Project Report-The Battle of Neighborhoods

Final Project-The Battle of Neighborhoods - Look for a nice resident in Downtown Toronto

1. Introduction:

Business Problem:
As we know a lot of people have being migrating to Canada for better study and career opportunities but since they are not local residents of Canada they are unaware of various locations, places in Canada. Specifically when it comes to looking for a nice and better place to live.

Target Audience:
Immigrants to Canada who are not familiar with Canada and are looking for better place to reside.
This project is aimed at solving this by providing a better way to explore and find various neighborhood based on various factors like access to nearby supermarket, grocery stores, malls, average housing price, school ratings. It will provide all results and information via an interactive map and bar charts making it easier for end user.

2. Data Section:

Source Data:
For this project we will be focusing only on Downtown Toronto area which is a popular destination for new immigrants moving to Canada. To fetch data we have referred to following source https://en.wikipedia.org/wiki/List_of_postal_codes_of_Canada:_M

This data contains Postal codes, Borough and Neighborhood

Postalcode	Borough	Neighborhood
M1B	Scarborough	Malvern, Rouge
M1C	Scarborough	Rouge Hill, Port Union, Highland Creek
M1E	Scarborough	Guildwood, Morningside, West Hill
M1G	Scarborough	Woburn
M1H	Scarborough	Cedarbrae

Libraries Used:
- Pandas: Standard library for all required dataframes operations.
- Scikit Learn: to import K-Means clustering.
- Matplotlib: to plot bar charts.
- Folium: To visualize cluster distribution of neighborhoods using interactive leaflet map.
- Beautiful Soup: To fetch and handle http requests operations.
- JSON: For JSON files operations.
- XML: To fetch data from XML and store it in dataframe.
- Geocoder: To fetch location coordinates.

3. Methodology Section

Following methods and approaches are used to get required results

- **Foursquare API:** Since above data only has limited information we will be using popular location data provider Foursquare's API to fetch information related nearby venues located inside each and every neighborhood. That would help us decide which of the neighborhood has better places and surroundings. Here we have used explore endpoint to get nearby venues names and coordinates.

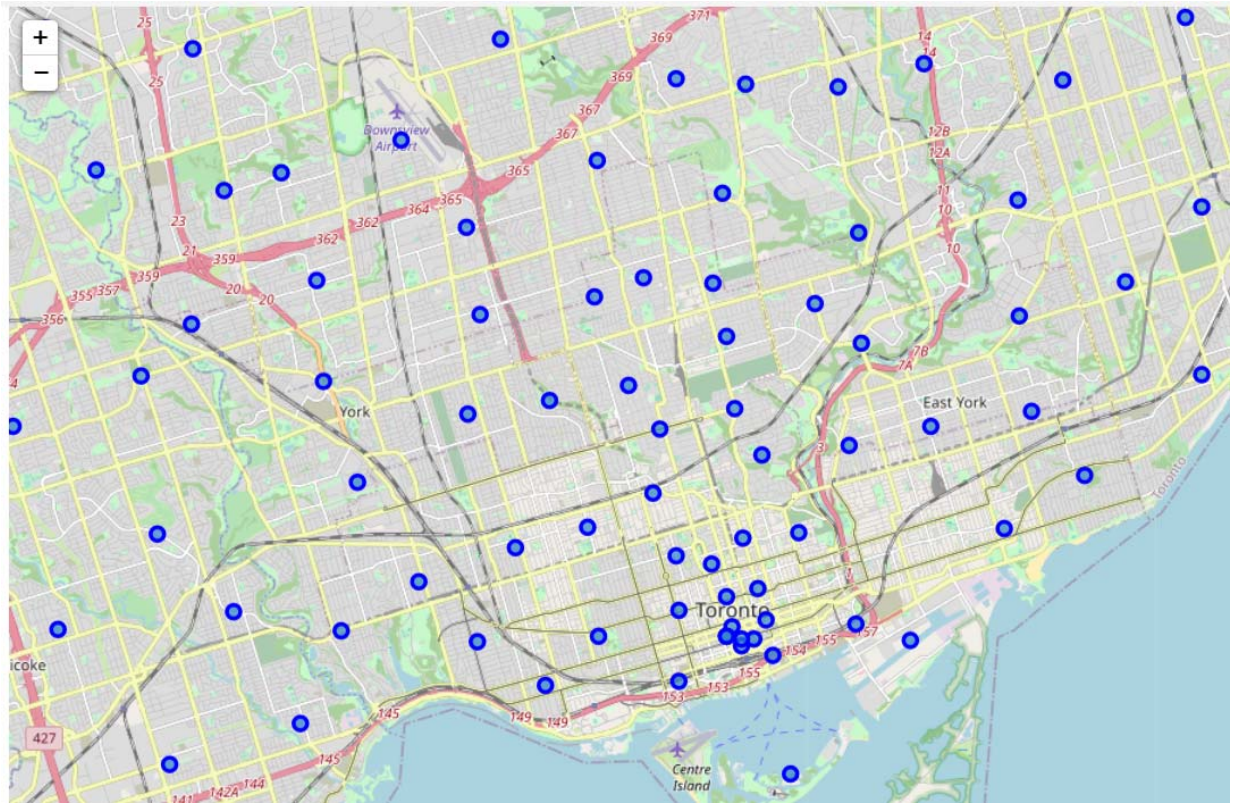
```
url = 'https://api.foursquare.com/v2/venues/explore?&client_id={}&client_secret={}&v={}&ll={},{}&radius={}&limit={}'
    CLIENT_ID,
    CLIENT_SECRET,
    VERSION,
    lat,
    lng,
    radius,
    LIMIT)
```

- One hot encoding technique and clustering to segment neighborhoods and group them into common clusters
- K-Means clustering to split nearby neighborhood into 3 clusters and find most common venues near neighborhood

	Postalcode	Borough	Neighborhood	Latitude	Longitude	Cluster Labels	1st Most Common Venue	2nd Most Common Venue	3rd Most Common Venue	4th Most Common Venue	5th Most Common Venue	C
0	M1B	Scarborough	Malvern, Rouge	43.808626	-79.189913	2	Park	Trail	Women's Store	Eastern European Restaurant	Dive Bar	
1	M1C	Scarborough	Rouge Hill, Port Union, Highland Creek	43.785779	-79.157368	0	Bar	History Museum	Park	Fish & Chips Shop	Convenience Store	C
2	M1E	Scarborough	Guildwood, Morningside, West Hill	43.765806	-79.185284	1	Pizza Place	Bank	Grocery Store	Coffee Shop	Park	Re

4. Results Section

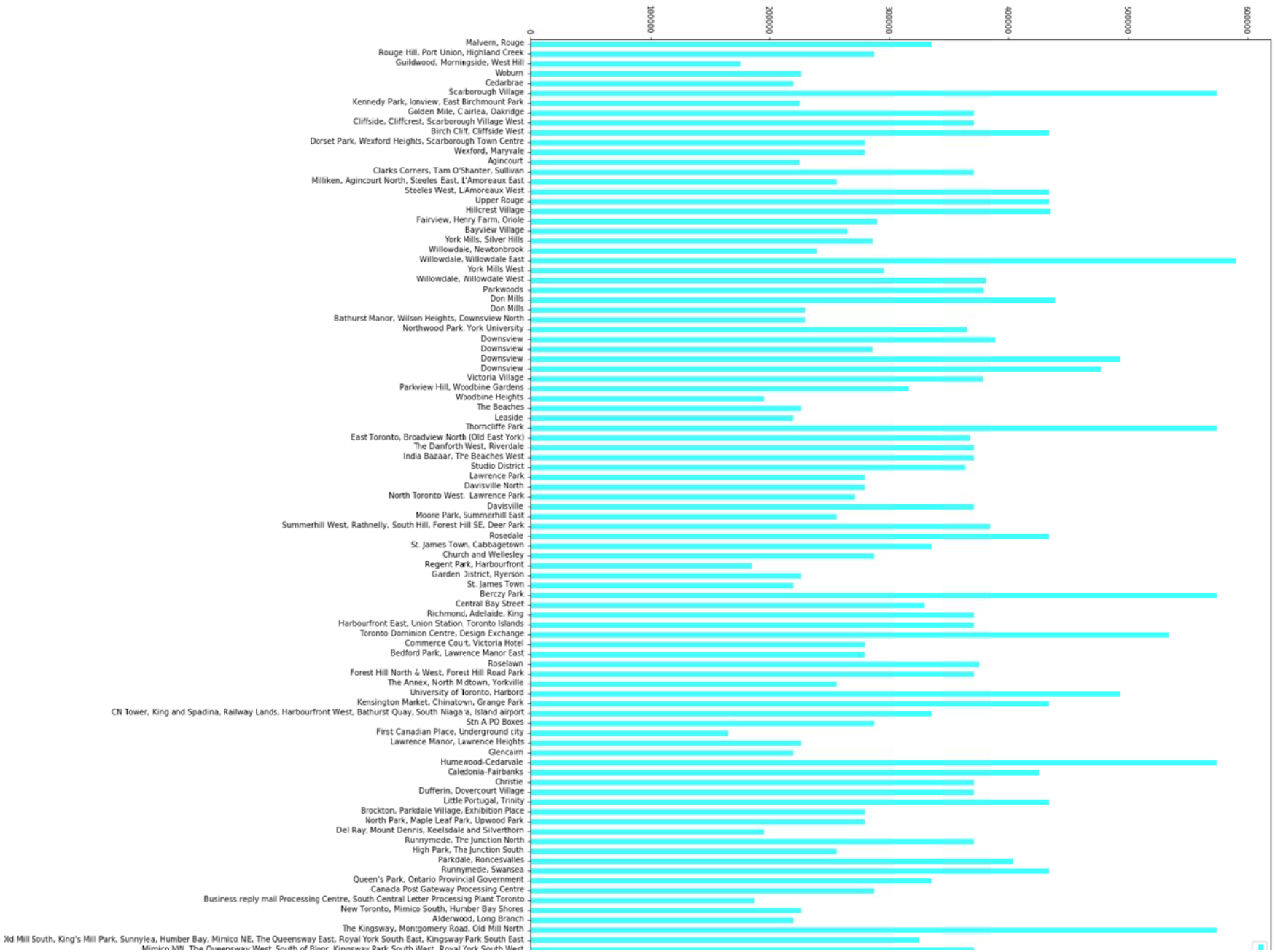
- Neighborhoods Segmented into clusters over Downtown Toronto area



- School Ratings by Clusters in Downtown Toronto Area

Top School Rating
0
2
4
6
8
10
Malvern, Rouge
Rouge Hill, Port Union, Highland Creek
Guildwood, Morningside, West Hill
Woburn
Cedarbrae
Scarborough Village
Kennedy Park, Ionview, East Birchmount Park
Golden Mile, Clairlea, Oakridge
Cliffside, Cliffcrest, Scarborough Village West
Dorset Park, Wexford Heights, Scarborough Town Centre
Wexford, Maryvale
Agincourt
Clarks Corners, Tam O'Shanter, Sullivan
Milliken, Agincourt North, Steeles East, L'Amoreaux East
Steeles West, L'Amoreaux West
Upper Rouge
Hillcrest Village
Fairview, Henry Farm, Oriole
Bayview Village
York Mills, Silver Hills
Willowdale, Newtonbrook
Willowdale, York Mills East
Willowdale, Willowdale West
Parkwoods
Don Mills
Don Mills
Bathurst Manor, Wilson Heights, Downsview North
Northwood Park, York University
Downsview
Downsview
Downsview
Victoria Village
Parkview Hill, Woodbine Gardens
Woodbine Heights
The Beaches
Leaside
Thorncliffe Park
East Toronto, Broadview North (Old East York)
The Danforth West, Riverdale
India Bazaar, The Beaches West
Studio District
Davisville North
Davisville
North Toronto West, Lawrence Park
Davisville
Moore Park, Summerhill East
Summerhill West, Rathnelly, South Hill, Forest Hill SE, Deer Park
Rosedale
St. James Town, Cabbagetown
Church and Wellesley
Regent Park, Harbourfront
Garden District, Ryerson
St. James Town
Berczy Park
Central Bay Street
Richmond, Adelaide, King
Harbourfront East, Union Station, Toronto Islands
Toronto Dominion Centre, Design Exchange
Commerce Court, Victoria Hotel
Bedford Park, Lawrence Manor East
Roselawn
Forest Hill North & West, Forest Hill Road Park
The Annex, North Midtown, Yorkville
University of Toronto, Harbord
Kensington Market, Chinatown, Grange Park
CN Tower, King and Spadina, Railway Lands, Harbourfront West, Bathurst Quay, South Niagara, Island airport
Stn A PO Boxes
First Canadian Place, Underground city
Lawrence Manor, Lawrence Heights
Glencairn
Humewood-Cedarvale
Caledonia-Fairbanks
Christie
Dufferin, Doyercourt Village
Little Portugal, Trinity
Brockton, Parkdale Village, Exhibition Place
North Park, Maple Leaf Park, Woodbine Park
Del Ray, Mount Dennis, Keelsdale and Eglinton West
Runnymede, The Junction North
High Park, The Junction South
Parkdale, Roncesvalles
Runnymede, Swansea
Queen's Park, Ontario Provincial Government
Little Portugal, Trinity
Business reply mail Processing Centre, South Central Letter Processing Plant
New Toronto, Mimico South, Humber Bay Shores
Alderwood, Long Branch
The Kingsway, Montgomery Road, Old Mill North
Old Mill South, King's Mill Park, Sunnylea, Humber Bay, Mimico NE, The Queensway East, Royal York South East, Kingsway Park South East
Mimico NW, The Queensway West, South of Bloor, Kingsway Park South West, Royal York South West
West Deane Park, Princess Gardens, Martin Grove, Islington, Cloverdale
Eringate, Bloordale Gardens, Old Burnhamthorpe, Markland Wood
Humber Summit
Humberlea, Emery
Weston
Westmount
Kingsview Village, St. Phillips, Martin Grove Gardens, Richview Gardens
South Steeles, Silverstone, Humbergate, Jamestown, Mount Olive, Beaumond Heights, Thistletown, Albion Gardens
Northwest, West Humber, Clairville
Neighborhood

- Average Housing Price by Clusters in Downtown Toronto Area


0
100000
200000
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Rouge Hill, Port Union, Highland Creek
Guildwood, Morningside, West Hill
Woburn
Cedarbrae
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Kennedy Park, Ionview, East Birchmount Park
Golden Mile, Clairlea, Oakridge
Cliffside, Cliffcrest, Scarborough Village West
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Mimico NW, The Queensway West, South of Bloor, Kingsway Park South West, Royal York South West

5. Discussion Section

Based on above results and findings I observed

- House prices should be the major contributing factor in decision as opposed to School ratings.
- If we observe carefully, house price in certain neighborhood is extremely high (above 500000) but lowest price is around 200000 which could be due to quick access of metro stations, expensive restaurants nearby and vice versa.
- School ratings ranges goes from 1 to 10 which is very wide range and most often schools with high rates are located in most expensive places which could also be one of deciding factors in House prices. So, neighborhoods with schools will probably have more demand and more price.

6. Conclusion Section

- Based on above discussed points and observations it would be best to first shortlisted neighborhoods based on specific price ranges say, 270000 to 320000.
- Then one by one eliminate those neighborhoods with School ratings below 5.
- Then ranking remaining neighborhoods first by lowest price and then by highest School rating and based on it pick your desired neighborhood.