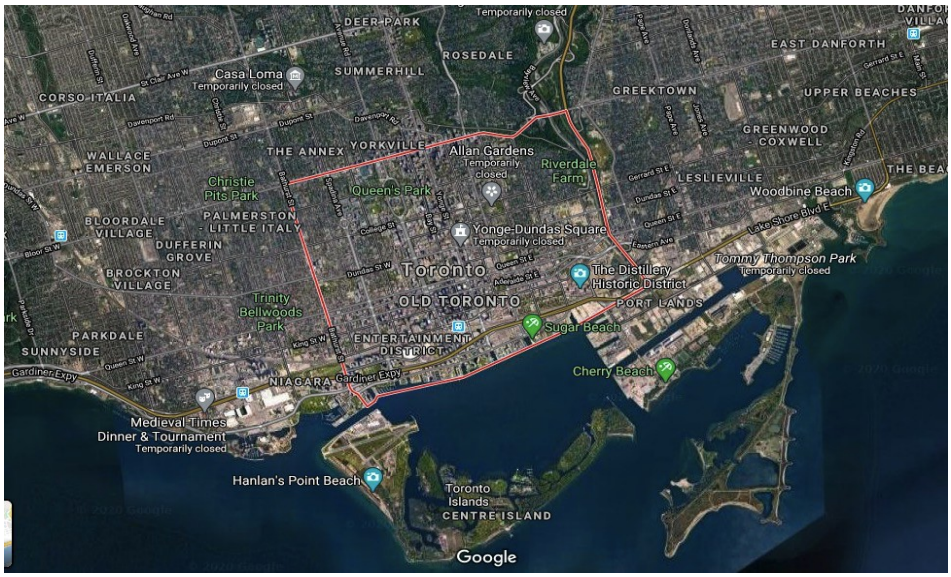
The Battle of Neighborhoods
The final report
"Analyzing and looking of the best place for new office"



A. Introduction and problem description

Background

Lake Ontario is one of the five Great Lakes of North America. It is surrounded on the north, west, and southwest by the Canadian province of Ontario, and on the south and east by the American state of New York, whose water boundaries meet in the middle of the lake.

Ontario, Canada's most populous province, was named for the lake. Many cities, including Canada's most populous city Toronto, Rochester, and Hamilton, are located on the lake's shores. In the Huron language, the name Ontario means "great lake".

Its primary inlet is the Niagara River from Lake Erie. The last in the Great Lakes chain, Lake Ontario serves as the outlet to the Atlantic Ocean via the Saint Lawrence River. It is the only Great Lake not to border the state of Michigan.

Toronto is Ontario's capital city, Canada's largest municipality and the fourth largest city in North America. It is made up of the former cities of Toronto, North York, Scarborough, York and Etobicoke, and the former borough of East York. Population of Toronto is 2,731,571

It is the most populous city in Canada, a multicultural city, and the country's financial and commercial centre. Its location on the northwestern shore of Lake Ontario, which forms part of the border between Canada and the United States, and its access to Atlantic shipping and to major U.S. industrial centres via the Great Lakes have enabled Toronto to become an important international trading centre.

Most importantly, its central location, along with a host of political policies favouring international trade, places this city with the greatest economic ties to, and influence from, the United States. Since the second half of the 20th century the city has grown phenomenally, from a

rather sedate provincial town—“Toronto the Good”—to a lively, thriving, cosmopolitan metropolitan area.

The Problem description:

The most popular US catamaran and pleasure yacht dealer wants to open a new branch in Canada.

This dealer’s main office is on Lake Ontario on the US side.The dealer has a yacht salon and a service center.The main business is the short-term rental of yachts and boats, usually for the weekend. The second part of the business is the sale of boats and yachts.

The dealer has a budget and the ability to open and run only one office in Canada. He is looking for the best place for his own business and new office. He plans to make street advertisements and attract new customers to a new office to close deals.

Therefore, the place for the new office should be suitable for prospective customers and should be in the most promising place.

Location of the new office:

The Ontario Lake is one of Canada's largest lakes. And Toronto is the largest lake-side city in eastern Canada.

Toronto Harbour or Toronto Bay is a bay on the north shore of Lake Ontario, in Toronto, Ontario, Canada. It is a natural harbour, protected from Lake Ontario waves by the Toronto Islands.

Today, the harbour is used primarily for recreational boating, including personal vessels and pleasure boats providing scenic or party cruises. Ferries travel from docks on the mainland to the Islands, and cargo ships deliver aggregates and raw sugar to industries located in the harbour. Historically, the harbour has been used for military vessels, passenger traffic and cargo traffic.

Waterfront uses include residential, recreational, cultural, commercial and industrial sites.

Also Toronto Harbor have many bad weather boat shelters and many residents have the opportunity to spend a weekend on the lake by boat or yacht.

B. Data description

Neighborhoods Data:

The Wikipedia page was scraped to pull out the information:

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

The information contains postal codes, borough and neighborhoods. Later that was converted into a pandas data frame for further analysis.

Location of Neighborhoods:

The following information from csv file gave us the geographical coordinates of each postal code: http://cocl.us/Geospatial_data

The information from the table will transformed into a pandas data frame for further analysis.

Using Foursquare API:

The Foursquare API allows application developers to interact with the Foursquare platform. The API itself is a RESTful set of addresses to which you can send requests, so there's really nothing to download onto your server and can easy get information, for example: venues, ratings..

We will be use Foursquare API for exploring of the neighborhoods. We set LIMIT parameter to 100 venues and radius to 700 metres for each neighborhood

Taken Information for each venue is:

- Name of neighborhood
- Neighborhood Longitude and latitude
- Name of venue
- Venue category
- Venue Longitude and latitude

Using Clustering:

Using k-means clustering algorithm we need to cluster data. It make possible to group similar neighborhoods and find the best Neighborhood for new office in Toronto

Visualising:

We will use folium library and matplotlib for visualize clasters

Other Packages and Libraries:

- JSON -for I/O Json files
- Pandas – for DataFrame
- Scikit Learn – for using clastering algorithm
- Requests – for http requests

C . Methodology section

Objective:

Our goal is to find the best area for a new office.The main criteria of our neighborhood are the prosperity and wealth of citizens, as well as the density of people with the same social status.

- They should be able to rent a boat or yacht at the weekend.
- Location density is essential for street advertising
- The location of the new office should be in the Lake Ontario.

For the purposes of this project, we need:

- Compare housing prices and find where above
- Compare restaurant ratings and find the best status
- Compare school rating

Scrape the Wikipedia page and gathering data into a Pandas dataframe

To start with our analysis, we used the **BeautifulSoup** package to transform the data in the table on the Wikipedia page into the below pandas dataframe.

[source]
url = "https://en.wikipedia.org/wiki/List_of_postal_codes_of_Canada:_M"

	Postal Code	Borough	Neighborhood
0	M5A	Downtown Toronto	Regent Park , Harbourfront
1	M7A	Downtown Toronto	Queen's Park , Ontario Provincial Government
2	M5B	Downtown Toronto	Garden District, Ryerson
3	M5C	Downtown Toronto	St. James Town
4	M5E	Downtown Toronto	Berczy Park
5	M5G	Downtown Toronto	Central Bay Street
6	M6G	Downtown Toronto	Christie
7	M5H	Downtown Toronto	Richmond , Adelaide , King
8	M5J	Downtown Toronto	Harbourfront East , Union Station , Toronto Is...
9	M5K	Downtown Toronto	Toronto Dominion Centre , Design Exchange
10	M5L	Downtown Toronto	Commerce Court , Victoria Hotel
11	M5S	Downtown Toronto	University of Toronto , Harbord
12	M5T	Downtown Toronto	Kensington Market , Chinatown , Grange Park
13	M5V	Downtown Toronto	CN Tower , King and Spadina , Railway Lands , ...
14	M4W	Downtown Toronto	Rosedale
15	M5W	Downtown Toronto	Stn A PO Boxes
16	M4X	Downtown Toronto	St. James Town , Cabbagetown
17	M5X	Downtown Toronto	First Canadian Place , Underground city

After we need geocoordinates (latitude and longitude)for each neighborhood.
We download coordinates from cocl.us and creating new data frame with coordinates

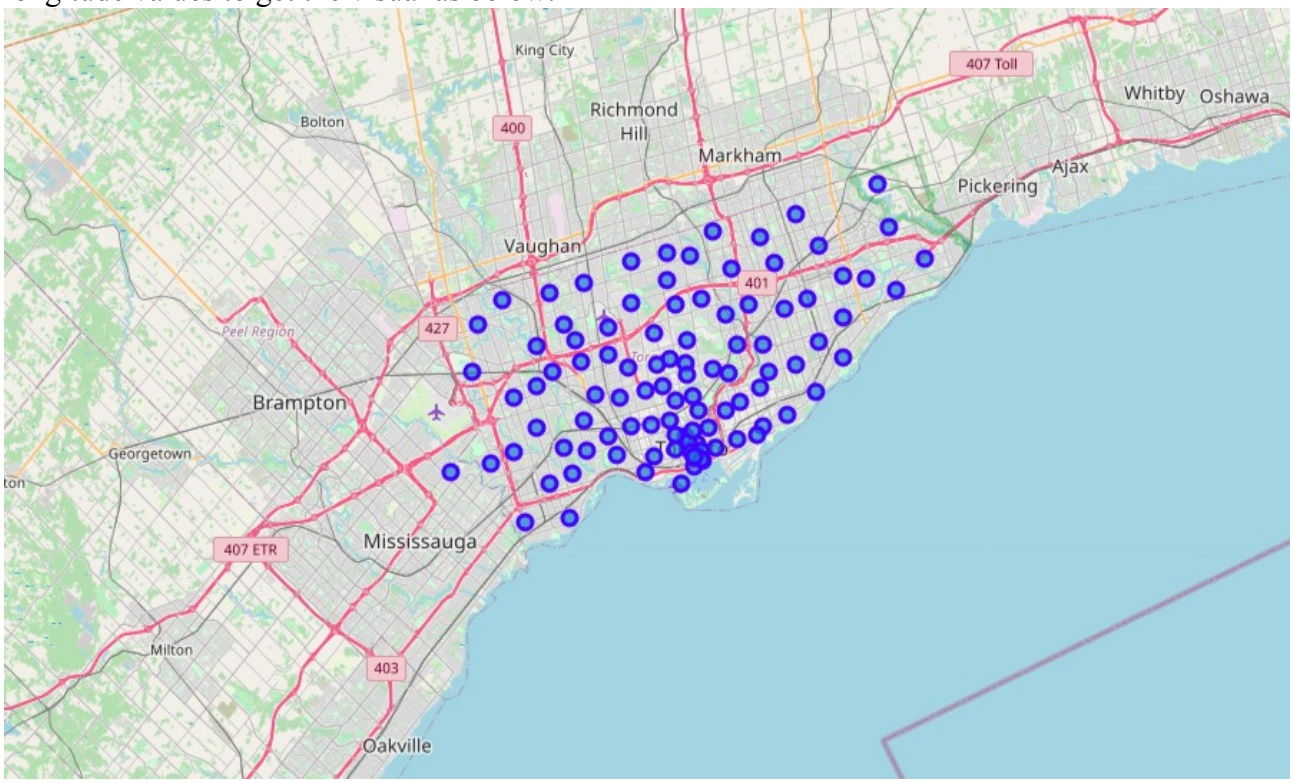
	Postal Code	Latitude	Longitude
0	M1B	43.806686	-79.194353
1	M1C	43.784535	-79.160497
2	M1E	43.763573	-79.188711
3	M1G	43.770992	-79.216917
4	M1H	43.773136	-79.239476

Now we have full list of neighborhood of Downtown Toronto with coordinates.

	Postal Code	Borough	Neighborhood	Latitude	Longitude
0	M5A	Downtown Toronto	Regent Park , Harbourfront	43.654260	-79.360636
1	M7A	Downtown Toronto	Queen's Park , Ontario Provincial Government	43.662301	-79.389494
2	M5B	Downtown Toronto	Garden District, Ryerson	43.657162	-79.378937
3	M5C	Downtown Toronto	St. James Town	43.651494	-79.375418
4	M5E	Downtown Toronto	Berczy Park	43.644771	-79.373306
5	M5G	Downtown Toronto	Central Bay Street	43.657952	-79.387383
6	M6G	Downtown Toronto	Christie	43.669542	-79.422564
7	M5H	Downtown Toronto	Richmond , Adelaide , King	43.650571	-79.384568
8	M5J	Downtown Toronto	Harbourfront East , Union Station , Toronto Is...	43.640816	-79.381752
9	M5K	Downtown Toronto	Toronto Dominion Centre , Design Exchange	43.647177	-79.381576
10	M5L	Downtown Toronto	Commerce Court , Victoria Hotel	43.648198	-79.379817
11	M5S	Downtown Toronto	University of Toronto , Harbord	43.662696	-79.400049
12	M5T	Downtown Toronto	Kensington Market , Chinatown , Grange Park	43.653206	-79.400049
13	M5V	Downtown Toronto	CN Tower , King and Spadina , Railway Lands , ...	43.628947	-79.394420
14	M4W	Downtown Toronto	Rosedale	43.679563	-79.377529
15	M5W	Downtown Toronto	Stn A PO Boxes	43.646435	-79.374846
16	M4X	Downtown Toronto	St. James Town , Cabbagetown	43.667967	-79.367675
17	M5X	Downtown Toronto	First Canadian Place , Underground city	43.648429	-79.382280
18	M4Y	Downtown Toronto	Church and Wellesley	43.665860	-79.383160

Let's take geografical coordinates All areas of Toronto and make Map

We then use the python folium library to visualize geographic details of Toronto and its boroughs. I created a map of Toronto with boroughs superimposed on top using the latitude and longitude values to get the visual as below:



Now we are going to use Foursquare API for exploring the neighborhoods/boroughs

Also later we will create segmentation of results.

	Postal Code	Borough	Neighborhood	Latitude	Longitude
0	M5A	Downtown Toronto	Regent Park , Harbourfront	43.654260	-79.360636
1	M7A	Downtown Toronto	Queen's Park , Ontario Provincial Government	43.662301	-79.389494
2	M5B	Downtown Toronto	Garden District, Ryerson	43.657162	-79.378937
3	M5C	Downtown Toronto	St. James Town	43.651494	-79.375418
4	M5E	Downtown Toronto	Berczy Park	43.644771	-79.373306
5	M5G	Downtown Toronto	Central Bay Street	43.657952	-79.387383
6	M6G	Downtown Toronto	Christie	43.669542	-79.422564
7	M5H	Downtown Toronto	Richmond , Adelaide , King	43.650571	-79.384568
8	M5J	Downtown Toronto	Harbourfront East , Union Station , Toronto Is...	43.640816	-79.381752
9	M5K	Downtown Toronto	Toronto Dominion Centre , Design Exchange	43.647177	-79.381576

Lets to analyse only one borough - Down Toronto and create Data Frame for it
To visualize geographic details of its boroughs...

Next, we are going to start utilizing the Foursquare API to explore the neighborhoods and segment them. We set the LIMIT parameter to 100, which would limit the number of venues returned by the Foursquare API and the radius of 700 meter. Here is a head of the list of Nearby Venues for the first neighborhood

	name	categories	lat	lng
0	UNIQLO ユニクロ	Clothing Store	43.655910	-79.380641
1	Elgin And Winter Garden Theatres	Theater	43.653394	-79.378507
2	LUSH	Cosmetics Shop	43.653557	-79.380400
3	Ed Mirvish Theatre	Theater	43.655102	-79.379768
4	Indigo	Bookstore	43.653515	-79.380696
5	CF Toronto Eaton Centre	Shopping Mall	43.654540	-79.380677
6	Yonge-Dundas Square	Plaza	43.656054	-79.380495
7	Eggspectation Bell Trinity Square	Breakfast Spot	43.653144	-79.381980
8	JOEY Eaton Centre	Restaurant	43.655404	-79.381929
9	Samsung Experience Store (Eaton Centre)	Electronics Store	43.655648	-79.381011
10	HomeSense	Furniture / Home Store	43.653053	-79.379450

We create a function that will repeat the process above for all the neighborhoods in Toronto. This function will give us a list of all venues present in Toronto

	Neighborhood	Neighborhood Latitude	Neighborhood Longitude	Venue	Venue Latitude	Venue Longitude	Venue Category
0	Regent Park , Harbourfront	43.65426	-79.360636	Roselle Desserts	43.653447	-79.362017	Bakery
1	Regent Park , Harbourfront	43.65426	-79.360636	Tandem Coffee	43.653559	-79.361809	Coffee Shop
2	Regent Park , Harbourfront	43.65426	-79.360636	Cooper Koo Family YMCA	43.653249	-79.358008	Distribution Center
3	Regent Park , Harbourfront	43.65426	-79.360636	Body Blitz Spa East	43.654735	-79.359874	Spa
4	Regent Park , Harbourfront	43.65426	-79.360636	Morning Glory Cafe	43.653947	-79.361149	Breakfast Spot
5	Regent Park , Harbourfront	43.65426	-79.360636	Impact Kitchen	43.656369	-79.356980	Restaurant
6	Regent Park , Harbourfront	43.65426	-79.360636	Corktown Common	43.655618	-79.356211	Park
7	Regent Park , Harbourfront	43.65426	-79.360636	Figs Breakfast & Lunch	43.655675	-79.364503	Breakfast Spot
8	Regent Park , Harbourfront	43.65426	-79.360636	The Distillery Historic District	43.650244	-79.359323	Historic Site
9	Regent Park , Harbourfront	43.65426	-79.360636	Dominion Pub and Kitchen	43.656919	-79.358967	Pub

Neighborhood	Neighborhood Latitude	Neighborhood Longitude	Venue	Venue Latitude	Venue Longitude	Venue Category
Berczy Park	55	55	55	55	55	55
Quay , South Niagara , Island airport	18	18	18	18	18	18
Central Bay Street	64	64	64	64	64	64
Christie	18	18	18	18	18	18
Church and Wellesley	75	75	75	75	75	75

The total uniques categories of venues is 201

Lets Analyze Each Neighborhood

We use One Hot Encoding, use the neighborhood to group data, and find out the top 7 venues present in each neighborhood.

```
----Berczy Park----
                venue  freq
0         Coffee Shop  0.05
1      Farmers Market  0.04
2              Bakery  0.04
3                Café  0.04
4  Italian Restaurant  0.04
5  Seafood Restaurant  0.04
6         Cheese Shop  0.04


----CN Tower , King and Spadina , Railway
 Quay , South Niagara , Island airport---
                venue  freq
0      Airport Service  0.17
1       Airport Lounge  0.11
2     Airport Terminal  0.11
3          Coffee Shop  0.06
4   Airport Food Court  0.06
5         Airport Gate  0.06
6  Rental Car Location  0.06


----Central Bay Street----
                      venue  freq
0                Coffee Shop  0.19
1         Italian Restaurant  0.06
2             Sandwich Place  0.05
3                      Café  0.05
4             Ice Cream Shop  0.03
5  Middle Eastern Restaurant  0.03
6            Bubble Tea Shop  0.03
```

Lets take it to Data Frame and Display the top 7 venues for each neighborhood.

	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
0	Berczy Park	Coffee Shop	Seafood Restaurant	Italian Restaurant	Beer Bar	Farmers Market	Cocktail Bar	Bakery
1	CN Tower , King and Spadina , Railway Lands , ...	Airport Service	Airport Lounge	Airport Terminal	Boat or Ferry	Airport	Airport Food Court	Airport Gate
2	Central Bay Street	Coffee Shop	Italian Restaurant	Sandwich Place	Café	Salad Place	Sushi Restaurant	Spa
3	Christie	Grocery Store	Café	Park	Athletics & Sports	Gas Station	Italian Restaurant	Diner
4	Church and Wellesley	Coffee Shop	Japanese Restaurant	Gay Bar	Restaurant	Sushi Restaurant	Yoga Studio	Pizza Place

Clustering Neighborhoods

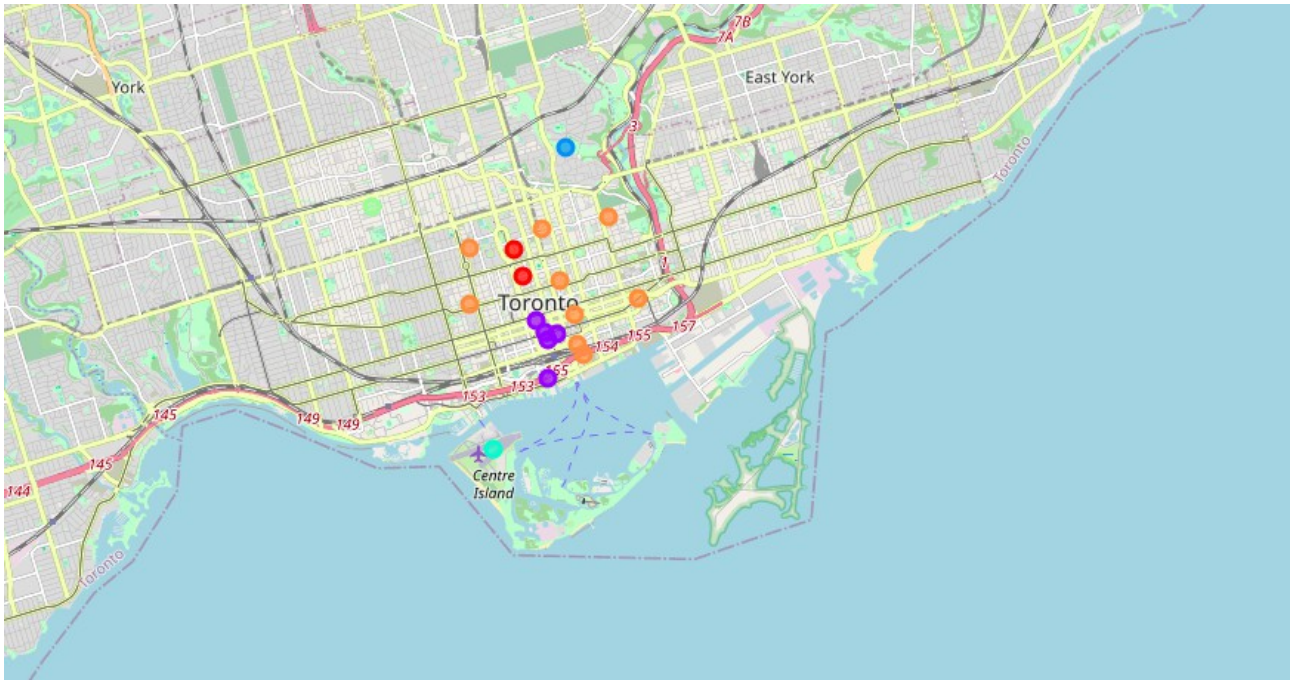
We have some common venue categories in the neighborhoods. We use the unsupervised learning K-means algorithm to cluster the neighborhoods. K-Means algorithm is one of the most common method for clustering in unsupervised learning.

We use a k_cluster value of 6 to split the neighborhoods into 6 different clusters based on the similarity they have concerning the venues they contain.

After Adding the Cluster Labels to the Venue Data:

	Postal Code	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	6th Most Common Venue	7th Most Common Venue
0	M5A	Downtown Toronto	Regent Park , Harbourfront	43.654260	-79.360636	5	Coffee Shop	Pub	Bakery	Park	Breakfast Spot	Mexican Restaurant	Café
1	M7A	Downtown Toronto	Queen's Park , Ontario Provincial Government	43.662301	-79.389494	0	Coffee Shop	Diner	Gym	Park	Mexican Restaurant	Juice Bar	Italian Restaurant
2	M5B	Downtown Toronto	Garden District, Ryerson	43.657162	-79.378937	5	Coffee Shop	Clothing Store	Café	Middle Eastern Restaurant	Japanese Restaurant	Italian Restaurant	Cosmetics Shop
3	M5C	Downtown Toronto	St. James Town	43.651494	-79.375418	5	Café	Coffee Shop	Cocktail Bar	Restaurant	Beer Bar	American Restaurant	Hotel
4	M5E	Downtown Toronto	Berczy Park	43.644771	-79.373306	5	Coffee Shop	Seafood Restaurant	Italian Restaurant	Beer Bar	Farmers Market	Cocktail Bar	Bakery
5	M5G	Downtown Toronto	Central Bay Street	43.657952	-79.387383	0	Coffee Shop	Italian Restaurant	Sandwich Place	Café	Salad Place	Sushi Restaurant	Spa
6	M6G	Downtown Toronto	Christie	43.669542	-79.422564	4	Grocery Store	Café	Park	Athletics & Sports	Gas Station	Italian Restaurant	Diner
7	M5H	Downtown Toronto	Richmond , Adelaide , King	43.650571	-79.384568	1	Coffee Shop	Café	Restaurant	Gym	Hotel	Deli / Bodega	Thai Restaurant
8	M5J	Downtown Toronto	Harbourfront East , Union Station , Toronto Is...	43.640816	-79.381752	1	Coffee Shop	Aquarium	Italian Restaurant	Restaurant	Hotel	Café	Sporting Goods Shop
9	M5K	Downtown Toronto	Toronto Dominion Centre , Design Exchange	43.647177	-79.381576	1	Coffee Shop	Hotel	Café	Restaurant	Italian Restaurant	Salad Place	Gastropub

Now we ready visualizing the resulting Clusters.We will use the matplotlib and folium packages



D.Results section

We found that the center of toronto is divided into 6 districts depending on venues
Now we can compare all areas with a rating of housing prices, a rating of restaurants and schools ...
Lets Examine each Clusters.

Data of each claster:

Cluster #0

	Neighborhood	Cluster Labels	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
1	Queen's Park , Ontario Provincial Government	0	Coffee Shop	Diner	Gym	Park	Mexican Restaurant	Juice Bar	Italian Restaurant
5	Central Bay Street	0	Coffee Shop	Italian Restaurant	Sandwich Place	Café	Salad Place	Sushi Restaurant	Spa

Cluster #1

	Neighborhood	Cluster Labels	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
7	Richmond , Adelaide , King	1	Coffee Shop	Café	Restaurant	Gym	Hotel	Deli / Bodega	Thai Restaurant
8	Harbourfront East , Union Station , Toronto Is...	1	Coffee Shop	Aquarium	Italian Restaurant	Restaurant	Hotel	Café	Sporting Goods Shop
9	Toronto Dominion Centre , Design Exchange	1	Coffee Shop	Hotel	Café	Restaurant	Italian Restaurant	Salad Place	Gastropub
10	Commerce Court , Victoria Hotel	1	Coffee Shop	Restaurant	Café	Hotel	Gym	American Restaurant	Seafood Restaurant
17	First Canadian Place , Underground city	1	Coffee Shop	Café	Restaurant	Hotel	Gym	Steakhouse	Gastropub

Cluster #2

	Neighborhood	Cluster Labels	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
14	Rosedale	2	Park	Trail	Playground	Dance Studio	Dumpling Restaurant	Donut Shop	Doner Restaurant

Cluster #3

	Neighborhood	Cluster Labels	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
13	CN Tower , King and Spadina , Railway Lands , ...	3	Airport Service	Airport Lounge	Airport Terminal	Boat or Ferry	Airport	Airport Food Court	Airport Gate

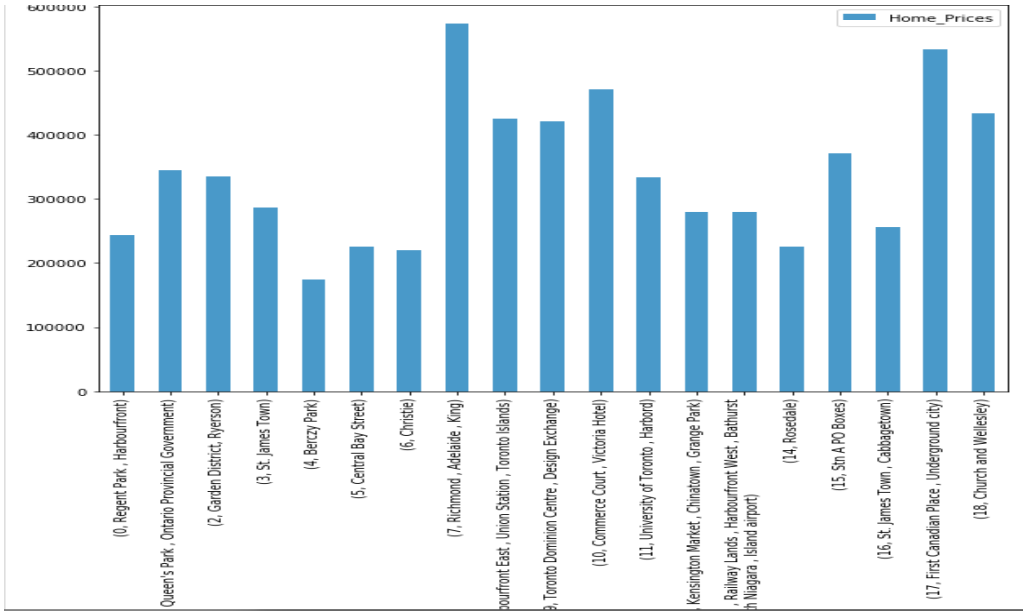
Cluster #4

	Neighborhood	Cluster Labels	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
6	Christie	4	Grocery Store	Café	Park	Athletics & Sports	Gas Station	Italian Restaurant	Diner

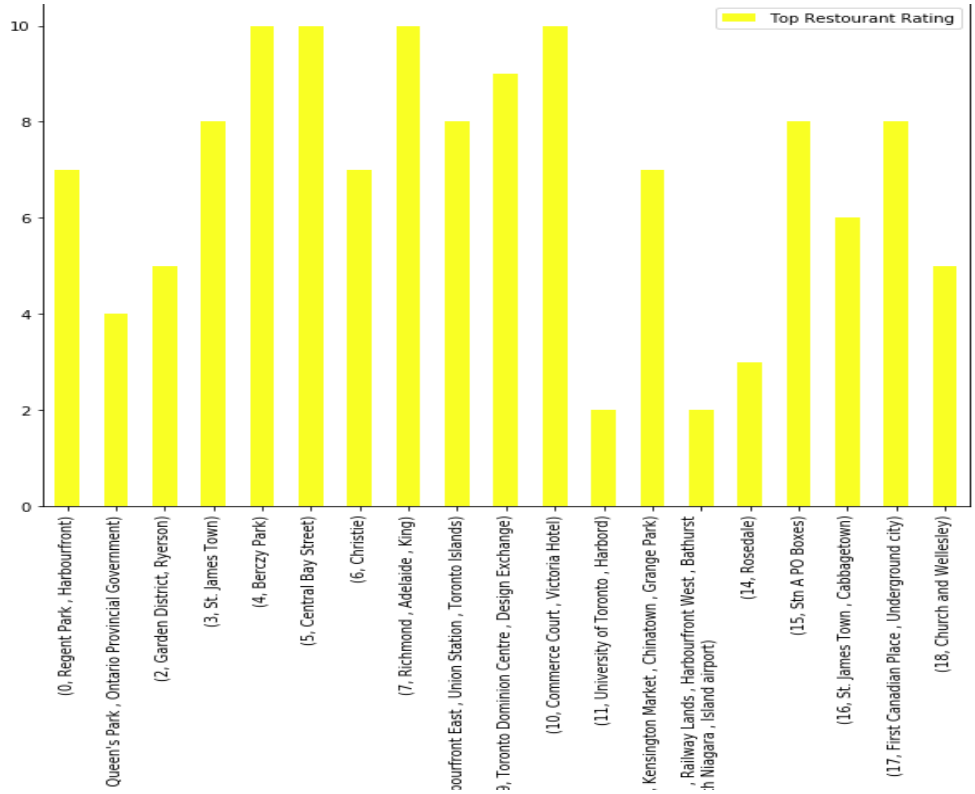
Cluster #5

	Neighborhood	Cluster Labels	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
0	Regent Park , Harbourfront	5	Coffee Shop	Pub	Bakery	Park	Breakfast Spot	Mexican Restaurant	Café
2	Garden District, Ryerson	5	Coffee Shop	Clothing Store	Café	Middle Eastern Restaurant	Japanese Restaurant	Italian Restaurant	Cosmetics Shop
3	St. James Town	5	Café	Coffee Shop	Cocktail Bar	Restaurant	Beer Bar	American Restaurant	Hotel
4	Berczy Park	5	Coffee Shop	Seafood Restaurant	Italian Restaurant	Beer Bar	Farmers Market	Cocktail Bar	Bakery
11	University of Toronto , Harbord	5	Café	Italian Restaurant	Restaurant	Bar	Japanese Restaurant	Bookstore	Bakery
12	Kensington Market , Chinatown , Grange Park	5	Café	Coffee Shop	Vietnamese Restaurant	Mexican Restaurant	Vegetarian / Vegan Restaurant	Bar	Dumpling Restaurant
15	Stn A PO Boxes	5	Coffee Shop	Café	Restaurant	Italian Restaurant	Seafood Restaurant	Hotel	Beer Bar
16	St. James Town , Cabbagetown	5	Coffee Shop	Market	Restaurant	Italian Restaurant	Bakery	Café	Park
18	Church and Wellesley	5	Coffee Shop	Japanese Restaurant	Gay Bar	Restaurant	Sushi Restaurant	Yoga Studio	Pizza Place

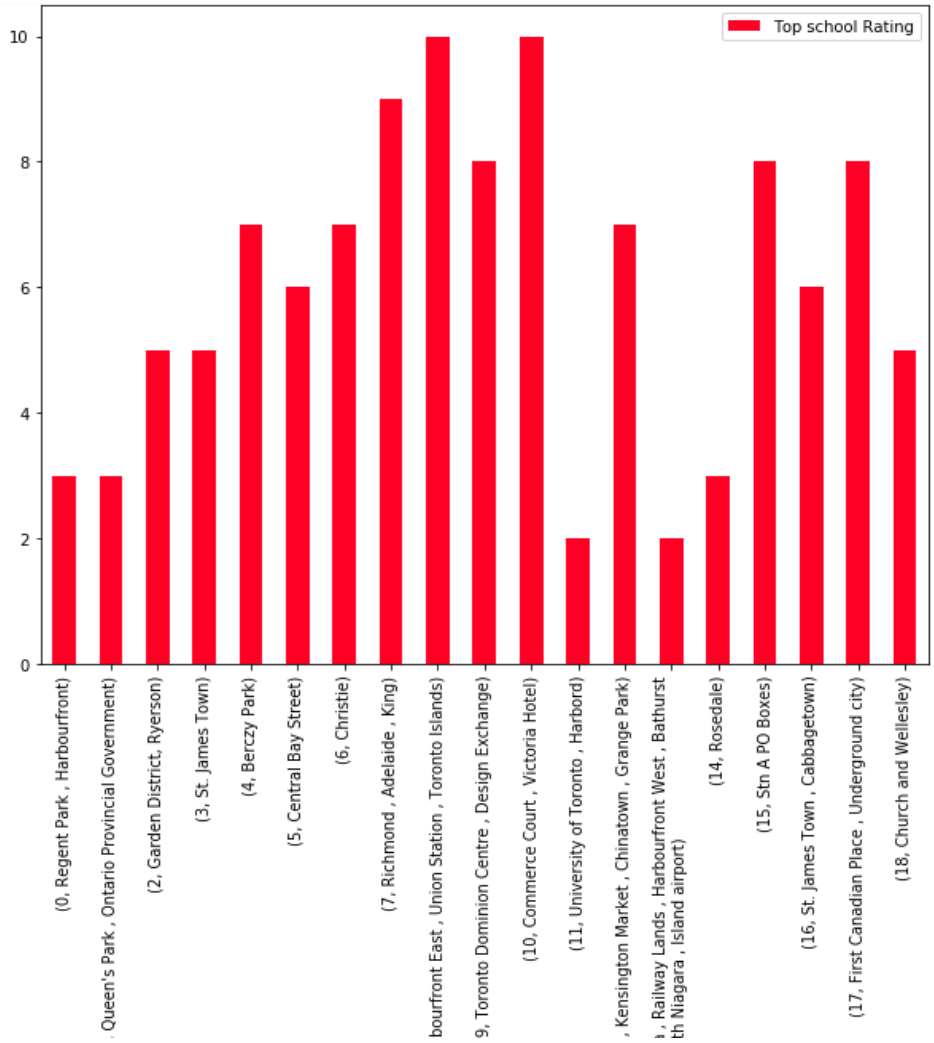
Next Lets make DataFrame and compare Average Housing PricesCompare restaurant ratings for each neighborhood



Compare restourants ratings and find the best status



Compare schools ratings and find the best status



Lets add all ratings to main DataFrame

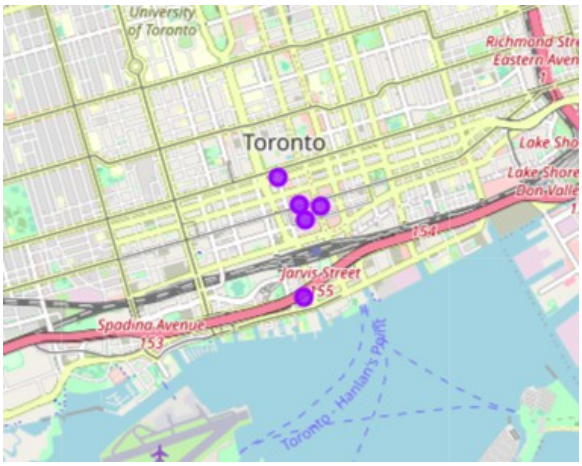
	Postal Code	Borough	Neighborhood	Latitude	Longitude	Cluster Labels	1st Most Common Venue	2nd Most Common Venue	3rd Most Common Venue	4th Most Common Venue	5th Most Common Venue	6th Most Common Venue	7th Most Common Venue	Avg Home Prices	Restourant	school_rating
0	M5A	Downtown Toronto	Regent Park , Harbourfront	43.654260	-79.360636	5	Coffee Shop	Pub	Bakery	Park	Breakfast Spot	Mexican Restaurant	Café	244000.0	7	3
1	M7A	Downtown Toronto	Queen's Park , Ontario Provincial Government	43.662301	-79.389494	0	Coffee Shop	Diner	Gym	Park	Mexican Restaurant	Juice Bar	Italian Restaurant	345000.0	4	3
2	M5B	Downtown Toronto	Garden District, Ryerson	43.657162	-79.378937	5	Coffee Shop	Clothing Store	Café	Middle Eastern Restaurant	Japanese Restaurant	Italian Restaurant	Cosmetics Shop	335000.0	5	5
3	M5C	Downtown Toronto	St. James Town	43.651494	-79.375418	5	Café	Coffee Shop	Cocktail Bar	Restaurant	Beer Bar	American Restaurant	Hotel	286600.0	8	5
4	M5E	Downtown Toronto	Berczy Park	43.644771	-79.373306	5	Coffee Shop	Seafood Restaurant	Italian Restaurant	Beer Bar	Farmers Market	Cocktail Bar	Bakery	175000.0	10	7

Now we can determine the best claster for new office.
Lets sorting by the most expensive houses...

Avg Home Prices	Restourant	school_rating	Cluster Labels
175000.0	10	7	5
219400.0	7	7	4
225000.0	3	3	2
225900.0	10	6	0
244000.0	7	3	5
255400.0	6	6	5
279200.0	2	2	3
	7	7	5
286600.0	8	5	5
333500.0	2	2	5
335000.0	5	5	5
345000.0	4	3	0
370500.0	8	8	5
420500.0	9	8	1
425000.0	8	10	1
433500.0	5	5	5
470500.0	10	10	1
533500.0	8	8	1
573900.0	10	9	1

This result table show us - the richest households with high-rated restaurants and schools located in cluster number 1

Lets visualize its segment:



E. Discussion section

The purpose for which the analysis was carried out was to find the best area for a new office.

By analyzing the results section, we can analyze clusters and see similar neighborhoods in different parts of the city. We compared different neighborhoods in 6 clusters.

As can be seen from the table above, given the rating of restaurants and schools, the best sector for a new office is claster 1

Also this sector will be match as much as possible to the main criteria of our neighborhood:

- the prosperity and wealth of citizensas
- the density of people with the same social status.
- be able to rent a boat or yacht at the weekend.
- Location density for street advertising

F. Conclusion section

In this project, through a k-means cluster algorithm we separate the neighborhood into 6 clusters, which have similar neighborhoods around them.

Using the charts above decision leading to a particular neighborhood based on average house prices and restourants and schools rating can be made

For whom is this Project:

This report and results would be useful for businessmen who are interested in relocating own business or opening new office/branch in Toronto. Provided that they offer services for this target group of residents

Similarly, data can also be used to solve other problems that most people face in large cities, given the lack of time and huge supply in the market.

G. References

1. Forsquare API

2. https://en.wikipedia.org/wiki/List_of_postal_codes_of_Canada:_M
The information contains postal codes, borough and neighborhoods

3. Housing Sales Prices of Each Borough from “Hurriyet Retail Index for 2018”

4. CSV for Coordinate data: http://cocl.us/Geospatial_data