

Capstone Project - The Battle of Neighbourhoods

Introduction

Toronto is the provincial capital of Ontario. With a recorded population of 2,731,571 in 2016, it is the most populous city in Canada and the fourth most populous city in North America. The Greater Toronto Area (GTA) as a whole had a 2016 population of 6,417,516. The city covers an area of 630.20 square kilometres (243.32 sq mi) and comprises six districts – East York, Etobicoke, North York, Old Toronto, Scarborough and York – which were amalgamated to form Toronto's present boundaries in 1998. The city is the anchor of the Golden Horseshoe, an urban agglomeration of 9,245,438 people (as of 2016) surrounding the western end of Lake Ontario. Toronto is an international centre of business, finance, arts, and culture, and is recognized as one of the most multicultural and cosmopolitan cities in the world.

The diverse population of Toronto reflects its current and historical role as an important destination for immigrants to Canada. More than 50 percent of residents belong to a visible minority population group, and over 200 distinct ethnic origins are represented among its inhabitants. While the majority of Torontonians speak English as their primary language, over 160 languages are spoken in the city.

Business Problem

With its excellent business opportunities and diverse cosmopolitan culture, Toronto attracts a lot of expats who come to the city for employment. Any new expat to the city would be looking to rent an apartment for living and staying.

A person looking to rent an apartment focusses on few things like rent amount, transportation, stores, entertainment options etc. So, as part of this project, we will list and visualize all major apartments/condos in the city of Toronto that are available for rent. One of the challenges faced by a prospective tenant is the neighbourhood where s/he would rent an apartment. We will cluster the neighbourhoods in order to recommend venues so that a prospective tenant can take an informed decision. We will also list the average rental prices along different neighborhoods.

Assumptions

1. The person is looking for 2+ -bedroom apartments only.
2. The apartment should be close to public transport.
3. There should be grocery and dining options available near the apartment.
4. We will consider RentCafe as the website from where to extract rental information.

Interest(Target Audience/Client)

- a. This solution would be useful to prospective tenants who can make better informed while engaging in apartment search.
- b. It would also be useful to real estate agents who can provide tailored and specific information to their clients.
- c. Apartment owners and landlords can also use this information to understand price trends and factors driving tenant interest.

Data acquisition and processing

Data Sources

For this project we need the following data:

- RentCafe data – This is one of the popular websites that lists apartments available for rent.
 - Data source : <https://www.rentcafe.com/apartments-for-rent/ca/on/toronto/?Beds=TwoPlus&PriceCategory=Luxury&OrderBy=RentDesc&page=2>
 - Description : This webpage will provide information regarding the available apartments that fit the selection criteria. We will scrape the webpage to get the required information.
- Toronto City data that lists registered apartments along with site address and various parameters e.g. safety features, amenities, age of building etc.
 - Data source : <https://open.toronto.ca/dataset/apartment-building-registration/>
 - Description : This data set contains the required information about the apartments. We will use this data set to get several important information about the apartments. Some of this data may be available in the RentCafe site, however the data from the 'City of Toronto' will be more authentic as it is a government site.
- Neighbourhood data
 - Data source: https://en.wikipedia.org/wiki/List_of_postal_codes_of_Canada:_M
 - Description – This wiki page will provide us with the neighbourhood corresponding to each postal code where the apartments are located.
- Venues in each neighbourhood of Toronto city where the apartments are located.
 - Data source : Fousquare API
 - Description : By using this api we will get all the venues in each neighborhood.
- GeoSpace data

- Data source :
 - a. http://cocl.us/Geospatial_data
 - b. geospatial_data.csv
- Description : By using either of the above geospatial data we will get the latitude/longitude details of the neighbourhoods.

Data Processing

Step 1:

The data downloaded from the RentCafe websites are scraped using BeautifulSoup – the relevant data like apartment name, rental price, address, postal code etc from all 3 pages are collected and combined into a dataframe so that we have a tabular representation of the RentCafe data. Given below is an example how it looks in the tabular representation.

Out[476]:

	Apt_Name	Apt_Street	Rent_Low	Rent_High	PostalCode
0	Cambridge Place Apartments	30 Denton Ave	1725	2475	M1L 4P2
1	Village Green Community - 55	55 Maitland Street	1900	2550	M4Y 1C9
2	West22	22 John St.	1780	2845	M9N 0B1
3	Kelvingrove Apartments	6 Airdrie Road	1825	2250	M4G 1L7
4	Main Square	2575 Danforth Avenue	1550	2445	M4C 1L5

Step 2:

In the next step, remove records where there is missing or incorrect data. Also, separate out the prefix part of the postal code so that we can use it to join with the Toronto Wikipedia page data which has only postal code prefix information. Given below is an example of how the data looks after executing this step.

Out[477]:

	Apt_Name	Apt_Street	Rent_Low	Rent_High	Postal_Code	Rent_Avg	PostalCode_Prefix
0	Cambridge Place Apartments	30 Denton Ave	1725	2475	M1L 4P2	2100	M1L
1	2550 Kingston	2550 Kingston Rd	1589	2469	M1M 1L8	2029	M1M
2	2560 Kingston	2560 Kingston Rd	1649	1869	M1M 1L8	1759	M1M
3	Queen Street East	3008-3010 Queen Street East	2400	2400	M1N 1A4	2400	M1N
4	2440 Queen Street East	2440 Queen Street East	2100	2400	M1N 1A5	2250	M1N

Step 3:

Now, we will scrape the Toronto Wikipedia data to get information for neighbourhoods and boroughs. This page is also scraped using BeautifulSoup and the data is put into a dataframe after cleaning it of special characters and headers, invalid data(Not Assigned).

Out[564]:

	PostalCode	Borough	Neighborhood
0	M3A	North York	Parkwoods
1	M4A	North York	Victoria Village
2	M5A	Downtown Toronto	Regent Park, Harbourfront
3	M6A	North York	Lawrence Manor, Lawrence Heights
4	M7A	Downtown Toronto	Queen's Park, Ontario Provincial Government

Step 4:

In the fourth step we will extract the geospatial data to get the latitude and longitude for each postal code. Then we will merge it with the dataframe from Step 3 above and then finally with the apartments' information data from Step2. The resulting dataframe will now have all apartment information along with the neighbourhoods' and latitude/longitude information.

Out[504]:

	Apt_Name	Apt_Street	Rent_Low	Rent_High	Postal_Code	Rent_Avg	Borough	Neighborhood	Latitude	Longitude
0	Cambridge Place Apartments	30 Denton Ave	1725	2475	M1L 4P2	2100	Scarborough	Golden Mile, Clairlea, Oakridge	43.711112	-79.284577
1	2550 Kingston	2550 Kingston Rd	1589	2469	M1M 1L8	2029	Scarborough	Cliffside, Cliffcrest, Scarborough Village West	43.716316	-79.239476
2	2560 Kingston	2560 Kingston Rd	1649	1869	M1M 1L8	1759	Scarborough	Cliffside, Cliffcrest, Scarborough Village West	43.716316	-79.239476
3	Queen Street East	3008-3010 Queen Street East	2400	2400	M1N 1A4	2400	Scarborough	Birch Cliff, Cliffside West	43.692657	-79.264848
4	2440 Queen Street East	2440 Queen Street East	2100	2400	M1N 1A5	2250	Scarborough	Birch Cliff, Cliffside West	43.692657	-79.264848

Step 5:

In this step, we will get the apartment registration information of the City of Toronto open data. This data will provide us crucial compliance information regarding apartments that are registered with the city. Once we have this information into a dataframe, it will have to be merged with the apartment data information from Step 4. This will be tricky as there is no clear-cut common field between the two. The closest common field is street address and it is represented differently in different websites. We will be using the fuzzy search algorithm to match the street addresses. However, this algorithm works on string data only. So, we need to separate out the string part from the address field in both dataframes and also convert everything to lower case. Then we apply the fuzzy search process and merge the two dataframes.

out[508]:

	Apt_Name	Apt_Street	Rent_Low	Rent_High	Postal_Code	Rent_Avg	Borough	Neighborhood	Latitude	Longitude	...	VISITOR_PARKING	YEAR_BUILT
0	345 Lonsdale	345 Lonsdale Road	1950	1950	M5P 1R5	1950	Central Toronto	Forest Hill North & West, Forest Hill Road...	43.696948	-79.411307	...	UNAVAILABLE	1930.0
1	345 Lonsdale	345 Lonsdale Road	1950	1950	M5P 1R5	1950	Central Toronto	Forest Hill North & West, Forest Hill Road...	43.696948	-79.411307	...	UNAVAILABLE	1923.0
2	345 Lonsdale	345 Lonsdale Road	1950	1950	M5P 1R5	1950	Central Toronto	Forest Hill North & West, Forest Hill Road...	43.696948	-79.411307	...	UNAVAILABLE	1957.0
3	345 Lonsdale	345 Lonsdale Road	1950	1950	M5P 1R5	1950	Central Toronto	Forest Hill North & West, Forest Hill Road...	43.696948	-79.411307	...	UNAVAILABLE	1920.0
4	345 Lonsdale	345 Lonsdale	1950	1950	M5P 1R5	1950	Central Toronto	Forest Hill North & West, Forest Hill Road...	43.696948	-79.411307	...	UNAVAILABLE	1927.0

A fuzzy search may result in false positives considering that we were considering the string part of address and there could be multiple apartment building on a single street. The apartment numbers are matched then to weed out the false positives.

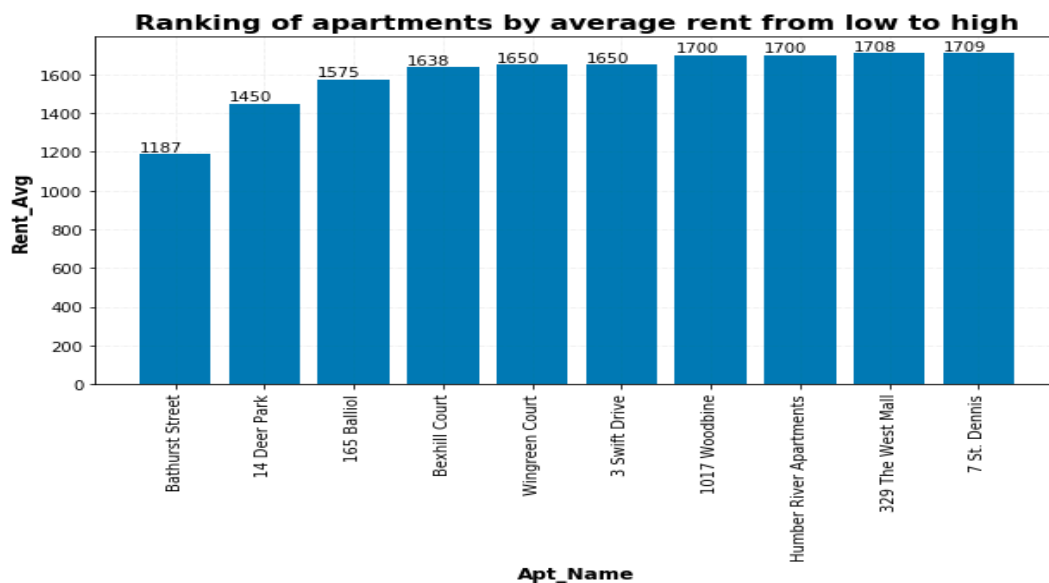
Feature Selection

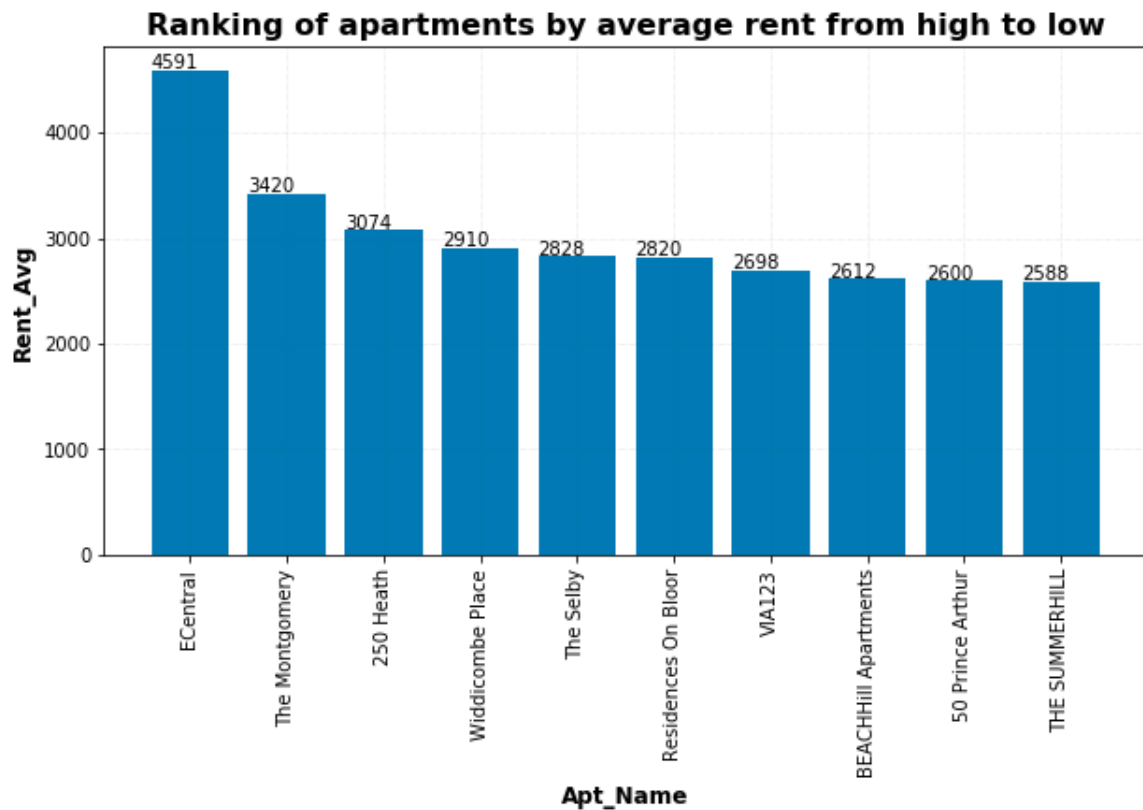
Now we have all the required features in the combine dataframe. However, there could be duplicate data due to multiple merges. Remove any duplicate data and now we have a clean dataframe with all the required information that can be used for data analysis and machine learning purposes.

Exploratory Data Analysis

Show top and bottom ten rent prices

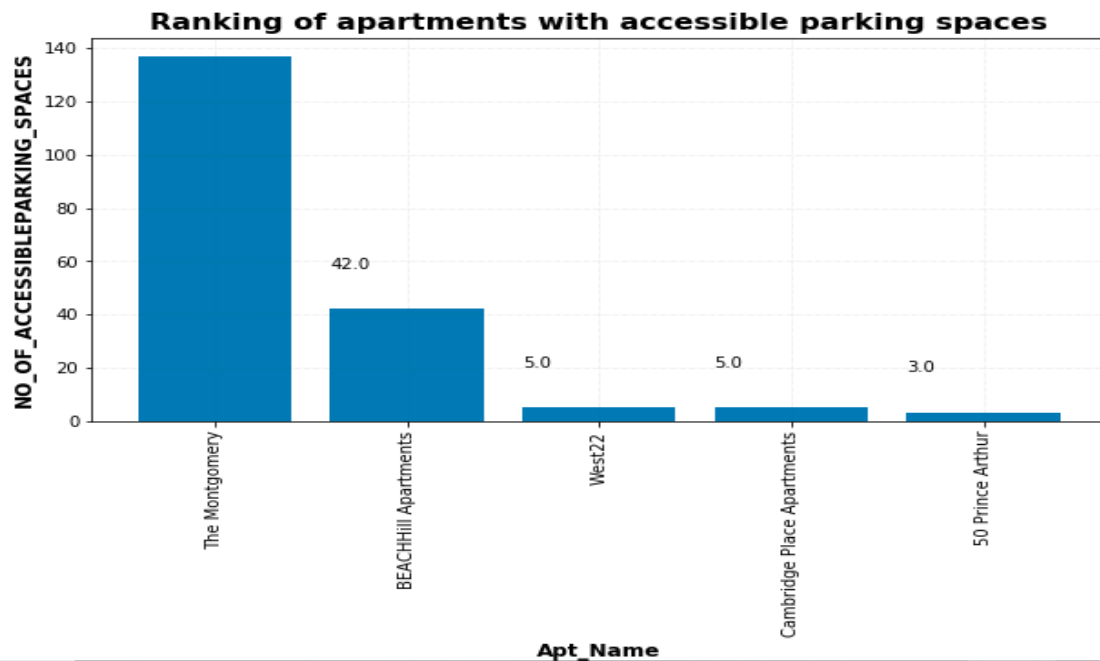
One of the key factors for choosing an apartment is the rent price. We will display the bottom ten and the top ten rental apartments by average rent in a bar chart. This will provide the prospective tenant with the required information as to which properties to target.





Show apartments that have accessible parking spaces

A tenant might look for apartments that have a large number of accessible parking spaces. The below bar chart will show the details around this feature.



Show registered apartments with fire-safety features

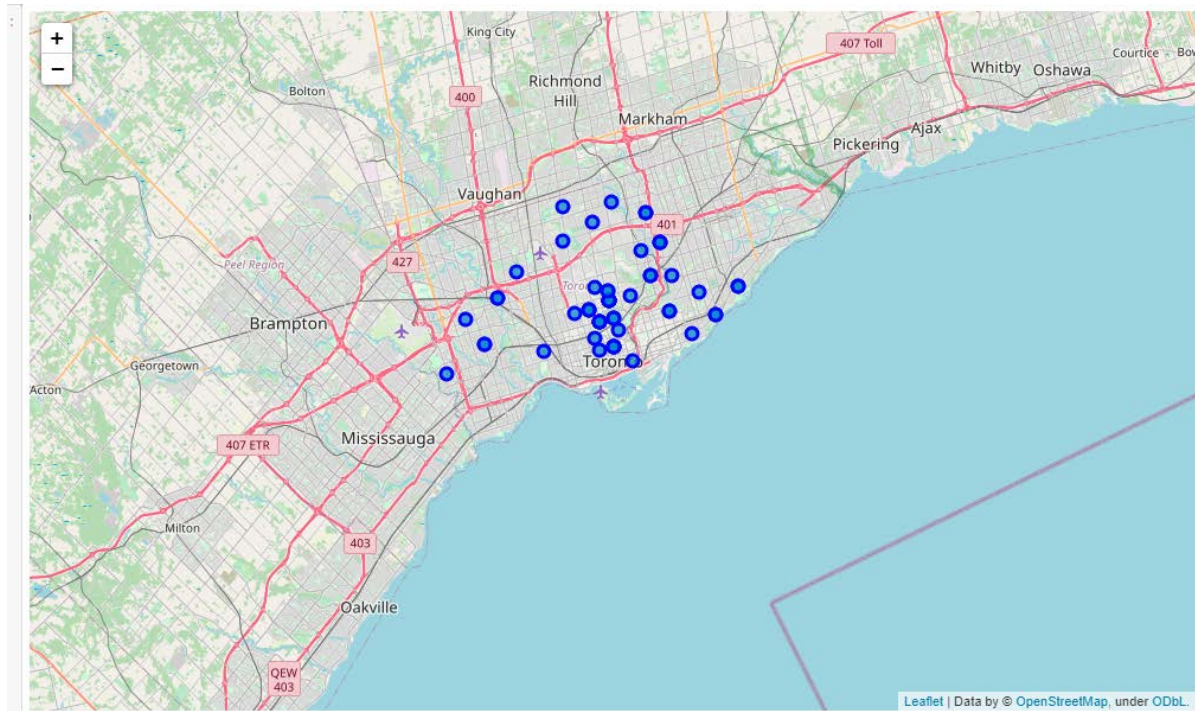
7J:

	Apt_Name	EXTERIOR_FIRE_ESCAPE	FIRE_ALARM
0	345 Lonsdale	NO	YES
1	Bathurst Street	NO	YES
2	140 Carlton	NO	YES
3	Cambridge Place Apartments	NO	YES
4	West22	NO	YES
5	2560 Kingston	NO	YES
6	2550 Kingston	NO	YES
7	The Montgomery	YES	YES
8	VIA123	NO	YES
9	50 Prince Arthur	NO	YES
10	329 The West Mall	NO	YES
11	BEACHHill Apartments	NO	YES

K-means Clustering

Create Map of Toronto

Create a Map of Toronto using the combined dataframe as input and using folium package. This map will show all the boroughs and neighbourhoods for the apartments shortlisted so far.



FourSquare Data

Use FourSquare API to get venue information for the shortlisted apartments. This will help the prospective tenant to decide on which neighbourhood to stay based on the availability of preferred venues in different neighbourhoods.

First explore one venue to see the information returned.

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J:
```

	name	categories	lat	lng
0	Local Leaside	Sports Bar	43.710012	-79.363514
1	Rack Attack	Sporting Goods Shop	43.706934	-79.362261
2	Olde Yorke Fish & Chips	Fish & Chips Shop	43.706141	-79.361829
3	CrossFit Toronto	Gym	43.708100	-79.359060
4	LCBO	Liquor Store	43.710571	-79.360287

Then get information regarding all the venues for the shortlisted apartments.

Analyze Neighbourhoods

With the data for the different venues now available, we can analyse the information. We will use the one-hot encoding approach to assign ones and zeroes to each venue.

J1:

	Neighborhood	Afghan Restaurant	American Restaurant	Antique Shop	Art Gallery	Arts & Crafts Store	Asian Restaurant	Bagel Shop	Bakery	Bank	...	Tennis Court	Thai Restaurant	Theater	Theme Restaurant	Toy / Game Store	Trail
0	Leaside	0	0	0	0	0	0	0	0	0	...	0	0	0	0	0	0
1	Leaside	0	0	0	0	0	0	0	0	0	...	0	0	0	0	0	0
2	Leaside	0	0	0	0	0	0	0	0	0	...	0	0	0	0	0	0
3	Leaside	0	0	0	0	0	0	0	0	0	...	0	0	0	0	0	0
4	Leaside	0	0	0	0	0	0	0	0	0	...	0	0	0	0	0	0

5 rows × 120 columns

This will provide us with information regarding the venues that are available in a particular neighbourhood. Then we will group these together by the mean of occurrence of each category.

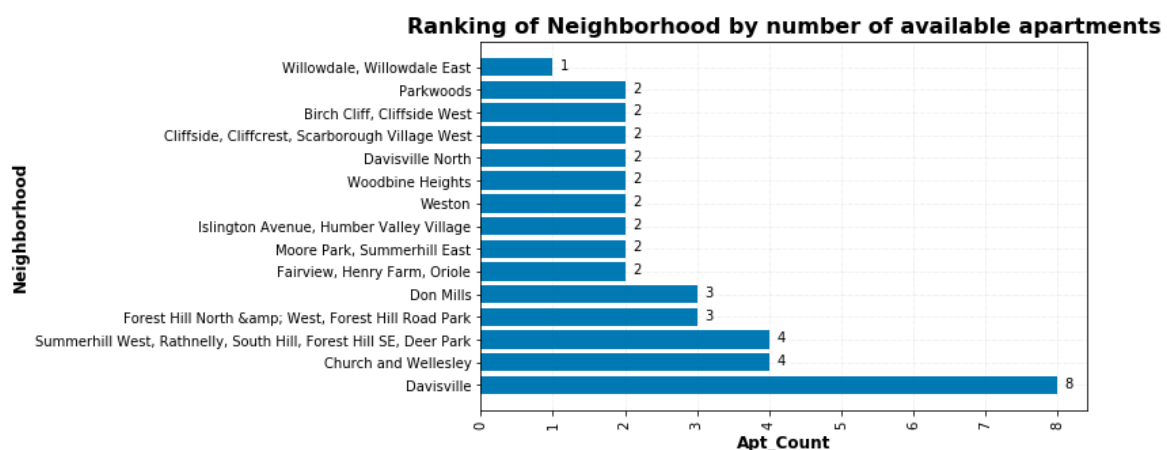
J1:

	Neighborhood	Afghan Restaurant	American Restaurant	Antique Shop	Art Gallery	Arts & Crafts Store	Asian Restaurant	Bagel Shop	Bakery	Bank	...	Tennis Court	Thai Restaurant	Theater	Theme Restaurant	C
0	Bayview Village	0.000000	0.062500	0.0	0.0	0.000000	0.0	0.0625	0.0	0.0625	...	0.000000	0.000000	0.000000	0.000000	0.00
1	Birch Cliff, Cliffside West	0.000000	0.000000	0.0	0.0	0.000000	0.0	0.0000	0.0	0.0000	...	0.030303	0.030303	0.000000	0.000000	0.03
2	Church and Wellesley	0.013158	0.013158	0.0	0.0	0.013158	0.0	0.0000	0.0	0.0000	...	0.000000	0.013158	0.013158	0.013158	0.00
3	Cliffside, Cliffcrest, Scarborough Village West	0.013158	0.013158	0.0	0.0	0.013158	0.0	0.0000	0.0	0.0000	...	0.000000	0.013158	0.013158	0.013158	0.00
4	Davisville	0.000000	0.062500	0.0	0.0	0.000000	0.0	0.0625	0.0	0.0625	...	0.000000	0.000000	0.000000	0.000000	0.00

5 rows × 120 columns

Get count of apartments in each neighbourhood

In this step we will get the count of the number of apartments available in each neighbourhood. This will help the prospective tenant to target neighbourhoods that have more apartments available for rent.



The graph above clearly shows that the Davisville neighbourhood has the maximum number of available apartments.

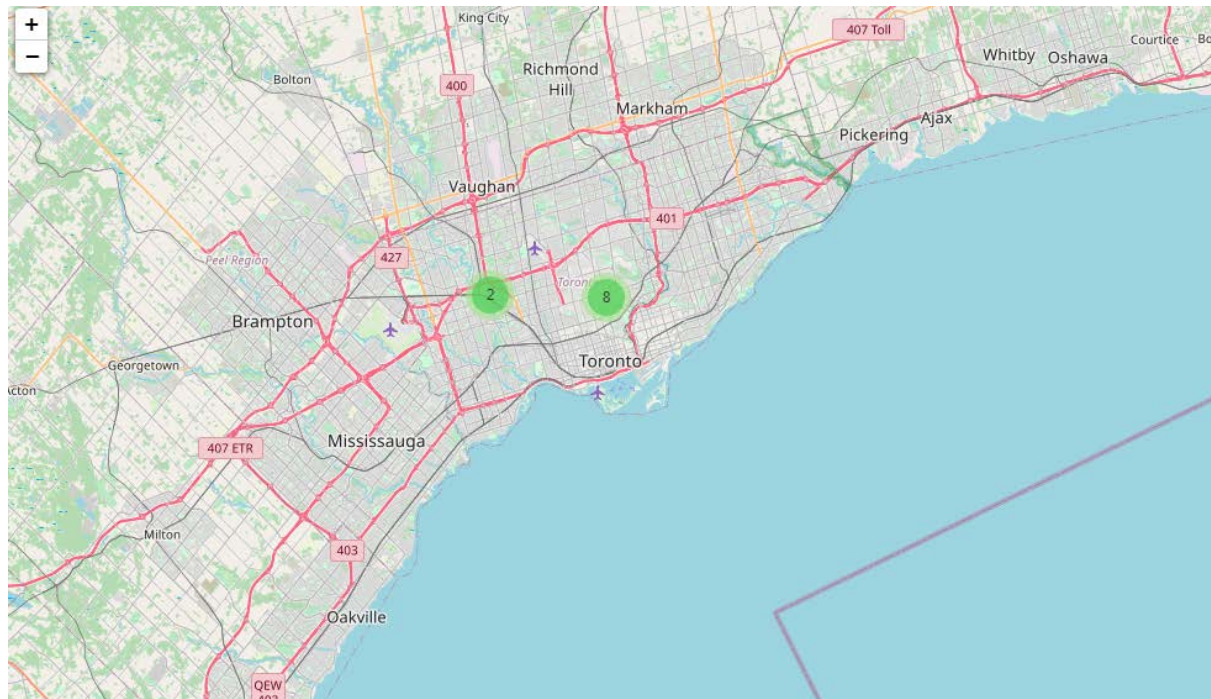
Rearrange Venues

In this step we will rearrange the venues to show the most commonly occurring venues in each neighbourhood.

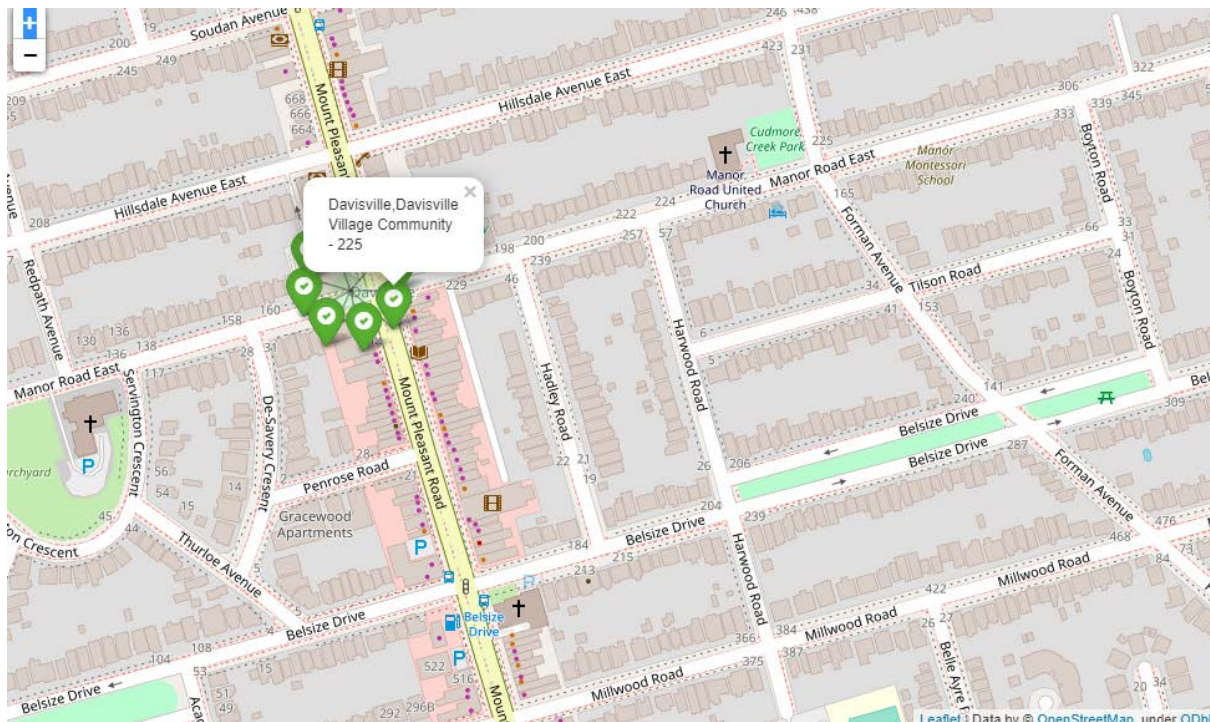
	Neighborhood	1st Most Common Venue	2nd Most Common Venue	3rd Most Common Venue	4th Most Common Venue	5th Most Common Venue	6th Most Common Venue	7th Most Common Venue	8th Most Common Venue	9th Most Common Venue	10th Most Common Venue
0	Bayview Village	Pub	Coffee Shop	Pizza Place	Sushi Restaurant	Liquor Store	Restaurant	Sports Bar	Bank	Supermarket	Bagel Shop
1	Birch Cliff, Cliffside West	Dessert Shop	Sandwich Place	Italian Restaurant	Café	Pizza Place	Coffee Shop	Sushi Restaurant	Gym	Diner	Brewery
2	Church and Wellesley	Coffee Shop	Sushi Restaurant	Japanese Restaurant	Restaurant	Gay Bar	Yoga Studio	Mediterranean Restaurant	Pizza Place	Hotel	Pub
3	Cliffside, Cliffcrest, Scarborough Village West	Coffee Shop	Sushi Restaurant	Japanese Restaurant	Restaurant	Gay Bar	Yoga Studio	Mediterranean Restaurant	Pizza Place	Hotel	Pub
4	Davisville	Pub	Coffee Shop	Pizza Place	Sushi Restaurant	Liquor Store	Restaurant	Sports Bar	Bank	Supermarket	Bagel Shop

Tenant Preferences

A new expatriate to the city will be looking for certain facilities in a neighbourhood prior to renting an apartment. Let's assume that the below parameters are examined by the prospective tenant - there should be public transportation available along with supermarkets, malls and good dining/wining options. The tenant would prefer neighbourhoods where these venues are available and active. Display the preferred neighbourhoods on a map.

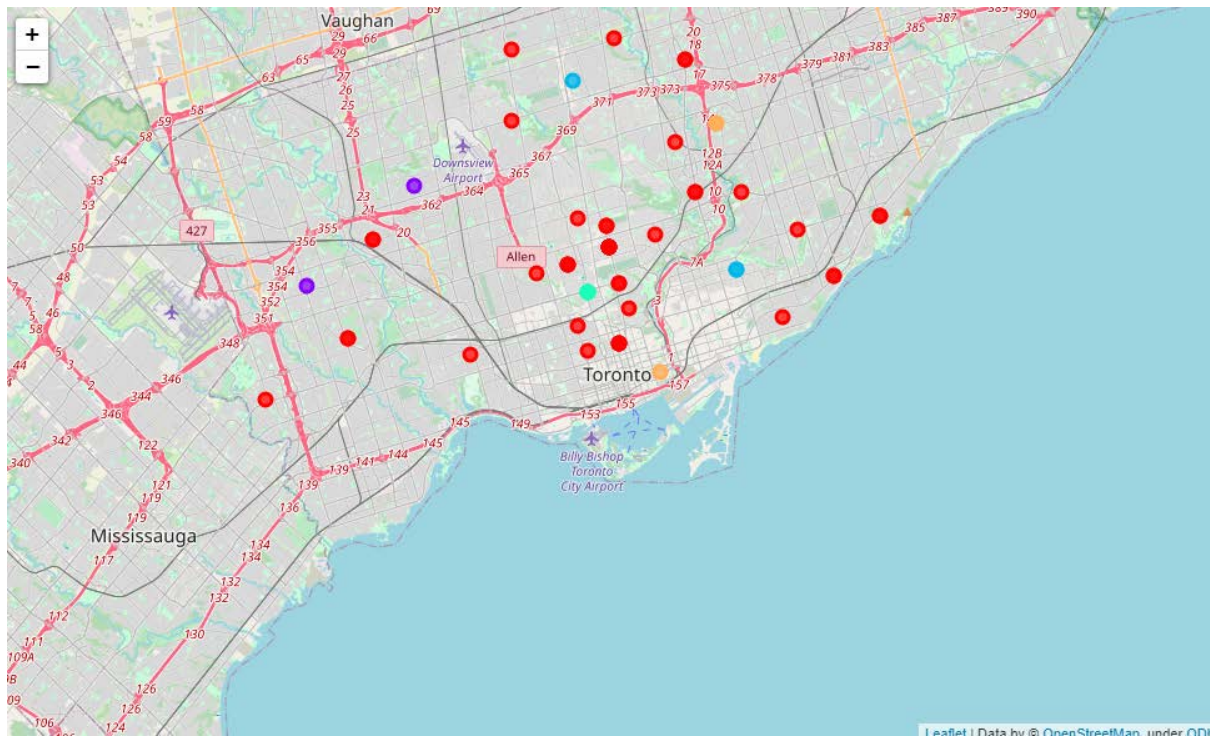


The below map shows the location for Davisville Village in Davisville which is one of preferred neighbourhoods.



Create Clusters

Finally, we will cluster all the above neighbourhoods using the k-means clustering algorithm. We will set the number of clusters to 5 and random_state to 0. Once the clusters are created, we will add those labels to the apartment data. Then use Folium to visualize the clusters.



We can then examine the clusters created so that we can see all the venues and salient features associated with an apartment within a particular cluster.

Convert the cluster dataframes to json records so that this data can be consumed by a web-app if required. We will perform this step so that a frontend can be connected to this solution and the clustered data can be presented to the front end. In practical terms, we cannot expect a tenant or real estate agent to be technically savvy enough to understand the output unless it is presented in an easy form. The conversion of this data to json will enable that possibility.

```
1 [562]: cluster_four_json
rt[562]: '[{"Apt_Street": "565 Avenue Road", "Rent_Avg": 2180, "Borough": "Central Toronto", "Neighborhood": "Summerhill West, Rathnelly, South Hill, Forest Hill SE, Deer Park", "Latitude": 43.6864123, "Longitude": -79.4000493, "EXTERIOR_FIRE_ESCAPE": "", "FIRE_ALARM": "", "GARBAGE_CHUTES": "", "BIKE_PARKING": "", "BARRIER_FREE_ACCESSIBILITY_ENTR": "", "LOCKER_OR_STORAGE_ROOM": "", "PETS_ALLOWED": "", "SITE_ADDRESS": "", "VISITOR_PARKING": "", "YEAR_BUILT": "", "NO_OF_STOREYS": "", "IS_THERE_EMERGENCY_POWER?": "", "NON-SMOKING_BUILDING": "", "NO_OF_ACCESSIBLEPARKING_SPACES": "", "NO_BARRIERFREE_ACCESSIBLE_UNITS": "", "Cluster_Labels": 3, "1st Most Common Venue": "Field", "2nd Most Common Venue": "Trail", "3rd Most Common Venue": "Hockey Arena", "4th Most Common Venue": "Tennis Court", "5th Most Common Venue": "Dim Sum Restaurant", "6th Most Common Venue": "Electronics Store", "7th Most Common Venue": "Dog Run", "8th Most Common Venue": "Distribution Center", "9th Most Common Venue": "Discount Store", "10th Most Common Venue": "Diner"}, {"Apt_Street": "291 Avenue Road", "Rent_Avg": 1750, "Borough": "Central Toronto", "Neighborhood": "Summerhill West, Rathnelly, South Hill, Forest Hill SE, Deer Park", "Latitude": 43.6864123, "Longitude": -79.4000493, "EXTERIOR_FIRE_ESCAPE": "", "FIRE_ALARM": "", "GARBAGE_CHUTES": "", "BIKE_PARKING": "", "BARRIER_FREE_ACCESSIBILITY_ENTR": "", "LOCKER_OR_STORAGE_ROOM": "", "PETS_ALLOWED": "", "SITE_ADDRESS": "", "VISITOR_PARKING": "", "YEAR_BUILT": "", "NO_OF_STOREYS": "", "IS_THERE_EMERGENCY_POWER?": "", "NON-SMOKING_BUILDING": "", "NO_OF_ACCESSIBLEPARKING_SPACES": "", "NO_BARRIERFREE_ACCESSIBLE_UNITS": "", "Cluster_Labels": 3, "1st Most Common Venue": "Field", "2nd Most Common Venue": "Trail", "3rd Most Common Venue": "Hockey Arena", "4th Most Common Venue": "Tennis Court", "5th Most Common Venue": "Dim Sum Restaurant", "6th Most Common Venue": "Electronics Store", "7th Most Common Venue": "Dog Run", "8th Most Common Venue": "Distribution Center", "9th Most Common Venue": "Discount Store", "10th Most Common Venue": "Diner"}, {"Apt_Street": "14 Deer Park Crescent", "Rent_Avg": 1450, "Borough": "Central Toronto", "Neighborhood": "Summerhill West, Rathnelly, South Hill, Forest Hill SE, Deer Park", "Latitude": 43.6864123, "Longitude": -79.4000493, "EXTERIOR_FIRE_ESCAPE": "", "FIRE_ALARM": "", "GARBAGE_CHUTES": "", "BIKE_PARKING": "", "BARRIER_FREE_ACCESSIBILITY_ENTR": "", "LOCKER_OR_STORAGE_ROOM": "", "PETS_ALLOWED": "", "SITE_ADDRESS": "", "VISITOR_PARKING": "", "YEAR_BUILT": "", "NO_OF_STOREYS": "", "IS_THERE_EMERGENCY_POWER?": "", "NON-SMOKING_BUILDING": "", "NO_OF_ACCESSIBLEPARKING_SPACES": "", "NO_BARRIERFREE_ACCESSIBLE_UNITS": "", "Cluster_Labels": 3, "1st Most Common Venue": "Field", "2nd Most Common Venue": "Trail", "3rd Most Common Venue": "Hockey Arena", "4th Most Common Venue": "Tennis Court", "5th Most Common Venue": "Dim Sum Restaurant", "6th Most Common Venue": "Electronics Store", "7th Most Common Venue": "Dog Run", "8th Most Common Venue": "Distribution Center", "9th Most Common Venue": "Discount Store", "10th Most Common Venue": "Diner"}]
```

Results

The results of this project can be summarized as below:

	Apartment Name/Number	Price	Borough	Neighbourhood	Cluster
Lowest priced apartment	Bathurst Street	\$1099	North York	Lawrence Manor, Lawrence Heights	1
	14 Deer Park	\$1450	Central Toronto	Summerhill West, Rathnelly, South Hill	1
Highest priced apartment	E-Central	\$7360	Central Toronto	Davisville North	1
	The Montgomery	\$4770	Central Toronto	North Toronto West, Lawrence Park	1
Average Price Range	Bathurst Street – ECentral	\$1187 - \$4591	North York – Central Toronto	Lawrence Manor, Lawrence Heights - Davisville North	1
Apartments with most fire safety features	The Montgomery		Central Toronto	North Toronto West, Lawrence Park	1
Number of apartments that satisfy tenant preferences	11	N/A	Central Toronto	Davisville	1
Number of Clusters	N/A	N/A	N/A		5
Cluster that satisfies all the requirements	N/A	N/A	N/A		1

Discussion and Recommendation

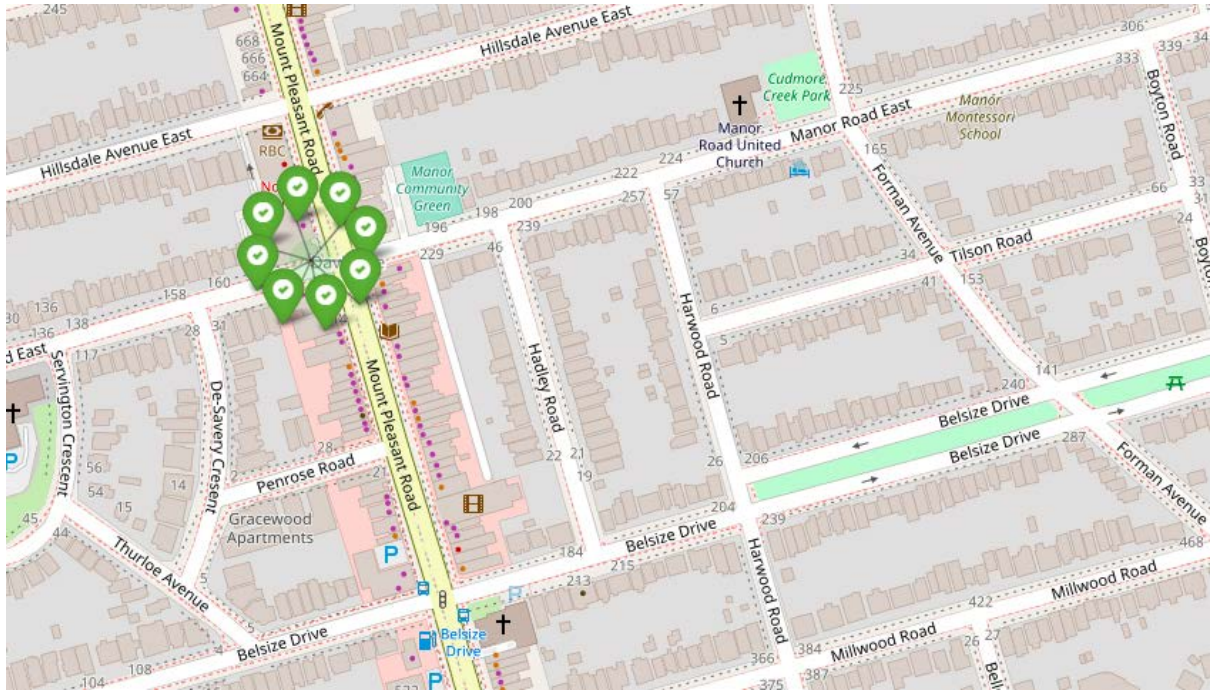
Based on the results, the following observation can be made:

- The average rental price has a wide variation starting from \$1187 and ending at \$4500 depending the apartment and neighbourhood.
- The apartment that has the maximum number of accessible parking spaces is ‘The Montgomery’. For a person looking for apartments with accessibility, this would be the ideal apartment.

- c. 'The Montgomery' and 'Beachhill' feature among the most expensive apartments and these apartments have a lot of amenities that other apartments do not. 'The Montgomery' is also the only apartment registered with the City of Toronto that has an exterior fire escape along with the alarm. 'West22' is another registered apartment that has accessible parking spaces and fire safety features. It is also amongst the top 10 most expensive apartment.
- d. Davisville neighbourhood has the maximum number of apartments available and it is the most expensive neighbourhood too. It is also part of Cluster one.
- e. Davisville is also a neighbourhood that has a lot of public transportation, wining and dining options along with supermarkets/pharmacy stores etc.
- f. Similarly, the borough of Central Toronto that includes the neighbourhoods of Summerhill West, Rathnelly has some of the cheapest available apartments. Interestingly, it is also the borough that has the most expensive apartment as well even though those are in different neighbourhoods. This borough also has most number of vacant apartments.

After analysing all this data, a prospective tenant is advised to search for an apartment in the Davisville neighbourhood. Given below are the apartments available in Davisville.

1	88 Redpath Avenue	Davisville
2	Angus House	Davisville
3	Vivere	Davisville
4	Davisville Village Community - 45	Davisville
5	The Torontonion	Davisville
6	Davisville Village Community - 77	Davisville
7	Davisville Village Community - 225	Davisville



Conclusion

This study helps us in understanding the apartment rental market of Toronto city. We can see the facilities and amenities available in each apartment and neighbourhood. Using Foursquare data we can get all the popular venues in each neighbourhood. We can get the number of apartments available in each neighbourhood and also cluster the neighbourhoods into 5 clusters based on the venues. This study also provides us with the rental price information of different apartments and how it differs across neighbourhoods. The maps generated by folium help showcase all the relevant information in an easy to understand manner. At the end, the conversion of the clustered data into json opens up the possibility of using all this data in a web-app.

The solution above will provide answers to the below questions that every prospective tenant looks for when searching for an apartment.

- What is the average rental price of different apartments and in different neighbourhoods?
- What are the ratings for each apartment?
- What are the entertainment options available in each apartment neighbourhood?
- What are the public transportation options available in each apartment neighbourhood?
- What are the safety features available for each apartment building?

This solution can be further improved by adding more data at source.

- a. Extract the page numbers from the RentCafe website and get apartment details for all the pages in a generic manner.

- b. Include other rental websites in the source data along with classifieds on different websites to return a comprehensive result.
- c. Check review comments regarding the apartments from different sites like Yelp, Foursquare and rate them.
- d. Plugin a web-app to this solution and the entire data can be viewed from a front-end.

Disclaimer:

This exercise has been completed as part of a project using data available openly on the internet. The author does not claim any authenticity of the data or the results.