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Exploring and cluster Toronto's borough for home-buyers

Background

- Toronto' population : 6, 139,000

- Diversities: 230 different nationalities

- Canada' commercial and financial centre

- 17% of immigrants choose Toronto as final destination

=> Raising concern:

- Which neighborhood in Toronto is suitable for one's lifestyles?

- Which neighborhood in Toronto has affordable housing?
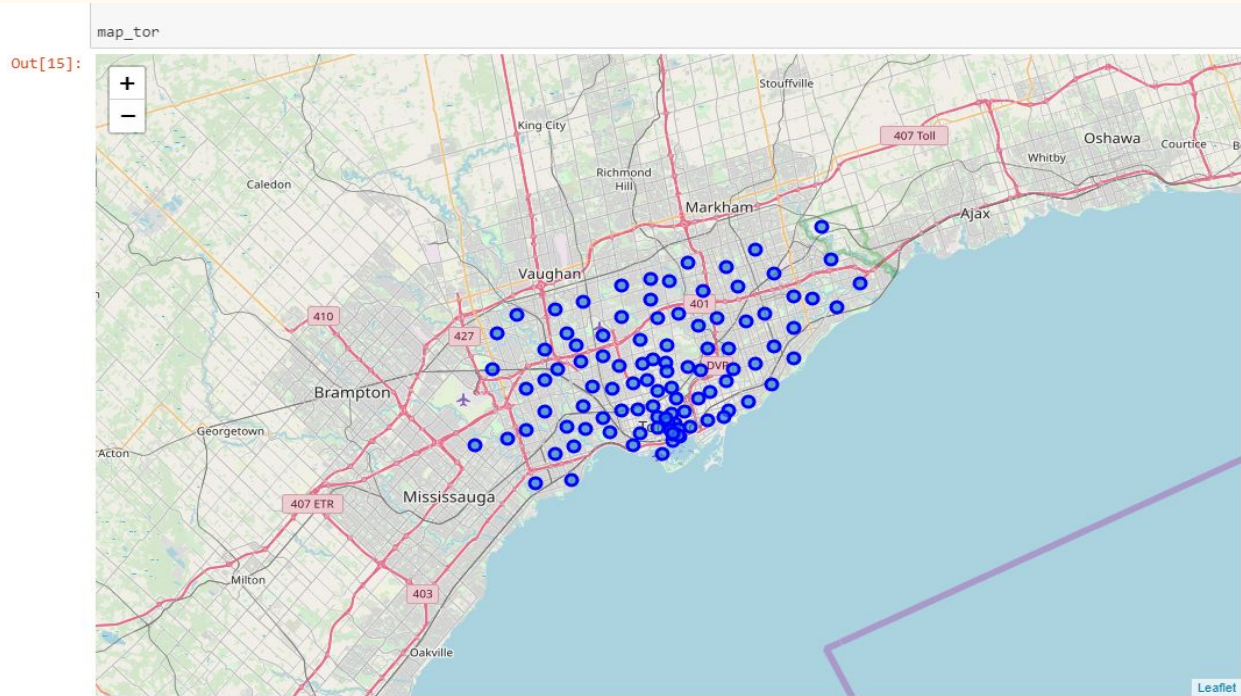
Using data to solve the problem:

- Explore and cluster the neighborhoods
- Analysis on house price in Toronto

2.1 Data cleaning and acquisition

Part 1: Explore and Cluster Toronto Neighborhoods

- Original data frame: 3 columns (Neighborhoods, Boroughs and Postal code) x 288 rows
- Drop missing borough. Assigned missing neighborhood the same as boroughs
- Final data frame: 3 columns x 103 rows

Exploratory Analysis and Cluster Neighborhood

-Using latitude and longitude from group of neighborhoods to create map through folium

-Map of Toronto with neighborhoods that share the same boroughs

Retrieve data venues information through Foursquare

(1718, 7)

	Neighborhood	Neighborhood Latitude	Neighborhood Longitude	Venue	Venue Latitude	Venue Longitude	Venue Category
0	The Beaches	43.676357	-79.293031	Glen Manor Ravine	43.676821	-79.293942	Trail
1	The Beaches	43.676357	-79.293031	Glen Stewart Ravine	43.676300	-79.294784	Other Great Outdoors
2	The Beaches	43.676357	-79.293031	The Big Carrot Natural Food Market	43.678879	-79.297734	Health Food Store
3	The Beaches	43.676357	-79.293031	Grover Pub and Grub	43.679181	-79.297215	Pub
4	The Beaches	43.676357	-79.293031	Domino's Pizza	43.679058	-79.297382	Pizza Place

- 1718 venues retrieved with venue name, venue categories , venues' longitude and latitude

Top 5 venues in each neighborhood

```
----Adelaide,King,Richmond----
              venue  freq
0        Coffee Shop  0.06
1               Café  0.04
2    Thai Restaurant  0.04
3                Bar  0.04
4         Steakhouse  0.03


----Berczy Park----
              venue  freq
0        Coffee Shop  0.09
1       Cocktail Bar  0.04
2      Farmers Market  0.04
3   Seafood Restaurant  0.04
4         Cheese Shop  0.04
```

- Example of 2 neighborhoods with top 5 venues

- Rank top 5 venues based on frequency of venue categories

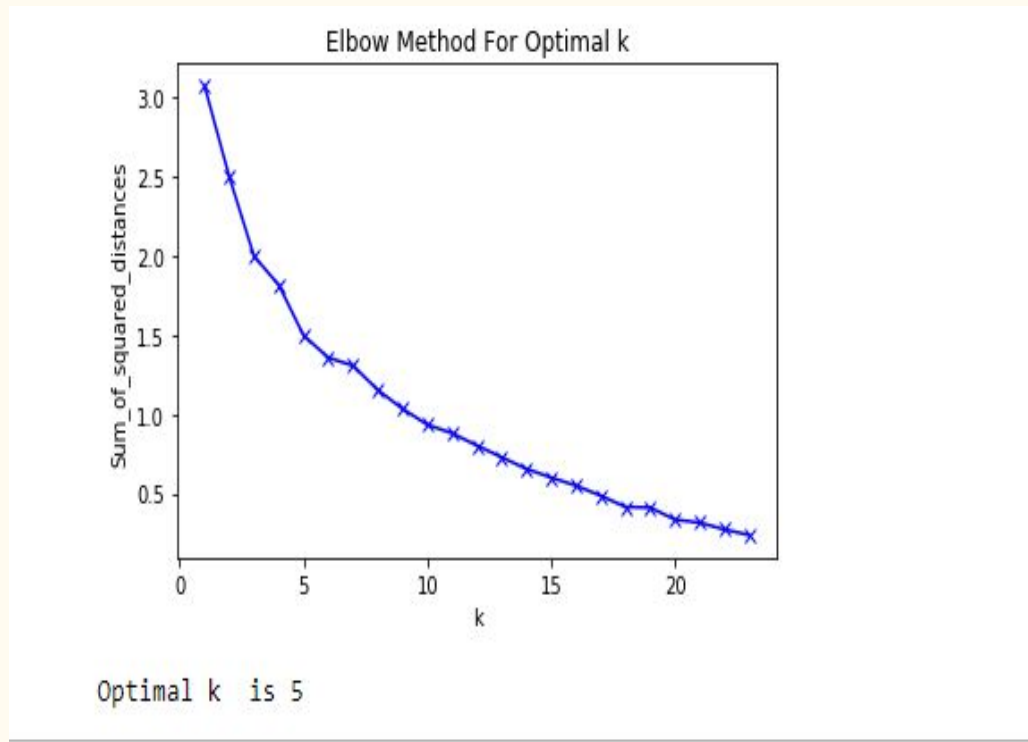- This also shows the discrepancy between top 5 most common venues

Top 10 common venues for each group neighborhoods
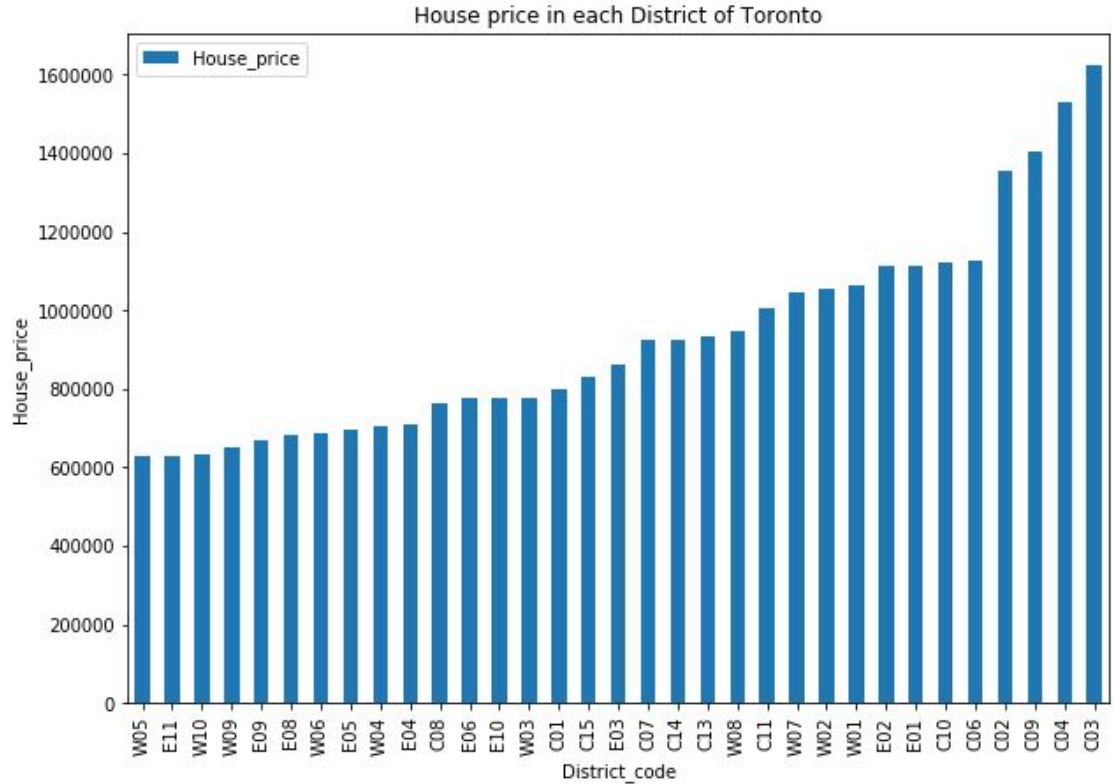
`neighborhoods_venues_sorted.head()`

Out[35]:

	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	Bar	Thai Restaurant	Steakhouse	Bakery	Cosmetics Shop	Sushi Restaurant	Restaurant	Burger Joint
1	Berczy Park	Coffee Shop	Seafood Restaurant	Cheese Shop	Steakhouse	Bakery	Farmers Market	Café	Beer Bar	Cocktail Bar	Department Store
2	Brockton,Exhibition Place,Parkdale Village	Café	Breakfast Spot	Coffee Shop	Bakery	Climbing Gym	Burrito Place	Stadium	Italian Restaurant	Restaurant	Intersection
3	Business Reply Mail Processing Centre 969 Eastern	Yoga Studio	Auto Workshop	Skate Park	Smoke Shop	Spa	Burrito Place	Farmers Market	Fast Food Restaurant	Restaurant	Recording Studio
4	CN Tower,Bathurst Quay,Island airport,Harbourf...	Airport Service	Airport Lounge	Airport Terminal	Boutique	Harbor / Marina	Rental Car Location	Coffee Shop	Plane	Boat or Ferry	Bar

Clustering Neighborhood in Toronto

- Find optimal K by Elbow Method. Run k ranging from 1 to 24
- Optimal k is 5
- Five cluster: Cluster 1 (34 points. Cluster 2 (2 points). Cluster 3 (2 ponts). Cluster 4 (1 point). Cluster 5 (1 points)

House price across districts in Toronto

House price in each District of Toronto

The average house price in Toronto across Districts is $926,360

The district that has the lowest house price is W05. Its average house price is $629,500.

The district that has the highest house price is C03. Its average house price is $1,623,800.

Conclusion and application

- Real estate agents can segment their customers based on their needs to recommend appropriate clusters of neighborhoods. For example, families will prefere clusters of neighborhoods that have lots of parks for their children. Clusters of neighborhoods like Rosedale, Forrest Hill North , Forrest Hill North.

- Regarding house prices in Toronto, real estate agents and home-buyers can find appropriate neighbors with a suitable price range.

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- These two results can be further analyzed and applied if real estate companies have a range of customer profiles with specific budgets and preference in the neighborhood.