Capstone Project Final Report

Neighbourhood Analysis in Scarborough, Toronto

Introduction

Lots of people are migrating to various states of Canada. People need to do a lot of research to select a good neighbourhood. The main factors they may consider will be affordable housing prices, reputed highly rated schools, weather conditions, ease of essential services like grocery shops, medical shops, hospitals, supermarket etc. Some may even have preferences for malls, theatres, likeminded people, commute facilities etc.

This project is aimed to help those people migrating to a new city, state, country or place for their work or to start a new fresh life, explore these different facilities around their neighbourhood and make smart decisions based on that. The neighbourhoods of Scarborough, Toronto is used as an example here which can be even extended to any other city or state.

Problem Statement

The major purpose of this project, is to suggest a better neighbourhood in a new city for the people who are migrating there. This project mainly explores the average housing prices, good schools and common venues.

The place we are analysing here is Scarborough, Toronto which is a popular destination for new immigrants in Canada to reside. As a result, it is one of the most diverse and multicultural areas in the Greater Toronto Area, being home to various religious groups and places of worship. Although immigration has become a hot topic over the past few years with more governments seeking more restrictions on immigrants and refugees, the general trend of immigration into Canada has been one of on the rise.

So in this project, I am assuming that I am part of a Data Science Team who will analyse and recommend the good location for the person who is going to migrate to this place i.e. the objective is to locate and recommend of Toronto will be best choice to start their living

Target Audience

This project is mainly intended to companies who are helping people migrate for their living or start a business in Scarborough, Toronto. The approach used here can be replicated to do the analysis on any city in any country.

Data description

The city analysed in this project is Scarborough, Toronto. The following data set is used for the analysis of the same.

https://en.wikipedia.org/wiki/List_of_postal_codes_of_Canada:_M

This is a list of postal codes in Canada where the first letter is M. Postal codes beginning with M are located within the city of Toronto in the province of Ontario.

Foursquare API Data

We will need data about different venues in different neighbourhoods of that specific borough. In order to gain that information, we will use "Foursquare" locational information. Foursquare is a location data provider with information about all manner of venues and events within an area of interest. Such information includes venue names, locations, menus and even photos. As such, the foursquare location platform will be used as the sole data source since all the stated required information can be obtained through the API.

After finding the list of neighbourhoods, we then connect to the Foursquare API to gather information about venues inside each and every neighbourhood. For each neighbourhood, we have chosen the radius to be 100 meter.

The data retrieved from Foursquare contains information of venues within a specified distance of the longitude and latitude of the postcodes. The information obtained per venue is as follows:

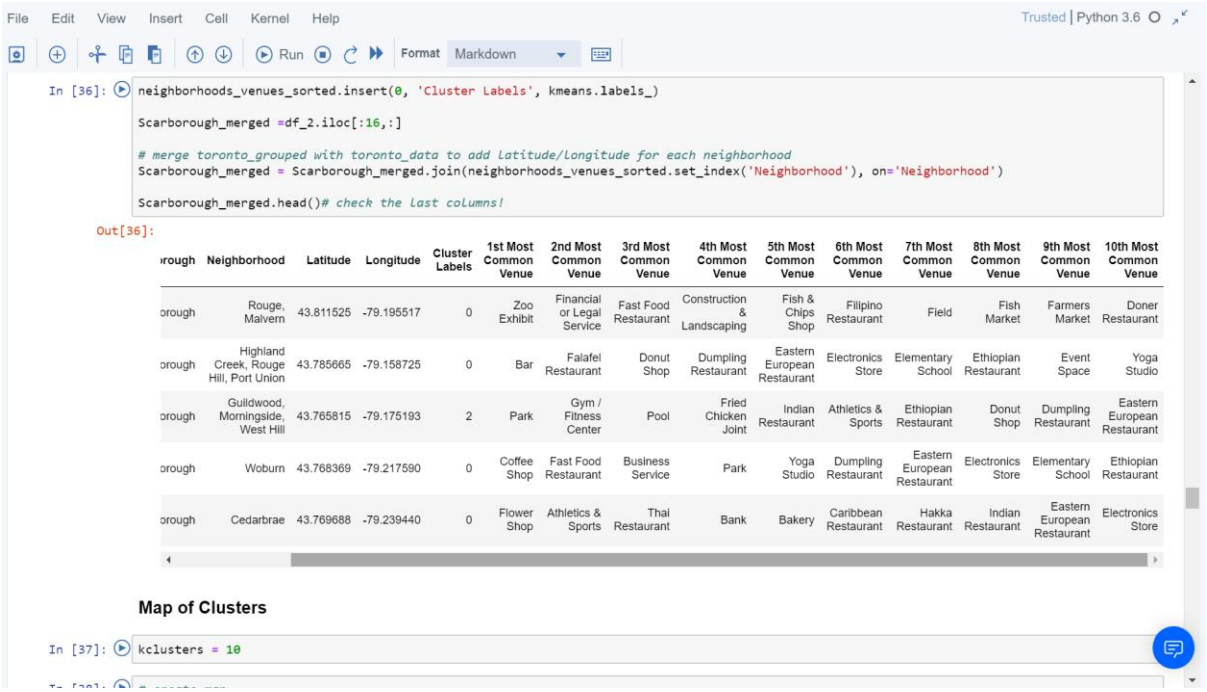
1. Neighbourhood
2. Neighbourhood Latitude
3. Neighbourhood Longitude
4. Venue
5. Name of the venue e.g. the name of a store or restaurant
6. Venue Latitude
7. Venue Longitude
8. Venue Category

Methodology Section

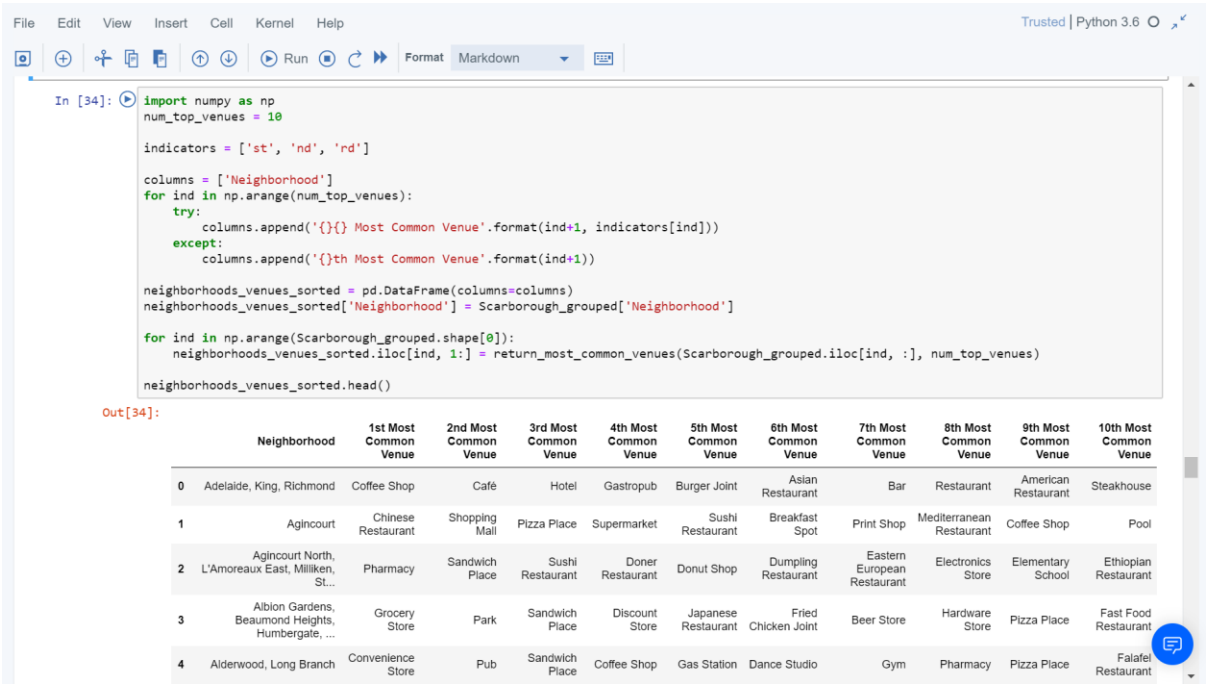
Clustering Approach:

To compare the similarities of two cities, we decided to explore neighborhoods, segment them, and group them into clusters to find similar neighborhoods in a big city like New York and Toronto. To be able to do that, we need to cluster data which is a form of unsupervised machine learning: k-means clustering algorithm.

Using K-Means Clustering Approach



Most Common venues near Neighbourhood



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Run Format Markdown

In [34]:

```
import numpy as np
num_top_venues = 10

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

columns = ['Neighborhood']
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))

neighborhoods_venues_sorted = pd.DataFrame(columns=columns)
neighborhoods_venues_sorted['Neighborhood'] = Scarborough_grouped['Neighborhood']

for ind in np.arange(Scarborough_grouped.shape[0]):
    neighborhoods_venues_sorted.iloc[ind, 1:] = return_most_common_venues(Scarborough_grouped.iloc[ind, :], num_top_venues)

neighborhoods_venues_sorted.head()
```

Out[34]:

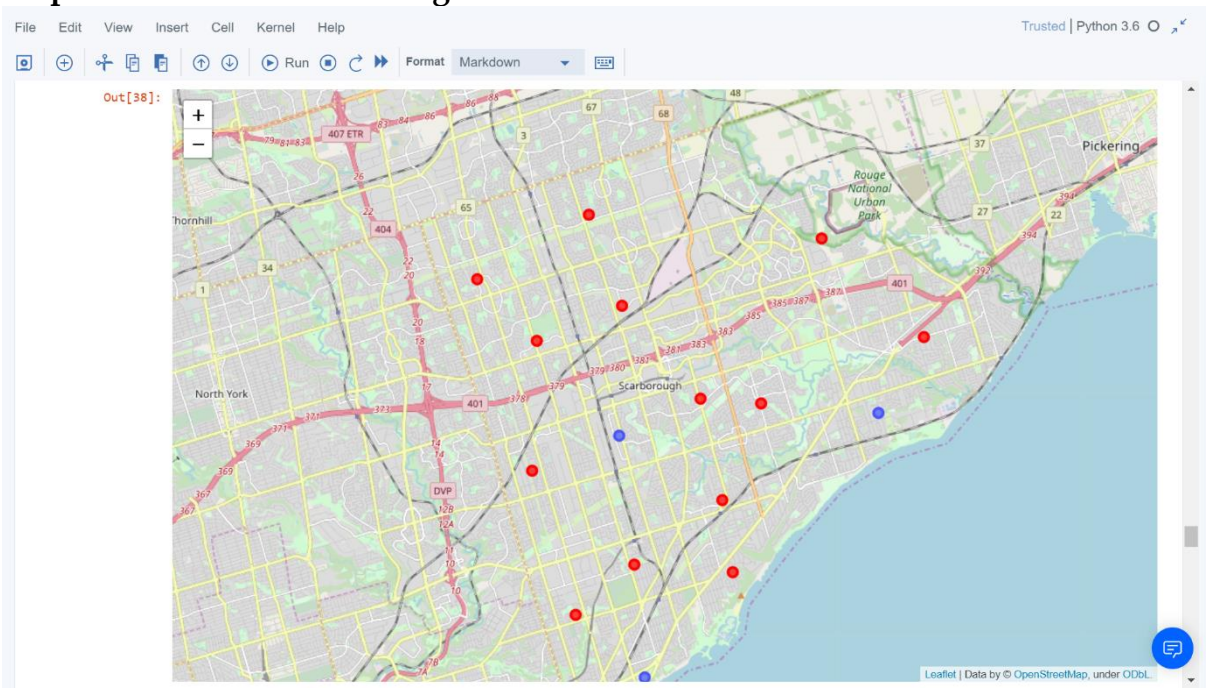
	Neighborhood	1st Most Common Venue	2nd Most Common Venue	3rd Most Common Venue	4th Most Common Venue	5th Most Common Venue	6th Most Common Venue	7th Most Common Venue	8th Most Common Venue	9th Most Common Venue	10th Most Common Venue
0	Adelaide, King, Richmond	Coffee Shop	Café	Hotel	Gastropub	Burger Joint	Asian Restaurant	Bar	Restaurant	American Restaurant	Steakhouse
1	Agincourt	Chinese Restaurant	Shopping Mall	Pizza Place	Supermarket	Sushi Restaurant	Breakfast Spot	Print Shop	Mediterranean Restaurant	Coffee Shop	Pool
2	Agincourt North, L'Amoreaux East, Milliken, St...	Pharmacy	Sandwich Place	Sushi Restaurant	Doner Restaurant	Donut Shop	Dumpling Restaurant	Eastern European Restaurant	Electronics Store	Elementary School	Ethiopian Restaurant
3	Albion Gardens, Beaumond Heights, Humbergate, ...	Grocery Store	Park	Sandwich Place	Discount Store	Japanese Restaurant	Fried Chicken Joint	Beer Store	Hardware Store	Pizza Place	Fast Food Restaurant
4	Alderwood, Long Branch	Convenience Store	Pub	Sandwich Place	Coffee Shop	Gas Station	Dance Studio	Gym	Pharmacy	Pizza Place	Falafel Restaurant

Work Flow:

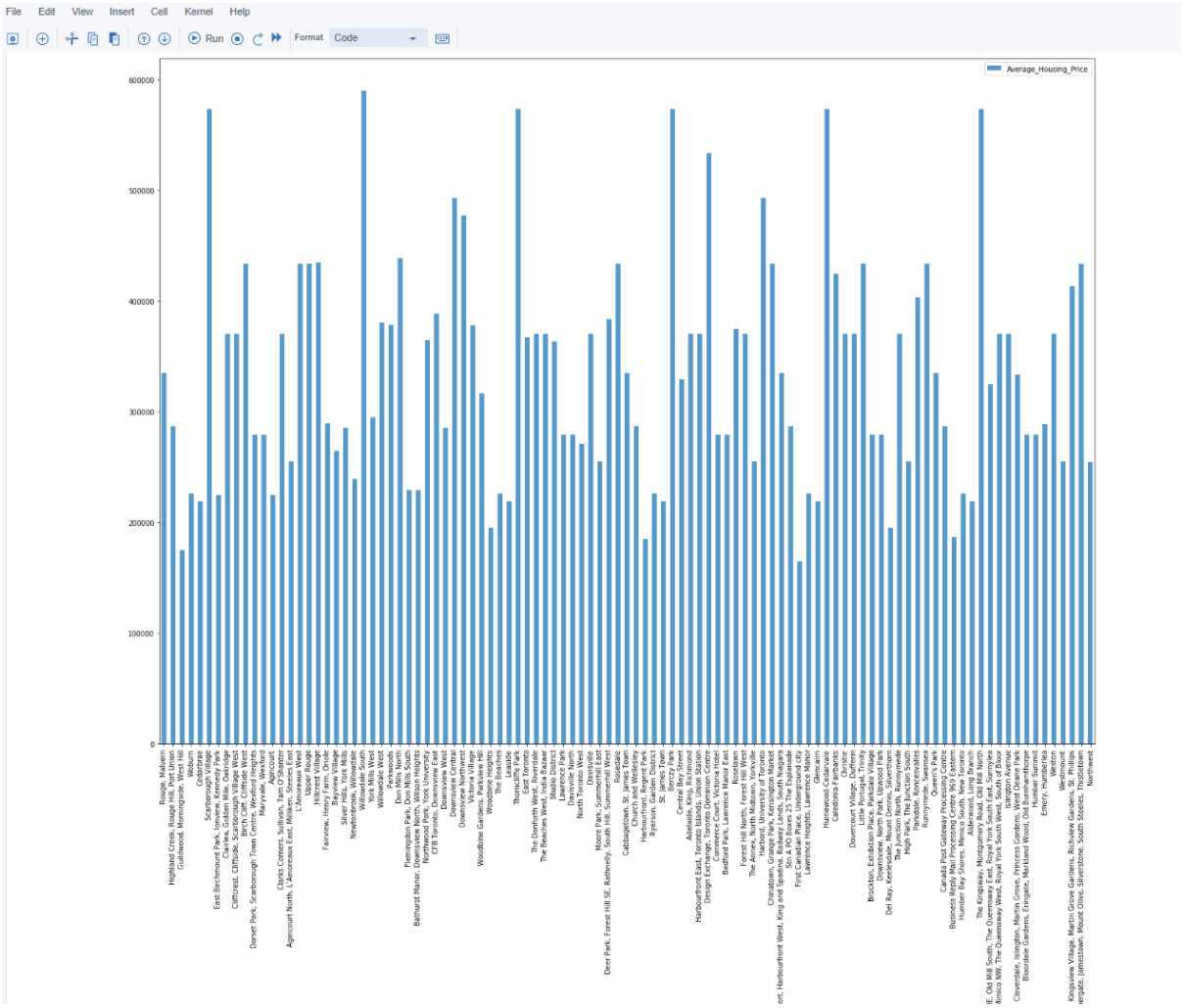
Using credentials of Foursquare API features of near-by places of the neighbourhoods would be mined. Due to http request limitations the number of places per neighbourhood parameter would reasonably be set to 100 and the radius parameter would be set to 500.

Results Section

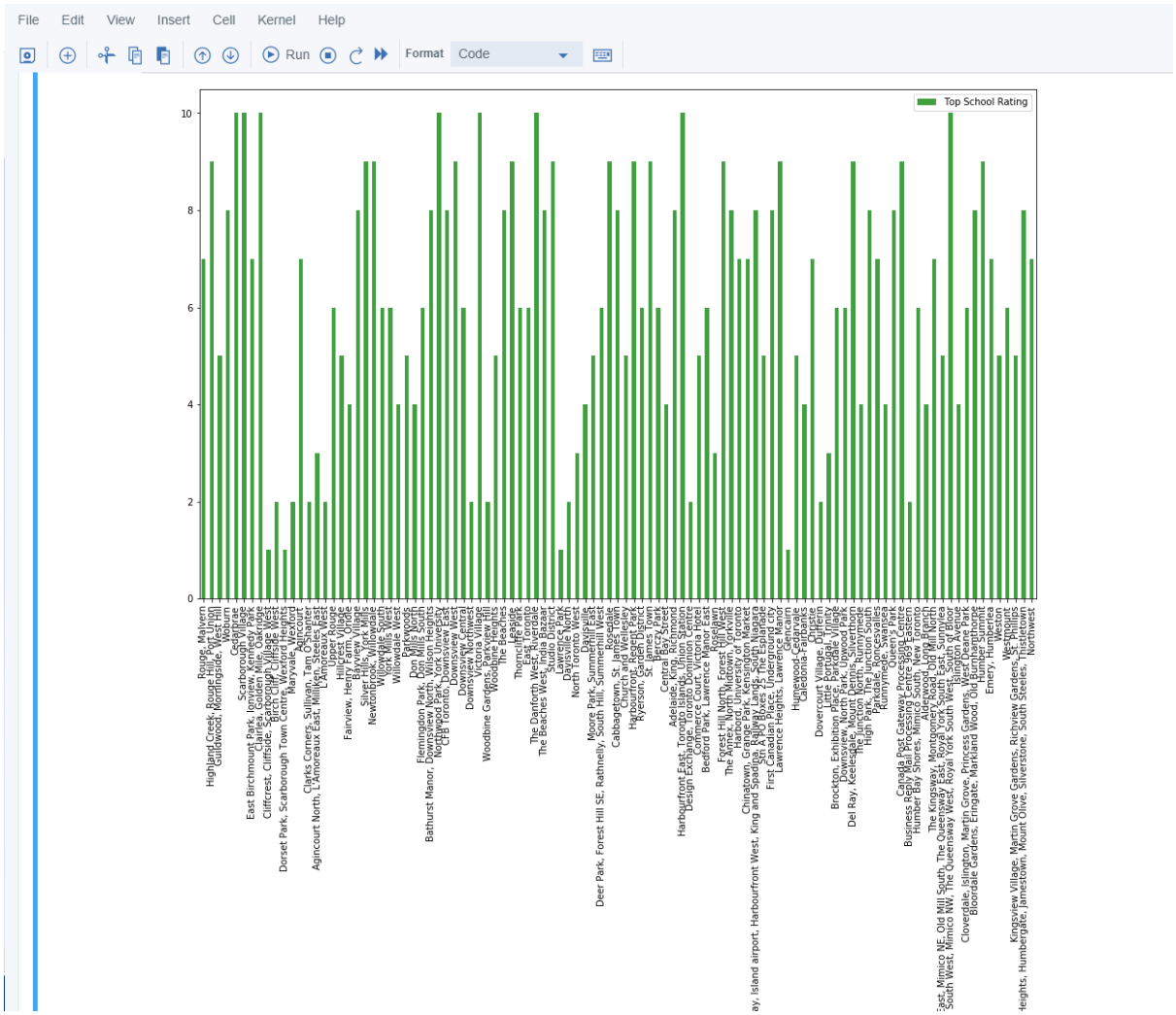
Map of Clusters in Scarborough



Average Housing Price by Clusters in Scarborough



School Ratings by Clusters in Scarborough



Discussion Section

The major purpose of this project, is to suggest a better neighbourhood in a new city for the person who are shifting there. Social presence in society in terms of like-minded people. Connectivity to the airport, bus stand, city centre, markets and other daily needs things nearby.

1. Sorted list of houses in terms of housing prices in a ascending or descending order
2. Sorted list of schools in terms of location, fees, rating and reviews

Conclusion Section

In this project, using k-means cluster algorithm I separated the neighbourhood into 10(Ten) different clusters and for 103 different latitude and longitude from dataset, which have very-similar neighbourhoods around them. Using the charts above results presented to a particular neighbourhood based on average house prices and school rating have been made.

I feel rewarded with the efforts and believe this course with all the topics covered is well worthy of appreciation. This project has shown me a practical application to resolve a real situation that has impacting personal and financial impact using Data Science tools. The mapping with Folium is a very powerful technique to consolidate information and make the analysis and decision better with confidence.

Future Scope

This project can be continued for making it more precise in terms to find best house in Scarborough. Best means on the basis of all required things (daily needs or things we need to live a better life) around and also in terms of cost effective.

Libraries Which are Used to Develop the Project:

Pandas: For creating and manipulating data frames.

Folium: Python visualization library would be used to visualize the neighbourhoods cluster distribution of using interactive leaflet map.

Scikit Learn: For importing k-means clustering.

JSON: Library to handle JSON files.

XML: To separate data from presentation and XML stores data in plain text format.

Geocoder: To retrieve Location Data.

Beautiful Soup and Requests: To scrap and library to handle http requests.

Matplotlib: Python Plotting Module.