Capstone Project: The Battle of Neighborhoods

Opening a Sporting Goods Shop in Toronto

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Introduction / Business problem:

Goal:

- Finding potential locations for opening a sporting goods shop in a shopping mall or shopping plaza in Toronto

Criterion:

- Neighborhoods with more sport venues are more attractive
- Neighborhoods with existing sporting goods shop are not suitable
- Customer wants to open the new shop in a shopping mall or shopping plaza
- Neighborhoods with more shopping plazas or shopping malls are more attractive

Audience of project:

- distributors of sports goods that are interested in opening new shops in the Toronto.

Data Description:

- Data of Toronto neighborhoods:
  https://en.wikipedia.org/wiki/List_of_postal_codes_of_Canada:_M

- Geographical information of Toronto neighborhoods:
  https://cocl.us/Geospatial_data

- Foursquare API to obtain venues

Methodology:

1. Collect and organize data about different neighborhoods of Toronto including their longitude, latitude, borough, and postal code

2. Use Foursquare to collect data for each neighborhood about available venues related to Sport, Shopping centers, and existing sporting goods shops.

3. Preprocess the data and perform exploratory data analysis to better explore and understand the data

4. Use K-Means clustering to cluster the neighborhoods based on the number of sporting venues and shopping centers

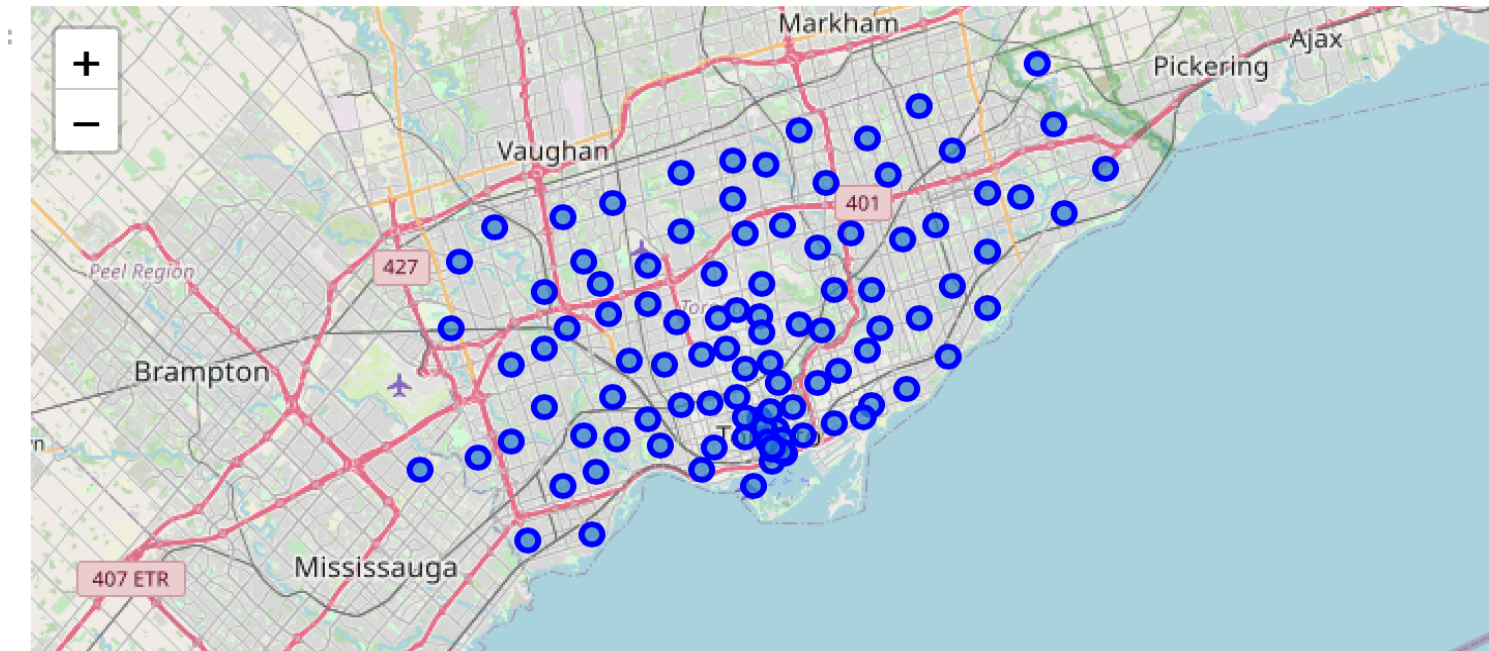5. Select the cluster of potential neighborhoods

Collecting and organizing the data:

- Neighborhood geographical data

	Postalcode	Borough	Neighborhood	Latitude	Longitude
0	M3A	North York	Parkwoods	43.753259	-79.329656
1	M4A	North York	Victoria Village	43.725882	-79.315572
2	M5A	Downtown Toronto	Regent Park, Harbourfront	43.654260	-79.360636
3	M6A	North York	Lawrence Manor, Lawrence Heights	43.718518	-79.464763
4	M7A	Downtown Toronto	Queen's Park, Ontario Provincial Government	43.662301	-79.389494

Collecting and organizing the data:

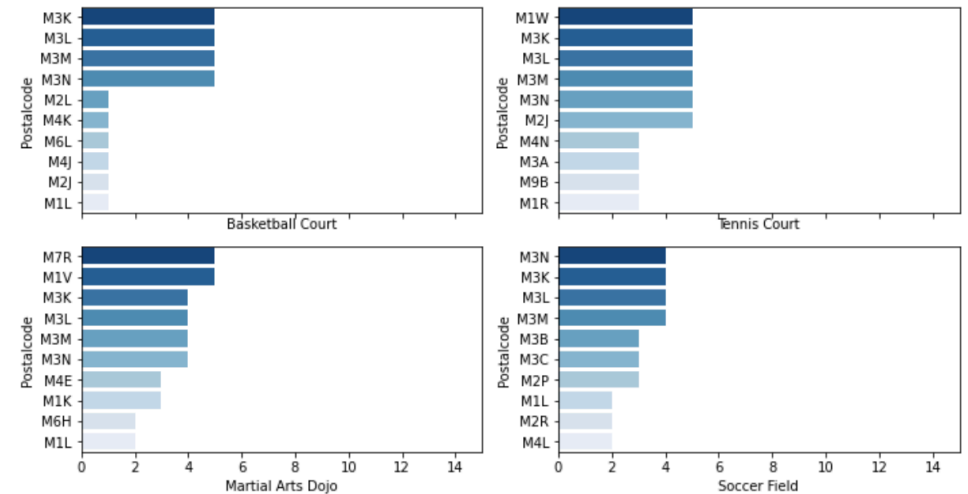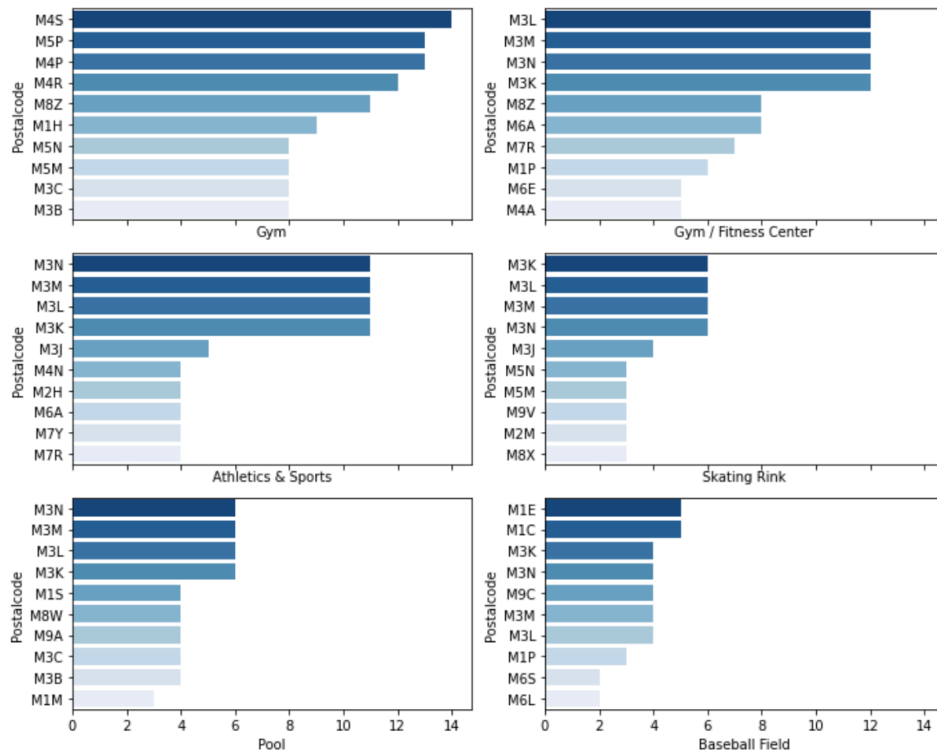- Neighborhood plotted on the Toronto map

Exploratory data analysis:

- Top 10 most popular sporting venues in Toronto

	count	mean	std	min	25%	50%	75%	max
Gym	98.0	4.265306	2.797462	0.0	2.0	4.0	5.0	14.0
Gym / Fitness Center	98.0	2.510204	2.057147	0.0	1.0	2.0	4.0	12.0
Athletics & Sports	98.0	1.418367	1.630404	0.0	0.0	1.0	2.0	11.0
Skating Rink	98.0	1.030612	0.989159	0.0	0.0	1.0	1.0	6.0
Pool	98.0	1.244898	1.175885	0.0	0.0	1.0	2.0	6.0
Baseball Field	98.0	0.795918	1.093176	0.0	0.0	0.0	1.0	5.0
Basketball Court	98.0	0.224490	0.618122	0.0	0.0	0.0	0.0	5.0
Tennis Court	98.0	0.806122	1.145661	0.0	0.0	0.0	1.0	5.0
Martial Arts Dojo	98.0	0.826531	1.055428	0.0	0.0	1.0	1.0	5.0
Soccer Field	98.0	0.428571	0.799484	0.0	0.0	0.0	1.0	4.0

Exploratory data analysis:

- Top 10 most popular sporting venues in Toronto

Exploratory data analysis:

- Number of sport venues vs. shopping centers for different neighborhoods of Toronto

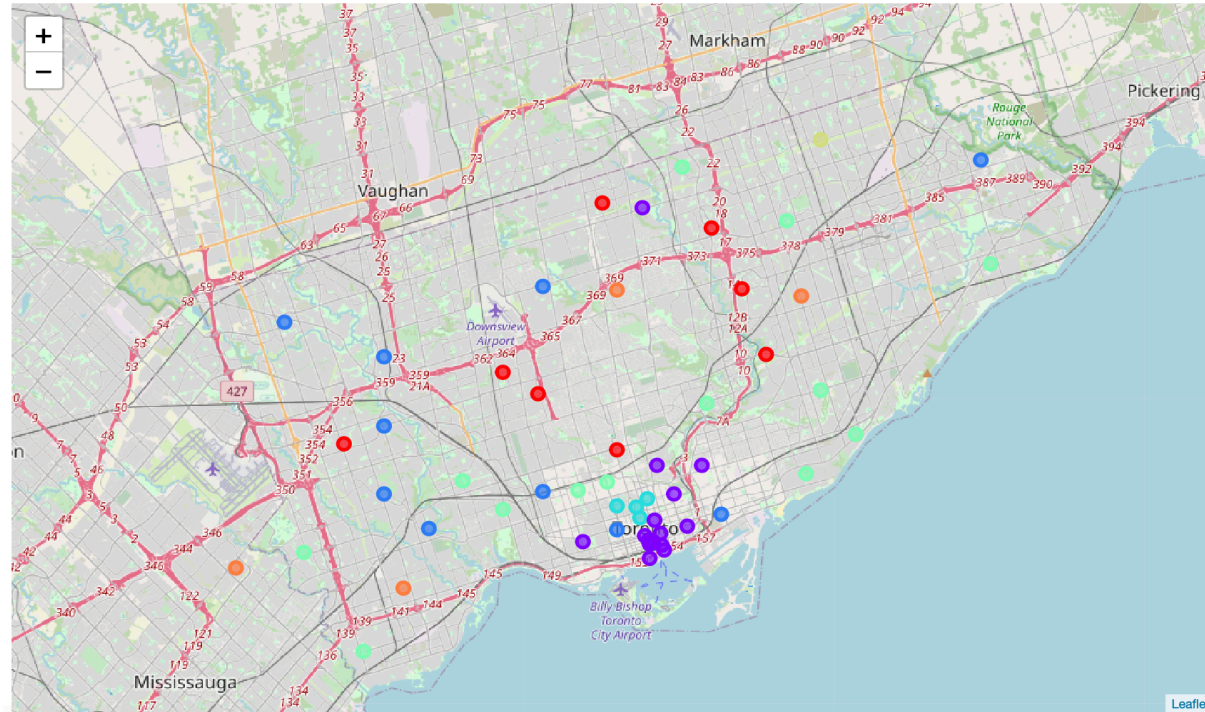|	Neighborhood	# of sport venues	# of shopping venues
1	Alderwood, Long Branch	17	3
2	Bathurst Manor, Wilson Heights, Downsview North	13	1
3	Bayview Village	8	4
4	Berczy Park	8	2
5	Birch Cliff, Cliffside West	17	1

Analysis and K-Means Clustering of Neighborhoods:

- Results of clustering the neighborhoods based on the availability of sport venues and shopping centers for each neighborhood within one-mile radius

- Neighborhoods are categorized in 7 clusters

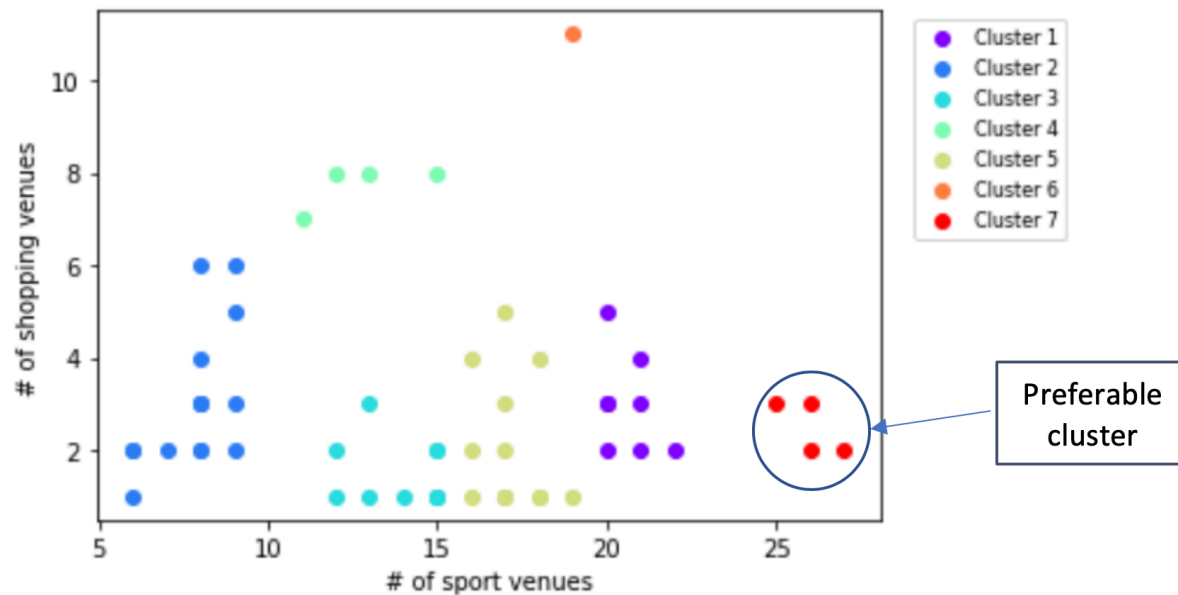|	Cluster Labels	Neighborhood	# of sport venues	# of shopping venues	Postalcode	Borough	Latitude	Longitude
1	4	Alderwood, Long Branch	17	3	M8W	Etobicoke	43.602414	-79.543484
2	2	Bathurst Manor, Wilson Heights, Downsview North	13	1	M3H	North York	43.754328	-79.442259
3	1	Bayview Village	8	4	M2K	North York	43.786947	-79.385975
4	1	Berczy Park	8	2	M5E	Downtown Toronto	43.644771	-79.373306
5	4	Birch Cliff, Cliffside West	17	1	M1N	Scarborough	43.692657	-79.264848

Analysis and K-Means Clustering of Neighborhoods:

- Results of clustering the neighborhoods on the map of Toronto

Results and discussion:

- Results of clustering the neighborhoods Toronto, based on number of available sport venues and shopping centers
- From the results, cluster number 7 seems to be superior, so we suggest this cluster

Results and discussion:

- Details of preferred cluster:

	Cluster Labels	Neighborhood	# of sport venues	# of shopping venues	Postalcode	Borough	Latitude	Longitude
7	6	Canada Post Gateway Processing Centre	26	2	M7R	Mississauga	43.636966	-79.615819
42	6	Mimico NW, The Queensway West, South of Bloor,...	26	3	M8Z	Etobicoke	43.628841	-79.520999
74	6	Wexford, Maryvale	25	3	M1R	Scarborough	43.750071	-79.295849
78	6	York Mills West	27	2	M2P	North York	43.752758	-79.400049

- The four neighborhoods in the above table could be suggested as the potential neighborhoods to open a new sporting goods shop because compared to other neighborhoods these neighborhoods have more sporting venues and there are minimum of two shopping malls or shopping plazas to open the new shop. Also there is no sporting goods shop in these neighborhoods

Results and discussion:

- Location of the suggested neighborhoods to open the new shop on the Toronto Map