |
| 45.931143 | -66.652700 | McDonald's | 4c6e9ef665eda09377e951d0 | 45.934575 | -66.663319 | Fas |  |
| Res |  |
|  |  |  |  |  |  |  |
| 45.931143 | -66.652700 | Home Sense | 54024f60498ee424eedb7bf9 | 45.930528 | -66.660103 | Depa |  |
|  |  |
| 45.931143 | -66.652700 | The Shoe | 4bd76dfa5cf276b0fb469b00 | 45.929636 | -66.660449 | Sho |  |
| company |  |
|  |  |  |  |  |  |  |
| 45.931143 | -66.652700 | Avalon Spa | 4cd99e0f51fc8cfa4369f05d | 45.930774 | -66.660927 |  |  |
| Uptown |  |  |
|  |  |  |  |  |  |  |
| 45.931143 | -66.652700 | Wicker | 4e6baﬀ588772457c4fd1968 | 45.930897 | -66.661338 | Fur |  |
| Emporium | Hom |  |
|  |  |  |  |  |  |
| 45.931143 | -66.652700 | Dollarama | 4ba3dd18f964a520d86738e3 | 45.930897 | -66.661714 | Di |  |
|  |  |
| 45.931143 | -66.652700 | Bed Bath & | 5083f283e4b0bf87c15e9ea1 | 45.930097 | -66.662166 | Fur |  |
| Beyond | Hom |  |
|  |  |  |  |  |  |
| 45.931143 | -66.652700 | GAP Factory | 50a8f005e4b0e4f42e033a2a | 45.930211 | -66.662416 | C |  |
| Store |  |  |
|  |  |  |  |  |  |  |
| 45.931143 | -66.652700 | carter's | | 50a51363e4b0a3e2f7db76bf | 45.929978 | -66.662966 | Kid |  |
| OshKosh |  |
|  |  | B'gosh |  |  |  |  |  |
| 45.931143 | -66.652700 | Deluxe Fish | 4e5d0b99fa76a4cf148d9a15 | 45.931722 | -66.663131 | S |  |
| & Chips | Res |  |
|  |  |  |  |  |  |
| 45.931143 | -66.652700 | Hallmark | 4cd96cf651fc8cfa522eef5d | 45.930646 | -66.663745 | Gif |  |

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|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 12/20/2018 |  |  |  |  | Capstone\_Week5 | |  |  |  |  |
|  |  | **Location** | **Location** | **Location** | **Venue** | **Venue id** | **Venue** | **Venue** |  |  |
|  |  | **Latitude** | **Longitude** | **Latitude** | **Longitude** | **Ca** |  |
|  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |  |  |  |
| **25** | | Knowledge | 45.931143 | -66.652700 | NB Liquor | 5985f08b6cf01a7e38b85fba | 45.930228 | -66.664395 | Liquo |  |
|  |  | Park |  |  |  |  |  |  |  |  |
| **26** | | Knowledge | 45.931143 | -66.652700 | Corbett | 57854d05498e301b3b5a4448 | 45.929733 | -66.664601 | Sh |  |
|  |  | Park |  |  | Center |  |  |  |  |  |
| **27** | | Knowledge | 45.931143 | -66.652700 | Costco Food | 53693053498ef3e4ea63560f | 45.927383 | -66.663544 | Fas |  |
|  |  | Park |  |  | Court |  |  |  | Res |  |

1. KnowledgePark 45.931143 -66.652700
2. KnowledgePark 45.931143 -66.652700
3. KnowledgePark 45.931143 -66.652700
4. FrederictonHill 45.948512 -66.656045
5. FrederictonHill 45.948512 -66.656045
6. FrederictonHill 45.948512 -66.656045
7. FrederictonHill 45.948512 -66.656045
8. FrederictonHill 45.948512 -66.656045
9. FrederictonHill 45.948512 -66.656045
10. FrederictonHill 45.948512 -66.656045
11. FrederictonHill 45.948512 -66.656045
12. FrederictonHill 45.948512 -66.656045
13. FrederictonHill 45.948512 -66.656045
14. FrederictonHill 45.948512 -66.656045
15. FrederictonHill 45.948512 -66.656045
16. FrederictonHill 45.948512 -66.656045
17. FrederictonHill 45.948512 -66.656045
18. FrederictonHill 45.948512 -66.656045

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Sleep | 555b5660498eae864c440e77 | 45.929074 | -66.664605 | M |  |
| Country |  |  |
|  |  |  |  |  |
| Sport Chek | 4ca4ecae8a65bfb717422b22 | 45.935211 | -66.663525 | S |  |
| Regent Mall | Good |  |
|  |  |  |  |
| Rôtisserie | 57164569498e9bb9e88d52b0 | 45.929838 | -66.664749 | Res |  |
| St-Hubert |  |  |  |  |  |
| YMCA | 4e93476b8231bf0d17ba3e24 | 45.953217 | -66.649478 |  |  |
| Fredericton |  |  |
|  |  |  |  |  |
| 20 Twenty | 4c5388b0f5f3d13ac74ba5f8 | 45.951042 | -66.648112 |  |  |
| Club |  |  |
|  |  |  |  |  |
| Shoppers | 4fb699dc7bebbeb2a6c7ba88 | 45.942627 | -66.655523 | Ph |  |
| Drug Mart |  |
|  |  |  |  |  |
| Subway | 4bae3571f964a52076923be3 | 45.940931 | -66.657445 | Sa |  |
|  |  |
| Canadian | 4bb52ba72ea19521201caa2f | 45.944409 | -66.666820 | Ha |  |
| Tire |  |  |
|  |  |  |  |  |
| Tim Hortons | 4dc29f89d4c07da169fbf84b | 45.943720 | -66.646907 | Coﬀe |  |
| The Aitken |  |  |  |  |  |
| University | 4b6458eﬀ964a52052ac2ae3 | 45.941644 | -66.663667 |  |  |
| Centre - |  |  |
|  |  |  |  |  |
| UNB |  |  |  |  |  |
| Queen | 4b7acb0ef964a520113d2fe3 | 45.950961 | -66.648245 |  |  |
| Square Park |  |  |
|  |  |  |  |  |
| Great | 4b784edbf964a52013c42ee3 | 45.941040 | -66.657545 |  |  |
| Canadian |  |  |
| Bagel |  |  |  |  |  |
| Monkey | 4ec147368231b62f43026067 | 45.940938 | -66.657346 |  |  |
| Cakes |  |  |
|  |  |  |  |  |
| Papa John's | 4ecc29f59adfd1f5b5c7bbb1 | 45.956655 | -66.657285 | Pizz |  |
| Pizza |  |
|  |  |  |  |  |
| Greco | 4cfc0660c51fa1cdd3d7e92b | 45.954055 | -66.647290 | Pizz |  |
| Dick's | 4c545e5db426ef3b11cc7e8a | 45.941957 | -66.663877 | Smok |  |
| Grocery |  |
| Store |  |  |  |  |  |
| Tingley's Ice | 4c13c001b7b9c9284e12aa37 | 45.957087 | -66.655855 | Ice |  |
| Cream |  |  |
|  |  |  |  |  |
| Domino's | 50f9bbc75d24acebc259244d | 45.957177 | -66.656638 | Pizz |  |
| Pizza |  |
|  |  |  |  |  |

|  |  |  |
| --- | --- | --- |
| **46** | Fredericton | 45.948512 -66.656045 Jumbo Video 4bc0d29a920eb71307a2192c 45.957286 -66.656312 Vide |
|  | Hill |  |

1. FrederictonHill 45.948512 -66.656045 Goody Shop 4b8580edf964a5201d6231e3 45.951172 -66.644000

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|  |  | Peters Meat, |  | G |  |
| **48** | Nashwaaksis 45.983382 -66.644856 | Seafood & | 4c4e04ecfb742d7fe7bba62d 45.976652 -66.649765 |  |
| Lobster |  |  |
|  |  |  |  |  |

Market

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| 12/20/2018 |  |  |  |  | Capstone\_Week5 | |  |  |  |  |
|  |  | **Location** | **Location** | **Location** | **Venue** | **Venue id** | **Venue** | **Venue** |  |  |
|  |  | **Latitude** | **Longitude** | **Latitude** | **Longitude** | **Ca** |  |
|  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |  |  |  |
| **49** | | Nashwaaksis | 45.983382 | -66.644856 | Tim Hortons | 4b742f31f964a520b7cb2de3 | 45.975294 | -66.646977 | Coﬀe |  |
| **50** | |  |  |  | The |  |  |  | F |  |
| Nashwaaksis | 45.983382 | -66.644856 | Northside | 50270b2ae4b042eaf816ee61 | 45.977779 | -66.635003 |  |
|  |  |
|  |  |  |  |  | Market |  |  |  |  |  |
| **51** | | Nashwaaksis | 45.983382 | -66.644856 | Shoppers | 4c745e08db52b1f781f775dc | 45.976515 | -66.648534 | Ph |  |
| Drug Mart |  |
|  |  |  |  |  |  |  |  |  |  |
| **52** | | Nashwaaksis | 45.983382 | -66.644856 | Subway | 4bc5db23693695213a9a8488 | 45.976886 | -66.648661 | Sa |  |
|  |  |
| **53** | | Nashwaaksis | 45.983382 | -66.644856 | Subway | 4c87f3b4bf40a1cd09fd08b4 | 45.989114 | -66.652061 | Sa |  |
|  |  |
| **54** | |  |  |  | Kentucky |  |  |  | Fas |  |
| Nashwaaksis | 45.983382 | -66.644856 | Fried | 4eefb90ba69ddc7bcb336081 | 45.975903 | -66.646846 |  |
| Res |  |
|  |  |  |  |  | Chicken |  |  |  |  |
|  |  |  |  |  |  |  |  |  |  |
| **55** | | Nashwaaksis | 45.983382 | -66.644856 | Nashwaaksis | 4b73436cf964a52016a52de3 | 45.984849 | -66.643635 |  |  |
|  |  |  |  |  | Field House |  |  |  |  |  |
| **56** | | Nashwaaksis | 45.983382 | -66.644856 | KFC | 4c9267139199bfb7786c14df | 45.975907 | -66.646870 | Fas |  |
| Res |  |
|  |  |  |  |  |  |  |  |  |  |
| **57** | | Nashwaaksis | 45.983382 | -66.644856 | Tim Hortons | 4c0104cf360a9c74bb11d9a0 | 45.989221 | -66.652208 | Coﬀe |  |
| **58** | | Nashwaaksis | 45.983382 | -66.644856 | Thai spice | 503658e5e4b00b386cc5d972 | 45.975890 | -66.647424 | Res |  |
|  |  |  |  |  |  |  |  |  |  |
| **59** | | Nashwaaksis | 45.983382 | -66.644856 | Mike's Old | 4d67fde7709bb60c5eacb014 | 45.976560 | -66.650030 |  |  |
| Fashioned |  |  |
|  |  |  |  |  | Bakery |  |  |  |  |  |
| **60** | | Nashwaaksis | 45.983382 | -66.644856 | Cox | 4d07eab6611ﬀ04d4f4718fb | 45.976112 | -66.649222 | Elec |  |
| Electronics |  |  |
|  |  |  |  |  |  |  |  |  |  |
| **61** | | Nashwaaksis | 45.983382 | -66.644856 | A Pile Of | 4e9f0e9b93ad5d11f3d36ba1 | 45.984398 | -66.633329 | Arts & |  |
| Scrap! |  |  |
|  |  |  |  |  |  |  |  |  |  |
| **62** | | Nashwaaksis | 45.983382 | -66.644856 | Jim Gilberts | 4b9a7ef5f964a520b6ba35e3 | 45.980784 | -66.633311 |  |  |
| Wheels And | Dea |  |
|  |  |  |  |  | Deals |  |  |  |  |
|  |  |  |  |  |  |  |  |  |  |
| **63** | | Nashwaaksis | 45.983382 | -66.644856 | Trailway | 574a1b86cd10af189e38500e | 45.975442 | -66.649496 | Bee |  |
| Brewery |  |
|  |  |  |  |  |  |  |  |  |  |
| **64** | | Nashwaaksis | 45.983382 | -66.644856 | The North | 501c19f7e4b01c57ﬀ1b1212 | 45.977837 | -66.635168 | F |  |
| Side Market |  |  |
|  |  |  |  |  |  |  |  |  |  |
| **65** | | Nashwaaksis | 45.983382 | -66.644856 | Avalon | 4bc31784920eb71312ec1c2c | 45.974591 | -66.644756 |  |  |
| SalonSpa |  |  |
|  |  |  |  |  |  |  |  |  |  |
| **66** | | Nashwaaksis | 45.983382 | -66.644856 | Tony | 4c88f56dbbec6dcbe9f2d758 | 45.991888 | -66.648599 | Pizz |  |
| Pepperoni |  |
|  |  |  |  |  |  |  |  |  |  |
|  |  | University of |  |  | The Richard |  |  |  |  |  |
| **67** | | 45.948121 | -66.641406 | J. CURRIE | 4dbae5806e815ab0de5d2637 | 45.946698 | -66.637891 | Bas |  |
| New |  |
|  |  | Brunswick |  |  | Center - |  |  |  |  |  |
|  |  |  |  | UNB |  |  |  |  |  |
|  |  |  |  |  |  |  |  |  |  |
| **68** | | University of | 45.948121 | -66.641406 | Charlotte | 4b7f0318f964a5203d1030e3 | 45.955620 | -66.639324 | Art |  |
| New | Street Arts |  |
|  |  | Brunswick |  |  | Centre |  |  |  |  |  |
| **69** | | University of |  |  |  |  |  |  | G |  |
| New | 45.948121 | -66.641406 | Sobeys | 4b6727daf964a520493e2be3 | 45.954891 | -66.645920 |  |
|  |  |
|  |  | Brunswick |  |  |  |  |  |  |  |  |
| **70** | | University of |  |  | YMCA |  |  |  |  |  |
| New | 45.948121 | -66.641406 | 4e93476b8231bf0d17ba3e24 | 45.953217 | -66.649478 |  |  |
| Fredericton |  |  |
|  |  | Brunswick |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |  |  |
| **71** | | University of |  |  | 20 Twenty |  |  |  |  |  |
| New | 45.948121 | -66.641406 | 4c5388b0f5f3d13ac74ba5f8 | 45.951042 | -66.648112 |  |  |
| Club |  |  |
|  |  | Brunswick |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |  |  |

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| 12/20/2018 |  |  |  |  | Capstone\_Week5 | |  |  |  |  |
|  |  | **Location** | **Location** | **Location** | **Venue** | **Venue id** | **Venue** | **Venue** |  |  |
|  |  | **Latitude** | **Longitude** | **Latitude** | **Longitude** | **Ca** |  |
|  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |  |  |  |
| **72** | | University of |  | -66.641406 | The Cellar | 4b7ac93ef964a520b53c2fe3 45.945434 | | -66.641626 |  |  |
| New 45.948121 | | Pub & Grill - |  |  |
|  |  | Brunswick |  |  | UNB |  |  |  |  |  |

University of

1. New 45.948121 -66.641406 Harvey's 4bbdﬀ85f57ba59320bdaeb9 45.953544 -66.645021 Burg Brunswick

University of

1. New 45.948121 -66.641406 Tim Hortons 4c865c1774d7b60c3f41a3d8 45.945185 -66.641545 Coﬀe Brunswick

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **75** | University of | 45.948121 | -66.641406 | Tim Hortons | 4dc29f89d4c07da169fbf84b | 45.943720 | -66.646907 | Coﬀe |  |
| New |  |
|  | Brunswick |  |  |  |  |  |  |  |  |
| **76** | University of |  |  | College Hill |  |  |  |  |  |
| New | 45.948121 | -66.641406 | 4b7aca23f964a520df3c2fe3 | 45.945162 | -66.641472 |  |  |
| Social Club |  |  |
|  | Brunswick |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |  |

New

1. Devon 45.968802 -66.622738England 4c09984e7e3fc928b64bf282 45.967675 -66.629905 Pizz Pizza

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **78** | Devon | 45.968802 | -66.622738 | Wolastoq | 4fbaafb0e4b0c7f68a419500 | 45.969975 | -66.632568 | S |  |
| Wharf | Res |  |
|  |  |  |  |  |  |  |  |
| **79** | Devon | 45.968802 | -66.622738 | Dairy Queen | 4c5cab2894fd0f473c69c945 | 45.969077 | -66.632059 | Fas |  |
| Res |  |
|  |  |  |  |  |  |  |  |  |
| **80** | Devon | 45.968802 | -66.622738 | Pharmacie | 4eb9523077c8972738ac89b2 | 45.967766 | -66.630551 | Ph |  |
| Jean Coutu |  |
|  |  |  |  |  |  |  |  |  |
| **81** | Devon | 45.968802 | -66.622738 | Tim Hortons | 4b5b0812f964a520d8df28e3 | 45.969381 | -66.632730 | Coﬀe |  |
| **82** | Devon | 45.968802 | -66.622738 | Henry Park | 4c8e283dad01199c7923726d | 45.963992 | -66.620283 | B |  |
|  |  |
| **83** | Devon | 45.968802 | -66.622738 | Giant Tiger | 4c95354f58d4b60c80443029 | 45.967715 | -66.630410 | Depa |  |
|  |  |
| **84** | Devon | 45.968802 | -66.622738 | york arena | 4b6c4f10f964a520792f2ce3 | 45.964888 | -66.617110 | Skatin |  |
| **85** | Devon | 45.968802 | -66.622738 | St. Mary's | 4b9fa6adf964a520c93137e3 | 45.971945 | -66.631248 | G |  |
| Supermarket |  |  |
|  |  |  |  |  |  |  |  |  |
| **86** | Devon | 45.968802 | -66.622738 | Dixie Lee | 4c5cacc5d25320a103fdc37a | 45.962257 | -66.624952 | Fas |  |
| Res |  |
|  |  |  |  |  |  |  |  |  |
| **87** | Devon | 45.968802 | -66.622738 | St Marys | 4ebddf8a4690d233887bf4a6 | 45.972270 | -66.631348 | Smok |  |
| Smoke Shop |  |
|  |  |  |  |  |  |  |  |  |
| **88** | Devon | 45.968802 | -66.622738 | Carleton | 4bce2eeb29d4b7138521a8dc | 45.961182 | -66.626310 |  |  |
| Park |  |  |
|  |  |  |  |  |  |  |  |  |
| **89** | New | 45.892795 | -66.683673 | New York | 4d8771fc651041bd194d9b30 | 45.890420 | -66.683580 | Fas |  |
|  | Maryland |  |  | Fries |  |  |  | Res |  |
|  |  |  |  | Centre De |  |  |  |  |  |
| **90** | New | 45.892795 | -66.683673 | Danse Roca | 55fdfc2b498ed76a0f7aa3f6 | 45.890978 | -66.692237 |  |  |
|  | Maryland |  |  | Dance |  |  |  |  |  |
|  |  |  |  | Center |  |  |  |  |  |
|  |  |  |  | Baseball, |  |  |  |  |  |
| **91** | New | 45.892795 | -66.683673 | Basketball, | 4e48415862e148603b8b3fc2 | 45.890726 | -66.692814 | B |  |
| Tennis and |  |
|  | Maryland |  |  | Hockey In |  |  |  |  |  |
|  |  |  |  | One... |  |  |  |  |  |
| **92** | New | 45.892795 | -66.683673 | Circle K | 4b9e633ef964a5202fdf36e3 | 45.885412 | -66.688995 | Gas |  |
|  | Maryland |  |  |  |  |  |  |  |  |
| **93** | Marysville | 45.978913 | -66.589491 | Tim Hortons | 4baa1b40f964a520174b3ae3 | 45.978193 | -66.593041 | Coﬀe |  |
| **94** | Marysville | 45.978913 | -66.589491 | Royals Field | 4c573f916201e21edﬀ8736e | 45.980267 | -66.588412 | B |  |
| S |  |
|  |  |  |  |  |  |  |  |  |

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| 12/20/2018 |  |  |  |  | Capstone\_Week5 | |  |  |  |  |
|  |  | **Location** | **Location** | **Location** | **Venue** | **Venue id** | **Venue** | **Venue** |  |  |
|  |  | **Latitude** | **Longitude** | **Latitude** | **Longitude** | **Ca** |  |
|  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |  |  |  |
| **95** | | Marysville | 45.978913 | -66.589491 | Northside | 4c8bee978018a1cdd1f2e7d2 | 45.980194 | -66.588628 | Ph |  |
| Pharmacy |  |
|  |  |  |  |  |  |  |  |  |  |
| **96** | | Marysville | 45.978913 | -66.589491 | Marysville | 4ce6d19be1eeb60c512d99ae | 45.980243 | -66.588277 |  |  |
| Place |  |  |
|  |  |  |  |  |  |  |  |  |  |
| **97** | | Marysville | 45.978913 | -66.589491 | Circle K | 4bb88fe853649c74431847fb | 45.979250 | -66.593232 | Gas |  |
| **98** | | Skyline | 45.931827 | -66.640339 | Grant Harvey | 4f915a7ee4b01406ebc873ae | 45.925002 | -66.641004 |  |  |
|  |  | Acres |  |  | Centre |  |  |  |  |  |
| **99** | | Skyline | 45.931827 | -66.640339 | Kimble Field | 4fdaa8c2e4b08f3358b1b3d1 | 45.930535 | -66.631233 | B |  |
|  |  | Acres |  |  |  |  |  |  |  |  |
| **100** | | Skyline | 45.931827 | -66.640339 | Mandarin | 4b786998f964a5204ecc2ee3 | 45.935440 | -66.631007 | C |  |
|  |  | Acres |  |  | Palace |  |  |  | Res |  |
| **101** | | Skyline | 45.931827 | -66.640339 | Oriental | 4ec68431775bf65c02417199 | 45.930085 | -66.629518 | C |  |
|  |  | Acres |  |  | Pearl |  |  |  | Res |  |

1. Hanwell 45.902315 -66.755113
2. Hanwell 45.902315 -66.755113
3. Downtown 45.958327 -66.647211
4. Downtown 45.958327 -66.647211
5. Downtown 45.958327 -66.647211
6. Downtown 45.958327 -66.647211
7. Downtown 45.958327 -66.647211
8. Downtown 45.958327 -66.647211
9. Downtown 45.958327 -66.647211
10. Downtown 45.958327 -66.647211
11. Downtown 45.958327 -66.647211
12. Downtown 45.958327 -66.647211
13. Downtown 45.958327 -66.647211
14. Downtown 45.958327 -66.647211
15. Downtown 45.958327 -66.647211
16. Downtown 45.958327 -66.647211
17. Downtown 45.958327 -66.647211
18. Downtown 45.958327 -66.647211
19. Downtown 45.958327 -66.647211

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| --- | --- | --- | --- | --- | --- |
| Advanced | 53c133a4498e933c415c6118 | 45.905297 | -66.750944 |  |  |
| Fabrics |  |  |
|  |  |  |  |  |
| Country | 56356c83498e17f8ed69a380 45.905937 -66.751084 Coﬀe | | | |  |
| Style |  |
|  |  |  |  |  |
| Cafe Loka & | 4e70d116152073dd03c2c50e | 45.957570 | -66.647978 |  |  |
| Bistro |  |  |
|  |  |  |  |  |
| Boyce |  |  |  | F |  |
| Farmers | 4b5163b4f964a5204d4c27e3 | 45.958354 | -66.639654 |  |
|  |  |
| Market |  |  |  |  |  |
| Second Cup | 4b7067c6f964a5205a182de3 | 45.961385 | -66.642372 | Coﬀe |  |
| Lunar Rogue | 4b8c53e7f964a520d4ca32e3 | 45.959998 | -66.639116 |  |  |
| Jonnie Java | 4bc47e80920eb71369c71e2c 45.962226 -66.643852 Coﬀe | | | |  |
| Roasters |  |
|  |  |  |  |  |
| Picaroon's | 4ced5cfe7b943704ea782653 | 45.962701 | -66.642731 | B |  |
| Brewtique |  |
|  |  |  |  |  |
| Sobeys | 4b6727daf964a520493e2be3 | 45.954891 | -66.645920 | G |  |
|  |  |
| Luna Pizza | 4be47e9b2468c92811dbfe42 | 45.962246 | -66.643788 | Res |  |
|  |  |  |  |  |
| Palate | 4c2e0e6ae760c9b69bdf4549 | 45.962338 | -66.641776 | Res |  |
| Restaurant & |  |
| Cafe |  |  |  |  |  |
| Alcool NB | 4d9a52120d5f224bc5f7a34e | 45.956140 | -66.647558 | Liquo |  |
| Liquor |  |
|  |  |  |  |  |
| coﬀee and | 4b533f74f964a520009427e3 45.961842 -66.643479 Coﬀe | | | |  |
| friends |  |
|  |  |  |  |  |
| Chess Piece | 53c00bcc498e1f34dc3687ae | 45.963354 | -66.644017 |  |  |
| Pâtisserie & |  |  |
| Cafe |  |  |  |  |  |
| Victory Meat | 4bd1ﬀd341b9ef3bcb19fde5 | 45.962661 | -66.645820 | G |  |
| Market |  |  |
|  |  |  |  |  |
| Exhibition | 4c76d45d07818cfafe94d2e3 | 45.960078 | -66.655522 | Ra |  |
| Grounds |  |
|  |  |  |  |  |
| The Abbey | 57178722498e4222f7d5b298 | 45.961301 | -66.640188 |  |  |
| Café & |  |  |
| Gallery |  |  |  |  |  |
| Charlotte | 4b7f0318f964a5203d1030e3 | 45.955620 | -66.639324 | Art |  |
| Street Arts |  |
| Centre |  |  |  |  |  |
| Isaac's Way | 51c8a824498ef33c708ac9e9 | 45.960944 | -66.637796 | Res |  |

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|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 12/20/2018 |  |  | Capstone\_Week5 |  |  |  |  |  |
| **Location** | **Location** | **Location** | **Venue** | **Venue id** | **Venue** | **Venue** |  |  |
| **Latitude** | **Longitude** | **Latitude** | **Longitude** | **Ca** |  |
|  |  |  |  |



1. Downtown 45.958327 -66.647211
2. Downtown 45.958327 -66.647211
3. Downtown 45.958327 -66.647211
4. Downtown 45.958327 -66.647211
5. Downtown 45.958327 -66.647211
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11. Downtown 45.958327 -66.647211
12. Downtown 45.958327 -66.647211
13. Downtown 45.958327 -66.647211
14. Downtown 45.958327 -66.647211
15. Downtown 45.958327 -66.647211
16. Downtown 45.958327 -66.647211
17. Downtown 45.958327 -66.647211
18. Downtown 45.958327 -66.647211
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20. Downtown 45.958327 -66.647211
21. Downtown 45.958327 -66.647211
22. Downtown 45.958327 -66.647211
23. Downtown 45.958327 -66.647211
24. Downtown 45.958327 -66.647211
25. Downtown 45.958327 -66.647211

YMCA Fredericton

Read's News Stand

King Street Ale House

1. Kitchen and Bar

Dimitri's

Souvlaki

Smoke's

Poutinerie

Snooty Fox

Oﬃcer's

Square

Fredericton Playhouse

Willie O'Ree Place

The Joyce

Cora's Breakfast & Lunch

Strange Adventures

Naru

Japanese

Cuisine

Mexicali

Rosas

Brewbakers

Dolan's Pub

Beaverbrook Art Gallery

McGinnis Landing

Atlantic Superstore

1. Twenty Club

Geek Chic

Wilser's

Room

Tim Hortons

TD Canada Trust

4e93476b8231bf0d17ba3e24 45.953217 -66.649478

4b4b6bf2f964a5200a9b26e3 45.961859 -66.643464 Coﬀe

5283fd1c498e138a8297590c 45.960460 -66.641012

53ab370e498e91a454f49e67 45.961657 -66.640152 Gas

4bacf7e8f964a520571f3be3 45.963093 -66.644479 Res

51756ac6498ece19b79a31f6 45.962032 -66.644021 Fas Res

4b4ca053f964a52006b826e3 45.960794 -66.638927

4c83b0df2f1c236a4bc54443 45.961754 -66.639084

4b516b64f964a520df4c27e3 45.960101 -66.636969 Perf Arts

4b76879ef964a520a5502ee3 45.963017 -66.646100

4b624863f964a5203b402ae3 45.960309 -66.636806

|  |  |  |
| --- | --- | --- |
| 4b8130c7f964a520e99930e3 45.962282 -66.641607 | Br |  |
|  |  |

4babdcbdf964a5200cd03ae3 45.962733 -66.643315 Hobb

50461342e4b0c55b9639accc 45.961721 -66.640125 Res

4c65dd9a19f3c9b697769eﬀ 45.962811 -66.646079 M Res

4b6754faf964a5208d482be3 45.960703 -66.640935 Res 4b516ddbf964a520144d27e3 45.962886 -66.644615

4c13a7f7b7b9c92865dea937 45.959878 -66.635858 Art M

4b6df601f964a5203d9f2ce3 45.963013 -66.646536 Stea

4b5b0a91f964a5205fe028e3 45.958260 -66.658048 Super

4c5388b0f5f3d13ac74ba5f8 45.951042 -66.648112

|  |  |  |
| --- | --- | --- |
| 4b516f03f964a520324d27e3 45.960573 -66.639225 | Toy / |  |
|  |  |

4ba01983f964a520f15937e3 45.963192 -66.644089

4b6455b0f964a52067ab2ae3 45.959873 -66.639259 Coﬀe

4b6d8261f964a52022792ce3 45.963891 -66.645782

1. Downtown 45.958327 -66.647211Fit4Less 4c9381ab94a0236a70ac8312 45.958634 -66.657319
2. Downtown 45.958327 -66.647211Harvey's 4bbdﬀ85f57ba59320bdaeb9 45.953544 -66.645021 Burg

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|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 12/20/2018 |  |  |  |  | Capstone\_Week5 | |  |  |  |  |
|  |  | **Location** | **Location** | **Location** | **Venue** | **Venue id** | **Venue** | **Venue** |  |  |
|  |  | **Latitude** | **Longitude** | **Latitude** | **Longitude** | **Ca** |  |
|  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |  |  |  |
| **148** | | Downtown | 45.958327 | -66.647211 | Shoppers | 4db07df34df03036e8bbb640 | 45.961351 | -66.644493 | Ph |  |
| Drug Mart |  |
|  |  |  |  |  |  |  |  |  |  |
| **149** | | Downtown | 45.958327 | -66.647211 | Shan | 4dfb6fc31f6eeef806aacc25 | 45.961818 | -66.643706 | C |  |
| Res |  |
|  |  |  |  |  |  |  |  |  |  |
| **150** | | Downtown | 45.958327 | -66.647211 | bulgogi | 4b605f0ﬀ964a5203de229e3 | 45.961522 | -66.642742 | Res |  |
|  |  |  |  |  |  |  |  |  |  |
| **151** | | Downtown | 45.958327 | -66.647211 | William's | 4b7c26f5f964a52061802fe3 | 45.959296 | -66.655663 | S |  |
| Seafood | Res |  |
|  |  |  |  |  |  |  |  |  |
| **152** | | Downtown | 45.958327 | -66.647211 | Subway | 4b6b883df964a5205a0e2ce3 | 45.962580 | -66.645032 | Sa |  |
|  |  |
| **153** | | Downtown | 45.958327 | -66.647211 | Capital | 4b6faa7cf964a52073f92ce3 | 45.963245 | -66.644123 |  |  |
| Complex |  |  |
|  |  |  |  |  |  |  |  |  |  |
| **154** | | Downtown | 45.958327 | -66.647211 | boom! | 4ba240eef964a52050e737e3 | 45.962315 | -66.641645 | Ni |  |
| Nightclub |  |
|  |  |  |  |  |  |  |  |  |  |
| **155** | | Downtown | 45.958327 | -66.647211 | Tim Hortons | 4ba8bdb3f964a5204ceb39e3 45.959933 -66.655493 Coﬀe | | | |  |
| **156** | | Downtown | 45.958327 | -66.647211 | King's Place | 4bc61ba4d35d9c74292de23a | 45.961679 | -66.643267 | Sh |  |
|  |  |  |  |  | Mall |  |  |  |  |  |
| **157** | | Downtown | 45.958327 | -66.647211 | Running | 4c6d4adb23c1a1cdﬀc81bcf | 45.961812 | -66.643510 | S |  |
| Room | Good |  |
|  |  |  |  |  |  |  |  |  |
| **158** | | Downtown | 45.958327 | -66.647211 | The Happy | 4b703d21f964a5204c0d2de3 | 45.960536 | -66.641465 |  |  |
| Baker |  |  |
|  |  |  |  |  |  |  |  |  |  |
| **159** | | Downtown | 45.958327 | -66.647211 | Owl's Nest | 4d6ea0c98df1548152778123 | 45.963051 | -66.643872 | Bo |  |
| Bookstore |  |
|  |  |  |  |  |  |  |  |  |  |
| **160** | | Downtown | 45.958327 | -66.647211 | Tingley's Ice | 4c13c001b7b9c9284e12aa37 | 45.957087 | -66.655855 | Ice |  |
| Cream |  |  |
|  |  |  |  |  |  |  |  |  |  |
| **161** | | Downtown | 45.958327 | -66.647211 | Jumbo Video | 4bc0d29a920eb71307a2192c | 45.957286 | -66.656312 | Vide |  |
| **162** | | Downtown | 45.958327 | -66.647211 | Enterprise | 4d3ae3edbf6d5481b26fd1e1 | 45.957743 | -66.656527 | Ren |  |
| Rent-A-Car | L |  |
|  |  |  |  |  |  |  |  |  |
| **163** | | Downtown | 45.958327 | -66.647211 | Domino's | 50f9bbc75d24acebc259244d | 45.957177 | -66.656638 | Pizz |  |
| Pizza |  |
|  |  |  |  |  |  |  |  |  |  |
| **164** | | Downtown | 45.958327 | -66.647211 | Papa John's | 4ecc29f59adfd1f5b5c7bbb1 | 45.956655 | -66.657285 | Pizz |  |
| Pizza |  |
|  |  |  |  |  |  |  |  |  |  |
| **165** | | Downtown | 45.958327 | -66.647211 | Queen | 4b7acb0ef964a520113d2fe3 | 45.950961 | -66.648245 |  |  |
| Square Park |  |  |
|  |  |  |  |  |  |  |  |  |  |



**In [109]: print('There are {} unique venue categories.'.format(len(fredericton\_data\_venues['V enue Category'].unique())))**

**There are 73 unique venue categories.**



**In [110]: print('There are {} unique venues.'.format(len(fredericton\_data\_venues['Venue id']. unique())))**

**There are 153 unique venues.**

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**In [111]: univen = fredericton\_data\_venues.groupby('Location').nunique('Venue Category') univen**

**Out[111]:**

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | **Location** | **Location** | **Location** |  | **Venue** | **Venue** | **Venue** | **Venue** | **Venue** |  |
|  |  | **Latitude** | **Longitude** |  |  | **id** | **Latitude** | **Longitude** | **Category** |  |
| **Location** |  |  |  |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |  |  |  |
| **Devon** | 1 |  | 1 | 1 | 12 | 12 | 12 | 12 | 11 |  |
| **Downtown** | 1 |  | 1 | 1 | 61 | 62 | 62 | 62 | 44 |  |
| **Fredericton Hill** | 1 |  | 1 | 1 | 17 | 17 | 17 | 17 | 13 |  |
| **Hanwell** | 1 |  | 1 | 1 | 2 | 2 | 2 | 2 | 2 |  |
| **Knowledge Park** | 1 |  | 1 | 1 | 31 | 31 | 31 | 31 | 23 |  |
| **Marysville** | 1 |  | 1 | 1 | 5 | 5 | 5 | 5 | 5 |  |
| **Nashwaaksis** | 1 |  | 1 | 1 | 17 | 19 | 19 | 19 | 15 |  |
| **New Maryland** | 1 |  | 1 | 1 | 4 | 4 | 4 | 4 | 4 |  |
| **Skyline Acres** | 1 |  | 1 | 1 | 4 | 4 | 4 | 4 | 3 |  |
| **University of New** | 1 |  | 1 | 1 | 9 | 10 | 10 | 10 | 8 |  |
| **Brunswick** |  |  |
|  |  |  |  |  |  |  |  |  |  |

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**In [112]: fredericton\_data\_venues.groupby('Venue Category').nunique()**

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**Out[112]:**

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | **Location** | **Location** | **Location** |  | **Venue** | **Venue** | **Venue** | **Venue** | **Venue** |  |
|  |  | **Latitude** | **Longitude** |  |  | **id** | **Latitude** | **Longitude** | **Category** |  |
| **Venue Category** |  |  |  |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |  |  |  |
| **Art Gallery** | 2 |  | 2 | 2 | 1 | 1 | 1 | 1 | 1 |  |
| **Art Museum** | 1 |  | 1 | 1 | 1 | 1 | 1 | 1 | 1 |  |
| **Arts & Crafts** | 2 |  | 2 | 2 | 2 | 2 | 2 | 2 | 1 |  |
| **Store** |  |  |
|  |  |  |  |  |  |  |  |  |  |
| **Auto Dealership** | 1 |  | 1 | 1 | 1 | 1 | 1 | 1 | 1 |  |
| **Bakery** | 3 |  | 3 | 3 | 5 | 5 | 5 | 5 | 1 |  |
| **Bank** | 1 |  | 1 | 1 | 1 | 1 | 1 | 1 | 1 |  |
| **Bar** | 3 |  | 3 | 3 | 4 | 4 | 4 | 4 | 1 |  |
| **Baseball Field** | 3 |  | 3 | 3 | 3 | 3 | 3 | 3 | 1 |  |
| **Baseball Stadium** | 1 |  | 1 | 1 | 1 | 1 | 1 | 1 | 1 |  |
| **Basketball Court** | 1 |  | 1 | 1 | 1 | 1 | 1 | 1 | 1 |  |
| **Beer Store** | 1 |  | 1 | 1 | 1 | 1 | 1 | 1 | 1 |  |
| **Big Box Store** | 1 |  | 1 | 1 | 1 | 1 | 1 | 1 | 1 |  |
| **Bookstore** | 1 |  | 1 | 1 | 1 | 1 | 1 | 1 | 1 |  |
| **Breakfast Spot** | 1 |  | 1 | 1 | 1 | 1 | 1 | 1 | 1 |  |
| **Brewery** | 1 |  | 1 | 1 | 1 | 1 | 1 | 1 | 1 |  |
| **Burger Joint** | 2 |  | 2 | 2 | 1 | 1 | 1 | 1 | 1 |  |
| **Café** | 1 |  | 1 | 1 | 3 | 3 | 3 | 3 | 1 |  |
| **Chinese** | 2 |  | 2 | 2 | 3 | 3 | 3 | 3 | 1 |  |
| **Restaurant** |  |  |
|  |  |  |  |  |  |  |  |  |  |
| **Clothing Store** | 1 |  | 1 | 1 | 3 | 3 | 3 | 3 | 1 |  |
| **Coﬀee Shop** | 7 |  | 7 | 7 | 6 | 13 | 13 | 13 | 1 |  |
| **Dance Studio** | 1 |  | 1 | 1 | 1 | 1 | 1 | 1 | 1 |  |
| **Department Store** | 2 |  | 2 | 2 | 2 | 2 | 2 | 2 | 1 |  |
| **Discount Store** | 1 |  | 1 | 1 | 1 | 1 | 1 | 1 | 1 |  |
| **Electronics Store** | 2 |  | 2 | 2 | 2 | 2 | 2 | 2 | 1 |  |
| **Farmers Market** | 2 |  | 2 | 2 | 3 | 3 | 3 | 3 | 1 |  |
| **Fast Food** | 5 |  | 5 | 5 | 9 | 10 | 10 | 10 | 1 |  |
| **Restaurant** |  |  |
|  |  |  |  |  |  |  |  |  |  |
| **Furniture / Home** | 1 |  | 1 | 1 | 2 | 2 | 2 | 2 | 1 |  |
| **Store** |  |  |
|  |  |  |  |  |  |  |  |  |  |
| **Gas Station** | 2 |  | 2 | 2 | 1 | 2 | 2 | 2 | 1 |  |
| **Gastropub** | 1 |  | 1 | 1 | 1 | 1 | 1 | 1 | 1 |  |
| **Gift Shop** | 1 |  | 1 | 1 | 1 | 1 | 1 | 1 | 1 |  |
| **Greek Restaurant** | 1 |  | 1 | 1 | 1 | 1 | 1 | 1 | 1 |  |
| **Grocery Store** | 4 |  | 4 | 4 | 4 | 4 | 4 | 4 | 1 |  |
| **Gym** | 4 |  | 4 | 4 | 2 | 2 | 2 | 2 | 1 |  |
| **Gym / Fitness** | 1 |  | 1 | 1 | 1 | 1 | 1 | 1 | 1 |  |
| **Center** |  |  |
|  |  |  |  |  |  |  |  |  |  |

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**Location Location** **Location** **Venue** **Venue Venue** **Venue** **Venue**

**Latitude** **Longitude** **id** **Latitude** **Longitude** **Category**

**Venue Category**



**Hardware Store**

**Hobby Shop**

**Hockey Arena**

**Ice Cream Shop**

**Italian Restaurant**

**Kids Store**

**Korean**

**Restaurant**

**Liquor Store**

**Mattress Store**

**Mexican**

**Restaurant**

**Nightclub**

**Park**

**Performing Arts**

**Venue**

**Pet Store**

**Pharmacy**

**Pizza Place**

**Pub**

**Racetrack**

**Rental Car**

**Location**

**Rental Service**

**Restaurant**

**Sandwich Place**

**Seafood**

**Restaurant**

**Shoe Store**

**Shopping Mall**

**Shopping Plaza**

**Skating Rink**

**Smoke Shop**

**Smoothie Shop**

**Spa**

**Sporting Goods**

**Shop**

**Sports Bar**

**Steakhouse**

**Supermarket**

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
| 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
| 3 | 3 | 3 | 3 | 3 | 3 | 3 | 1 |
| 2 | 2 | 2 | 1 | 1 | 1 | 1 | 1 |
| 2 | 2 | 2 | 2 | 2 | 2 | 2 | 1 |
| 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
| 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
| 2 | 2 | 2 | 2 | 3 | 3 | 3 | 1 |
| 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
| 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
| 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
| 4 | 4 | 4 | 4 | 4 | 4 | 4 | 1 |
| 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
| 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
| 5 | 5 | 5 | 3 | 5 | 5 | 5 | 1 |
| 4 | 4 | 4 | 5 | 5 | 5 | 5 | 1 |
| 2 | 2 | 2 | 6 | 6 | 6 | 6 | 1 |
| 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
| 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
| 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
| 2 | 2 | 2 | 5 | 5 | 5 | 5 | 1 |
| 3 | 3 | 3 | 1 | 4 | 4 | 4 | 1 |
| 3 | 3 | 3 | 3 | 3 | 3 | 3 | 1 |
| 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
| 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
| 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
| 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
| 2 | 2 | 2 | 2 | 2 | 2 | 2 | 1 |
| 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
| 2 | 2 | 2 | 2 | 2 | 2 | 2 | 1 |
| 2 | 2 | 2 | 2 | 2 | 2 | 2 | 1 |
| 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
| 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
| 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |

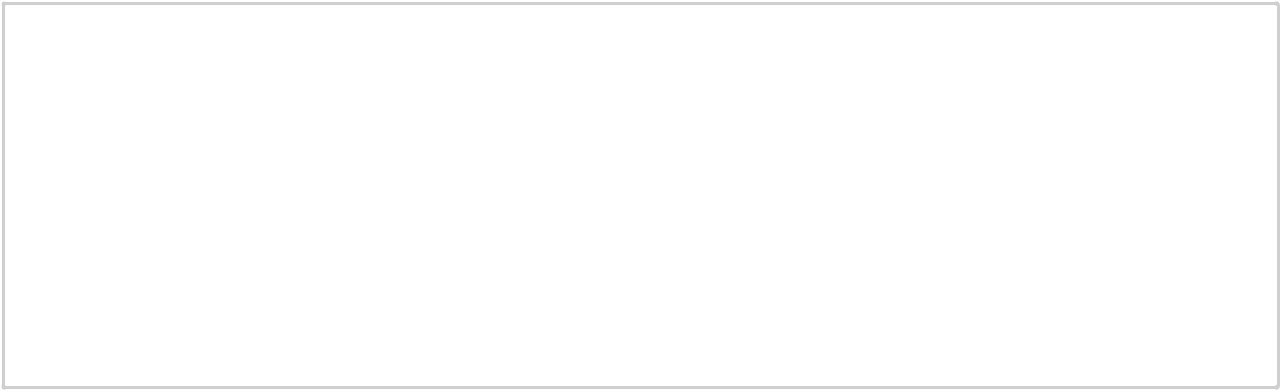
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|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 12/20/2018 |  |  |  | Capstone\_Week5 | |  |  |  |  |  |
|  |  | **Location** | **Location** | **Location** | **Venue** | **Venue** | **Venue** | **Venue** |  | **Venue** |
|  |  |  | **Latitude** | **Longitude** |  | **id** | **Latitude** | **Longitude** |  | **Category** |
|  | **Venue Category** |  |  |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |  |  |  |
|  | **Sushi Restaurant** | 1 | 1 | 1 | 1 | 1 |  | 1 | 1 | 1 |
|  | **Thai Restaurant** | 1 | 1 | 1 | 1 | 1 |  | 1 | 1 | 1 |
|  | **Toy / Game Store** | 1 | 1 | 1 | 1 | 1 |  | 1 | 1 | 1 |
|  | **Video Store** | 2 | 2 | 2 | 1 | 1 |  | 1 | 1 | 1 |
|  | **Warehouse Store** | 1 | 1 | 1 | 1 | 1 |  | 1 | 1 | 1 |



**In [ ]:**

**Analyze each Location**



**In [113]: *# one hot encoding***

**freddy\_onehot = pd.get\_dummies(fredericton\_data\_venues[['Venue Category']], prefix= "", prefix\_sep="")**

***# add neighbourhood column back to dataframe***

**freddy\_onehot['Location'] = fredericton\_data\_venues['Location']**

***# move neighbourhood column to the first column***

**fixed\_columns = [freddy\_onehot.columns[-1]] + list(freddy\_onehot.columns[:-1])**

**freddy\_onehot = freddy\_onehot[fixed\_columns]**

**freddy\_onehot.head()**

**Out[113]:**

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | **Location** | **Art** | **Art** | **Arts &** | **Auto** | **Bakery** | **Bank** | **Bar** | **Baseball** | **Baseball** | **Basketball** | **Beer** |  |
|  | **Gallery** | **Museum** | **Crafts** | **Dealership** | **Field** | **Stadium** | **Court** | **Store** |  |
|  |  |  |  | **Store** |  |  |  |  |  |  |  |  |  |
| **0** | Knowledge | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |  |
|  | Park |  |  |  |  |  |  |  |  |  |  |  |  |
| **1** | Knowledge | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |  |
|  | Park |  |  |  |  |  |  |  |  |  |  |  |  |
| **2** | Knowledge | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |  |
|  | Park |  |  |  |  |  |  |  |  |  |  |  |  |
| **3** | Knowledge | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |  |
|  | Park |  |  |  |  |  |  |  |  |  |  |  |  |
| **4** | Knowledge | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |  |
|  | Park |  |  |  |  |  |  |  |  |  |  |  |  |



**In [114]: freddy\_onehot.shape**

**Out[114]: (166, 74)**

**Group rows by location and by the mean of the frequency of occurrence of each category**

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**In [115]: freddy\_grouped = freddy\_onehot.groupby('Location').mean().reset\_index() freddy\_grouped**

**Out[115]:**

|  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  |  | **Art** | **Art** | **Arts &** | **Auto** |  |  |  | **Baseball** | **Baseball Ba** |  |
|  | **Location** | **Crafts** | **Bakery** | **Bank** | **Bar** |  |
|  | **Gallery** | **Museum** | **Dealership** | **Field** | **Stadium** |  |
|  |  |  |  | **Store** |  |  |  |  |  |  |  |
| **0** | Devon | 0.000000 | 0.000000 | 0.000000 | 0.000000 | 0.000000 | 0.000000 | 0.000000 | 0.083333 | 0.0 |  |
| **1** | Downtown | 0.016129 | 0.016129 | 0.000000 | 0.000000 | 0.016129 | 0.016129 | 0.048387 | 0.000000 | 0.0 |  |
| **2** | Fredericton | 0.000000 | 0.000000 | 0.000000 | 0.000000 | 0.176471 | 0.000000 | 0.058824 | 0.000000 | 0.0 |  |
|  | Hill |  |  |  |  |  |  |  |  |  |  |
| **3** | Hanwell | 0.000000 | 0.000000 | 0.000000 | 0.000000 | 0.000000 | 0.000000 | 0.000000 | 0.000000 | 0.0 |  |
| **4** | Knowledge | 0.000000 | 0.000000 | 0.032258 | 0.000000 | 0.000000 | 0.000000 | 0.000000 | 0.000000 | 0.0 |  |
|  | Park |  |  |  |  |  |  |  |  |  |  |
| **5** | Marysville | 0.000000 | 0.000000 | 0.000000 | 0.000000 | 0.000000 | 0.000000 | 0.000000 | 0.000000 | 0.2 |  |
| **6** | Nashwaaksis | 0.000000 | 0.000000 | 0.052632 | 0.052632 | 0.052632 | 0.000000 | 0.000000 | 0.000000 | 0.0 |  |
| **7** | New | 0.000000 | 0.000000 | 0.000000 | 0.000000 | 0.000000 | 0.000000 | 0.000000 | 0.250000 | 0.0 |  |
|  | Maryland |  |  |  |  |  |  |  |  |  |  |
| **8** | Skyline | 0.000000 | 0.000000 | 0.000000 | 0.000000 | 0.000000 | 0.000000 | 0.000000 | 0.250000 | 0.0 |  |
|  | Acres |  |  |  |  |  |  |  |  |  |  |
| **9** | University of | 0.100000 | 0.000000 | 0.000000 | 0.000000 | 0.000000 | 0.000000 | 0.200000 | 0.000000 | 0.0 |  |
| New |  |
|  | Brunswick |  |  |  |  |  |  |  |  |  |  |



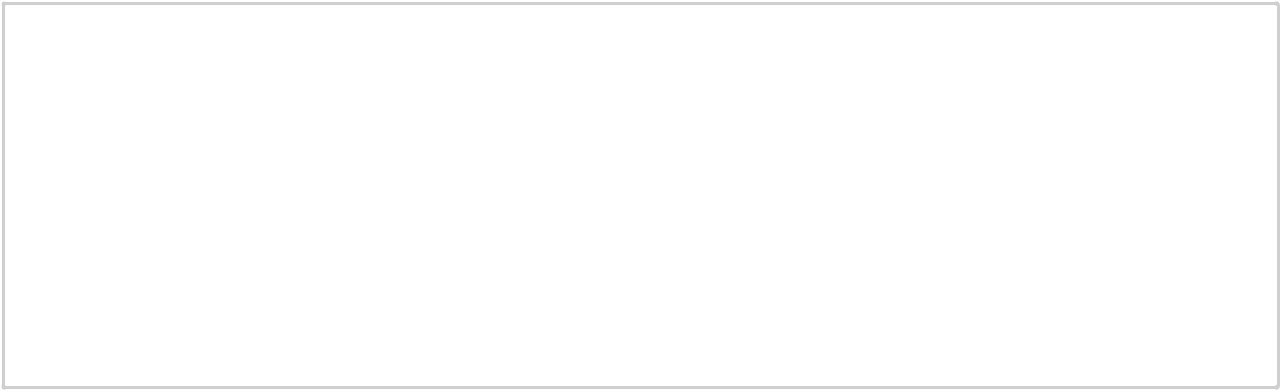
**In [116]: freddy\_grouped.shape**

**Out[116]: (10, 74)**

**Print each Location with the top 5 most common venues**

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**In [117]: num\_top\_venues = 5**

**for hood in freddy\_grouped['Location']:**

**print("----"+hood+"----")**

**temp = freddy\_grouped[freddy\_grouped['Location'] == hood].T.reset\_index()**

**temp.columns = ['venue','freq']**

**temp = temp.iloc[1:]**

**temp['freq'] = temp['freq'].astype(float)**

**temp = temp.round({'freq': 2})**

**print(temp.sort\_values('freq', ascending=False).reset\_index(drop=True).head(num \_top\_venues))**

**print('\n')**

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**----Devon----**

**venue freq**

* **Fast Food Restaurant 0.17**

**1Coffee Shop 0.08**

**2Grocery Store 0.08**

**3Seafood Restaurant 0.08**

**4Skating Rink 0.08**

**----Downtown----**

**venue freq**

* **Coffee Shop 0.10**
* **Pub 0.08**
* **Café 0.05 3 Restaurant 0.05**
* **Bar 0.05**

|  |  |  |
| --- | --- | --- |
| **----Fredericton Hill----** | | |
|  | **venue** | **freq** |
| **0** | **Bakery** | **0.18** |
| **1** | **Pizza Place** | **0.18** |
| **2** | **Hockey Arena** | **0.06** |
| **3** | **Smoke Shop** | **0.06** |
| **4** | **Ice Cream Shop** | **0.06** |

|  |  |  |
| --- | --- | --- |
| **----Hanwell----** | |  |
|  | **venue** | **freq** |
| **0** | **Coffee Shop** | **0.5** |
| **1** | **Rental Service** | **0.5** |
| **2** | **Art Gallery** | **0.0** |
| **3** | **Rental Car Location** | **0.0** |
| **4** | **Racetrack** | **0.0** |

**----Knowledge Park----**

**venue freq**

* **Fast Food Restaurant 0.13**

**1Clothing Store 0.10**

**2Liquor Store 0.06**

**3** **Restaurant** **0.06**

* **Furniture / Home Store 0.06**

|  |  |  |
| --- | --- | --- |
| **----Marysville----** | |  |
|  | **venue** | **freq** |
| **0** | **Coffee Shop** | **0.2** |
| **1** | **Pharmacy** | **0.2** |
| **2** | **Park** | **0.2** |
| **3** | **Baseball Stadium** | **0.2** |

* **Gas Station 0.2**

**----Nashwaaksis----**

**venue freq**

* **Farmers Market 0.11**

**1Sandwich Place 0.11**

**2Coffee Shop 0.11**

* **Fast Food Restaurant 0.11**

**4Beer Store 0.05**

**----New Maryland----**

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|  |  |  |
| --- | --- | --- |
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|  | **venue** | **freq** |
| **0** | **Fast Food Restaurant** | **0.25** |
| **1** | **Baseball Field** | **0.25** |
| **2** | **Gas Station** | **0.25** |
| **3** | **Dance Studio** | **0.25** |
| **4** | **Art Gallery** | **0.00** |

|  |  |  |
| --- | --- | --- |
| **----Skyline Acres----** | |  |
|  | **venue** | **freq** |
| **0** | **Chinese Restaurant** | **0.50** |
| **1** | **Hockey Arena** | **0.25** |
| **2** | **Baseball Field** | **0.25** |
| **3** | **Pet Store** | **0.00** |
| **4** | **Rental Service** | **0.00** |

|  |  |  |
| --- | --- | --- |
| **----University of New** | | **Brunswick----** |
|  | **venue** | **freq** |
| **0** | **Coffee Shop** | **0.2** |
| **1** | **Bar** | **0.2** |
| **2** | **Basketball Court** | **0.1** |
| **3** | **Gym** | **0.1** |
| **4** | **Grocery Store** | **0.1** |

**Now into a pandas dataframe**



**In [118]: def return\_most\_common\_venues(row, num\_top\_venues):**

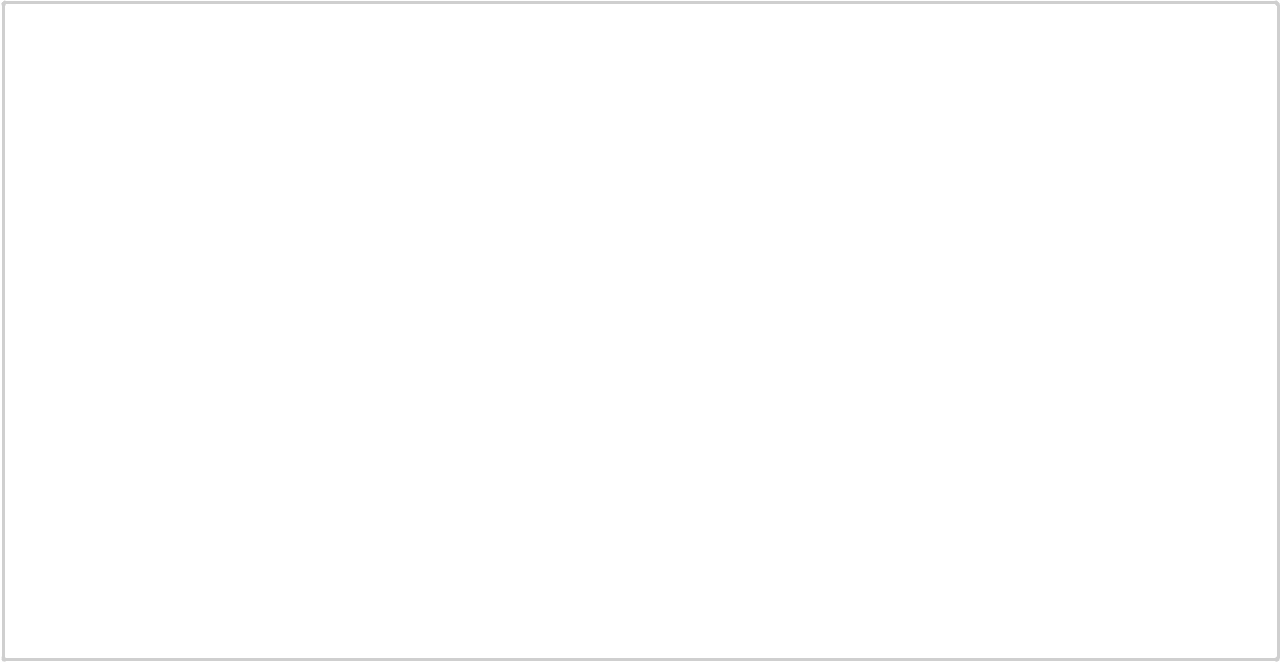
**row\_categories = row.iloc[1:]**

**row\_categories\_sorted = row\_categories.sort\_values(ascending=False)**

**return row\_categories\_sorted.index.values[0:num\_top\_venues]**

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**In [119]: num\_top\_venues = 10**

**indicators = ['st', 'nd', 'rd']**

* ***create columns according to number of top venues* columns = ['Location']**

**for ind in np.arange(num\_top\_venues): try:**

**columns.append('{}{} Most Common Venue'.format(ind+1, indicators[ind])) except:**

**columns.append('{}th Most Common Venue'.format(ind+1))**

* ***create a new dataframe***

**location\_venues\_sorted = pd.DataFrame(columns=columns)**

**location\_venues\_sorted['Location'] = freddy\_grouped['Location']**

**for ind in np.arange(freddy\_grouped.shape[0]):**

**location\_venues\_sorted.iloc[ind, 1:] = return\_most\_common\_venues(freddy\_grouped**

**.iloc[ind, :], num\_top\_venues)**

**location\_venues\_sorted**

**Out[119]:**

|  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  |  | **1st Most** | **2nd** | **3rd Most** | **4th Most** | **5th Most** | **6th Most** | **7th Most** | **8th Most** |  |  |
|  |  | **Most** |  |  |
|  | **Location** | **Common** | **Common** | **Common** | **Common** | **Common** | **Common** | **Common** |  |  |
|  | **Common** |  |  |
|  |  | **Venue** | **Venue** | **Venue** | **Venue** | **Venue** | **Venue** | **Venue** |  |  |
|  |  |  | **Venue** |  |  |  |  |  |  |  |  |
| **0** | Devon | Fast Food | Grocery | Smoke | Pharmacy | Coﬀee | Seafood | Park | Department |  |  |
|  |  | Restaurant | Store | Shop |  | Shop | Restaurant |  | Store |  |  |
| **1** | Downtown | Coﬀee | Pub | Bar | Café | Restaurant | Park | Pizza | Grocery |  |  |
| Shop | Place | Store |  |  |
|  |  |  |  |  |  |  |  |  |
| **2** | Fredericton | Bakery | Pizza | Hockey | Smoke | Hardware | Video Store | Ice Cream | Park | P |  |
| Hill | Place | Arena | Shop | Store | Shop |  |
|  |  |  |  |  |  |
| **3** | Hanwell | Rental | Coﬀee | Warehouse | Dance | Department | Discount | Electronics | Farmers | F |  |
| Service | Shop | Store | Studio | Store | Store | Store | Market | R |  |
|  |  |  |
| **4** | Knowledge | Fast Food | Clothing | Furniture / | Liquor | Restaurant | Warehouse | Shoe Store | Pet Store |  |  |
| Home |  |  |
|  | Park | Restaurant | Store | Store | Store |  | Store |  |  |  |  |
|  |  |  |  |  |  |  |  |  |  |  |
| **5** | Marysville | Baseball | Gas | Pharmacy | Park | Coﬀee | Gift Shop | Gastropub | Greek | F |  |
|  |  |
| Stadium | Station | Shop | Restaurant |  |  |
|  |  |  |  |  |  |  |  |
| **6** | Nashwaaksis | Coﬀee | Sandwich | Farmers | Fast Food | Gym | Spa | Electronics | Beer Store |  |  |
|  |  | Shop | Place | Market | Restaurant |  |  | Store |  |  |  |
| **7** | New | Gas | Dance | Fast Food | Baseball | Furniture / | Department | Discount | Electronics |  |  |
| Home |  |  |
|  | Maryland | Station | Studio | Restaurant | Field | Store | Store | Store | Store |  |  |
|  |  |  |  |  |  |  |  |  |  |  |
| **8** | Skyline | Chinese | Baseball | Hockey | Arts & | Coﬀee | Gym / |  | Grocery |  |  |
| Crafts | Fitness | Gym |  |  |
| Acres | Restaurant | Field | Arena | Shop | Store | R |  |
|  | Store | Center |  |  |
|  |  |  |  |  |  |  |  |  |  |
| **9** | University of |  | Coﬀee |  |  | Burger | Basketball | Grocery |  |  |  |
| New | Bar | Art Gallery | Pub | Gym |  |  |
| Shop | Joint | Court | Store |  |  |
|  | Brunswick |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |  |  |  |

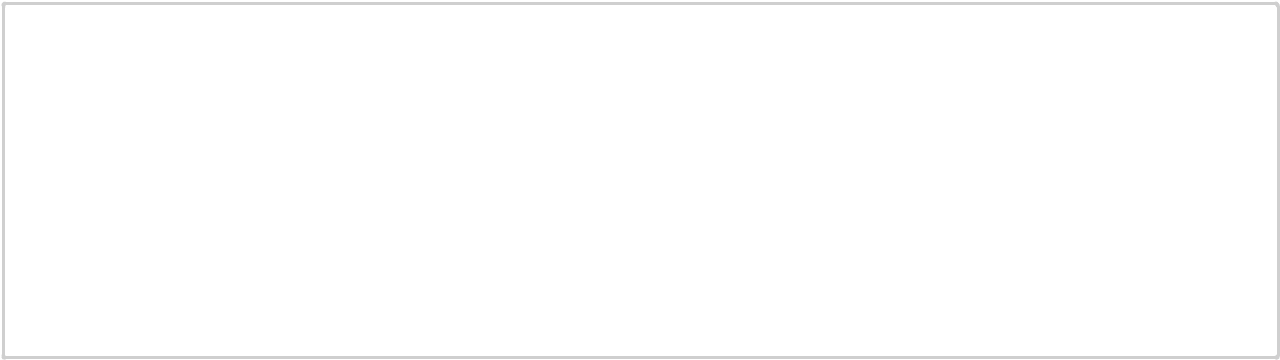


**Cluster Fredericton Locations**

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**Run k-means to cluster Locations into 5 clusters**



**In [120]: *# set number of clusters***

**kclusters = 5**

**freddy\_grouped\_clustering = freddy\_grouped.drop('Location', 1)**

***# run k-means clustering***

**kmeans = KMeans(n\_clusters=kclusters, random\_state=0).fit(freddy\_grouped\_clustering )**

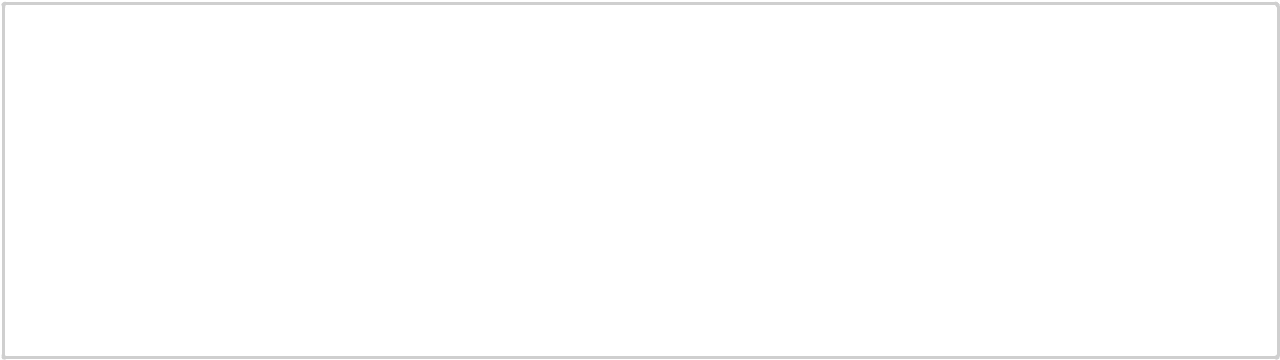
* ***check cluster labels generated for each row in the dataframe* kmeans.labels\_[0:10]**

**Out[120]: array([1, 1, 1, 0, 1, 4, 1, 3, 2, 1], dtype=int32)**

**Now creating a new dataframe including the cluster as well as the top 10 venues for each Location**

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**In [121]: freddy\_merged = location\_df**

***# add clustering labels***

**freddy\_merged['Cluster Labels'] = kmeans.labels\_**

* ***merge fredericton\_grouped with location df to add latitude/longitude for each loc ation***

**freddy\_merged = freddy\_merged.join(location\_venues\_sorted.set\_index('Location'), on ='Location')**

**freddy\_merged*# check the last columns!***

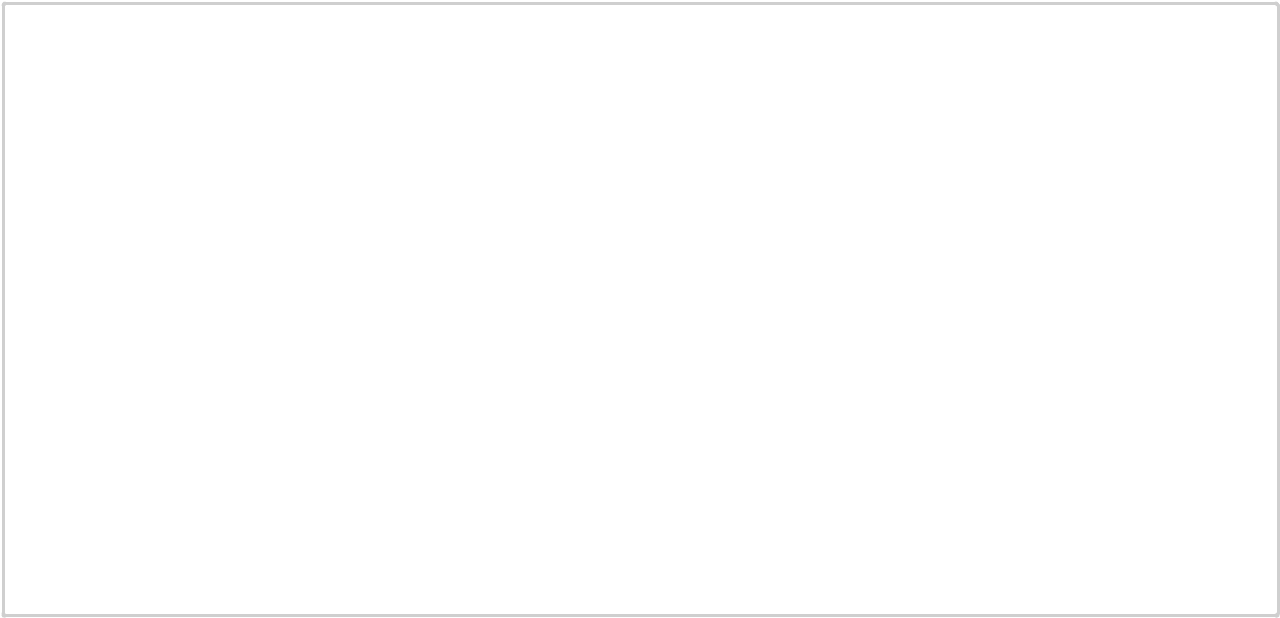
**Out[121]:**

|  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  |  |  |  |  | **1st Most** | **2nd** | **3rd Most** | **4th Most** | **5th Most** | **6th** |  |
|  | **Location** | **Latitude** | **Longitude** | **Cluster** | **Most** |  |
|  | **Common** | **Common** | **Common** | **Common** | **Com** |  |
|  |  |  |  | **Labels** | **Venue** | **Common** | **Venue** | **Venue** | **Venue** | **V** |  |
|  |  |  |  |  |  | **Venue** |  |  |  |  |  |
| **0** | Knowledge | 45.931143 | -66.652700 | 1 | Fast Food | Clothing | Furniture / | Liquor | Restaurant | Wareh |  |
| Home |  |
|  | Park |  |  |  | Restaurant | Store | Store | Store |  |  |  |
|  |  |  |  |  |  |  |  |  |  |  |
| **1** | Fredericton | 45.948512 | -66.656045 | 1 | Bakery | Pizza | Hockey | Smoke | Hardware | Video |  |
|  | Hill |  |  |  |  | Place | Arena | Shop | Store |  |  |
| **2** | Nashwaaksis | 45.983382 | -66.644856 | 1 | Coﬀee | Sandwich | Farmers | Fast Food | Gym |  |  |
| Shop | Place | Market | Restaurant |  |  |
|  |  |  |  |  |  |  |  |
| **3** | University of |  |  |  |  | Coﬀee |  |  | Burger | Bask |  |
| New | 45.948121 | -66.641406 | 0 | Bar | Art Gallery | Pub |  |
| Shop | Joint |  |  |
|  | Brunswick |  |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |  |  |  |
| **4** | Devon | 45.968802 | -66.622738 | 1 | Fast Food | Grocery | Smoke | Pharmacy | Coﬀee | Sea |  |
| Restaurant | Store | Shop | Shop | Resta |  |
| **5** | New | 45.892795 | -66.683673 | 4 | Gas | Dance | Fast Food | Baseball | Furniture / | Depart |  |
| Home |  |
|  | Maryland |  |  |  | Station | Studio | Restaurant | Field | Store |  |  |
|  |  |  |  |  |  |  |  |  |  |  |
| **6** | Marysville | 45.978913 | -66.589491 | 1 | Baseball | Gas | Pharmacy | Park | Coﬀee | Gift |  |
| Stadium | Station | Shop |  |
|  |  |  |  |  |  |  |  |  |
| **7** | Skyline | 45.931827 | -66.640339 | 3 | Chinese | Baseball | Hockey | Arts & | Coﬀee | G |  |
| Crafts | Fi |  |
|  | Acres |  |  |  | Restaurant | Field | Arena | Store | Shop | C |  |
|  |  |  |  |  |  |  |  |  |  |
| **8** | Hanwell | 45.902315 | -66.755113 | 2 | Rental | Coﬀee | Warehouse | Dance | Department | Disc |  |
| Service | Shop | Store | Studio | Store |  |  |
|  |  |  |  |  |  |  |
| **9** | Downtown | 45.958327 | -66.647211 | 1 | Coﬀee | Pub | Bar | Café | Restaurant |  |  |
| Shop |  |  |
|  |  |  |  |  |  |  |  |  |  |  |



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**In [122]: *# create map***

**map\_clusters = folium.Map(location=[latitude, longitude], zoom\_start=11)**

* ***set color scheme for the clusters* x = np.arange(kclusters)**

**ys = [i+x+(i\*x)\*\*2 for i in range(kclusters)]**

**colors\_array = cm.rainbow(np.linspace(0, 1, len(ys))) rainbow = [colors.rgb2hex(i) for i in colors\_array]**

* ***add markers to the map***

**markers\_colors = []**

**for lat, lon, poi, cluster in zip(freddy\_merged['Latitude'], freddy\_merged['Longitu de'], freddy\_merged['Location'], freddy\_merged['Cluster Labels']):**

**label = folium.Popup(str(poi) + ' Cluster ' + str(cluster), parse\_html=True) folium.CircleMarker([lat, lon], radius=5,popup=label,color=rainbow[cluster-1],f**

**ill=True,fill\_color=rainbow[cluster-1],**

**fill\_opacity=0.7).add\_to(map\_clusters)**

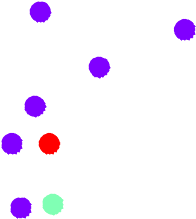
**map\_clusters**

**Out[122]:**



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~~−~~



[Leaflet (http://leafletjs.com)](http://leafletjs.com/)



**In [ ]:**

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