

The Battle of Neighborhoods

Compare the most common venue category
in the neighborhoods of Toronto





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- In this project, we will compare the most common venues category in the neighborhoods of Toronto.
- Since there are lots of venues category in neighborhoods of Toronto we will try to detect which type of venue category are more common in Neighborhoods.
- Specifically, this report will be targeted to stakeholders interested in finding the optimal venue category in the neighborhoods of Toronto.
- The advantages of venue category in each neighborhood will then be clearly expressed so that the best possible final venue category can be chosen by stakeholders.



Data acquisition

Following data sources will be needed for analysis of Neighborhoods of Toronto:

- For all the information we need to explore and cluster the neighborhoods in Toronto a Wikipedia page exists,
link:https://en.wikipedia.org/wiki/List_of_postal_codes_of_Canada:_M.
- For scraping the table, we can simply use pandas to read the table into a pandas dataframe.
- For the geographical coordinates of each postal code, read a CSV file (link:https://cocl.us/Geospatial_data) using pandas dataframe.
- Explore the neighborhoods and segment them using Foursquare API.

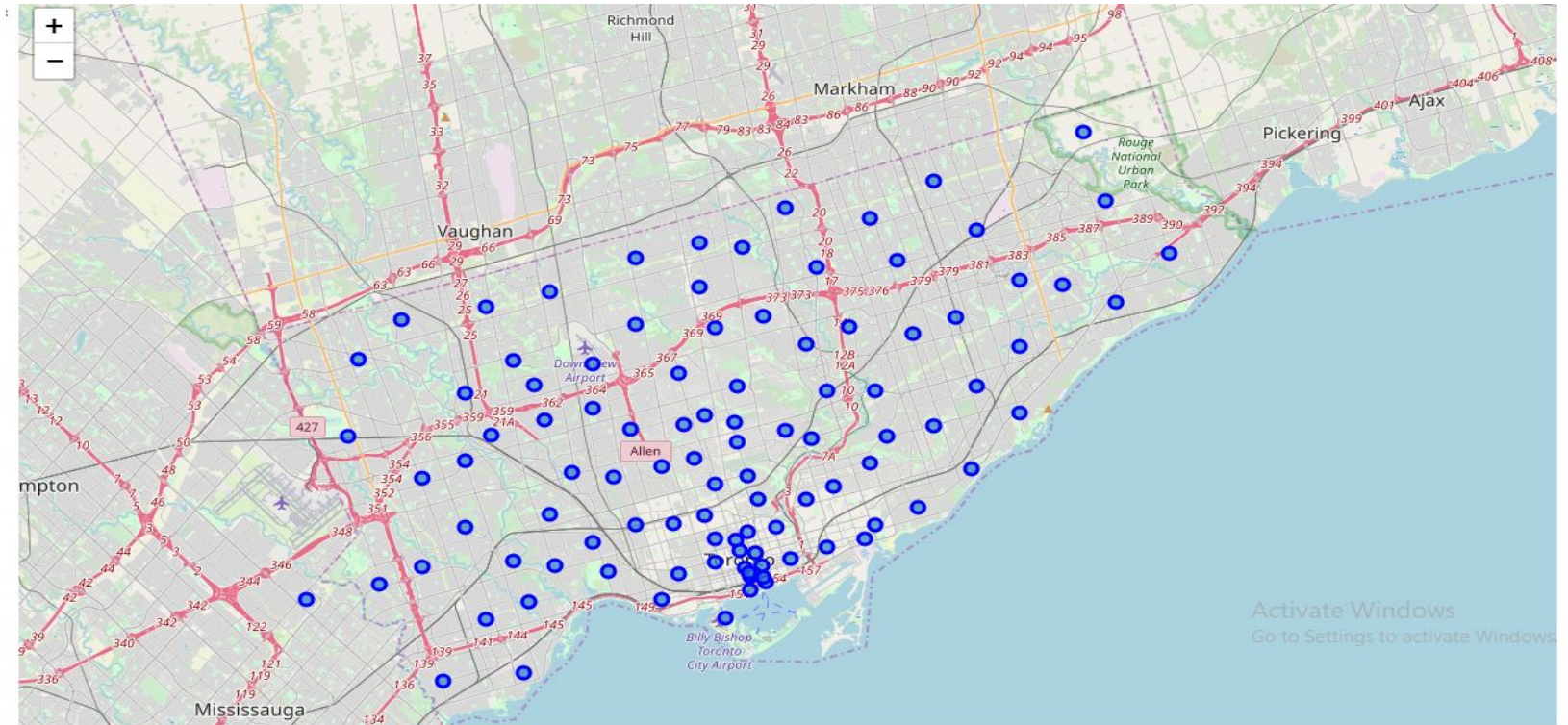


Data Cleaning

- Data downloaded and scraped from multiple sources were combined into one table.
- When we scrap the table using pandas dataframe, there were a lot of Not assigned 'borrow' and a lot of Not assigned 'neighborhoods' in the table, we drop cells with a 'borough' that is Not assigned.
- There is more than one neighborhood that can exist in one postcode area. These rows will be combined into one row with the neighborhoods separated with a comma using 'groupby'.

Analysis

The dataframe has 11 boroughs and 103 neighborhoods.





Different neighborhoods have same 1st most common venues, 2nd most common venue and up to 10th most common venues.

In the following table, neighborhoods Albion Gardens, Beaumont Heights, Humbergate in row 3 have same 1st most common venues, 2nd most common venue and up to 10th most common venues

	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	Thai Restaurant	Steakhouse	Salad Place	Restaurant	Burger Joint	Bar	Bakery	Sushi Restaurant
1	Agincourt	Lounge	Latin American Restaurant	Skating Rink	Breakfast Spot	Donut Shop	Dim Sum Restaurant	Diner	Discount Store	Dog Run	Doner Restaurant
2	Agincourt North,L'Amoreaux East,Milliken,Steel...	Park	Playground	Women's Store	Doner Restaurant	Department Store	Dessert Shop	Dim Sum Restaurant	Diner	Discount Store	Dog Run
3	Albion Gardens,Beaumont Heights,Humburgate,Jam...	Pizza Place	Fried Chicken Joint	Grocery Store	Pharmacy	Beer Store	Fast Food Restaurant	Sandwich Place	Discount Store	Department Store	Dessert Shop
4	Alderwood,Long Branch	Pizza Place	Skating Rink	Sandwich Place	Coffee Shop	Gym	Pub	Pharmacy	Pool	Deli / Bodega	Department Store



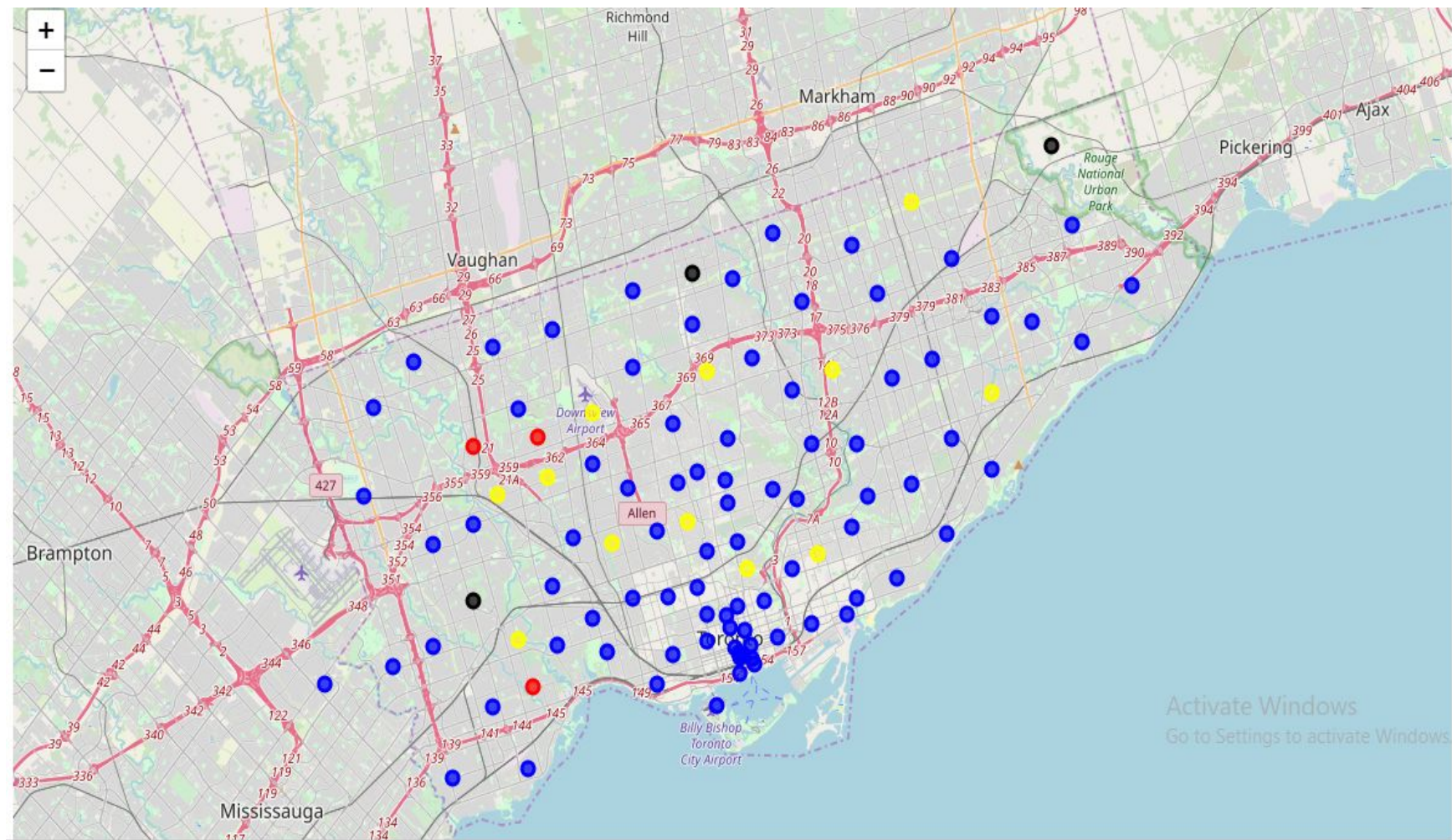
Clustering Models

Here we have to group similar type venue categories so, we have used K-means clustering models to cluster similar types of venues. We have Taken $k=3$ (where k is number of cluster) for cluster analysis.

Finally, visualize the resulting clusters. Same color shows the same type of cluster, cluster 1 of red color, cluster 2 of blue color and cluster 3 of yellow color.

After visualizing the map we have analyze that

- cluster 1 is smaller than cluster 2 and cluster 3
- cluster 2 is larger than cluster 1 and cluster 3 and
- cluster 3 is larger than cluster 1 and smaller than cluster 2.



Cluster 1

We have analyzed that the 1st most common venue category is Baseball Field.

Cluster 1

```
: toronto_merged.loc[toronto_merged['Cluster Labels'] == 0, toronto_merged.columns[[1] + list(range(5, toronto_merged.shape[1]))]]
```

	Borough	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	8th Most Common Venue	9th Most Common Venue	10th Most Common Venue
32	North York	0.0	Baseball Field	Food Truck	Women's Store	Dim Sum Restaurant	Diner	Discount Store	Dog Run	Doner Restaurant	Donut Shop	Department Store
91	Etobicoke	0.0	Deli / Bodega	Baseball Field	Dim Sum Restaurant	Diner	Discount Store	Dog Run	Doner Restaurant	Donut Shop	Drugstore	Department Store
97	North York	0.0	Baseball Field	Women's Store	Dim Sum Restaurant	Diner	Discount Store	Dog Run	Doner Restaurant	Donut Shop	Drugstore	Department Store

Cluster 2

We have analyzed that the most common venue category are Fast Food Restaurant, Coffee Shop, Pizza Place.

Cluster 2

```
toronto_merged.loc[toronto_merged['Cluster Labels'] == 1, toronto_merged.columns[[1] + list(range(5, toronto_merged.shape[1]))]]
```

	Borough	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	8th Most Common Venue	9th Most Common Venue	10th Most Common Venue
0	Scarborough	1.0	Fast Food Restaurant	Women's Store	Donut Shop	Dessert Shop	Dim Sum Restaurant	Diner	Discount Store	Dog Run	Doner Restaurant	Drugstore
1	Scarborough	1.0	Bar	Women's Store	Donut Shop	Dim Sum Restaurant	Diner	Discount Store	Dog Run	Doner Restaurant	Drugstore	Department Store
2	Scarborough	1.0	Rental Car Location	Mexican Restaurant	Spa	Breakfast Spot	Medical Center	Intersection	Electronics Store	Pizza Place	Concert Hall	Construction & Landscaping
3	Scarborough	1.0	Coffee Shop	Korean Restaurant	Women's Store	Donut Shop	Dessert Shop	Dim Sum Restaurant	Diner	Discount Store	Dog Run	Doner Restaurant
4	Scarborough	1.0	Fried Chicken Joint	Gas Station	Hakka Restaurant	Bakery	Bank	Athletics & Sports	Caribbean Restaurant	Thai Restaurant	Dessert Shop	Dim Sum Restaurant
6	Scarborough	1.0	Hobby Shop	Coffee Shop	Discount Store	Convenience Store	Department Store	Electronics Store	Eastern European Restaurant	Dumpling Restaurant	Drugstore	Deli / Bodega
7	Scarborough	1.0	Bakery	Bus Line	Park	Metro Station	Soccer Field	Bus Station	Fast Food Restaurant	Intersection	Diner	Discount Store
8	Scarborough	1.0	Motel	American Restaurant	Women's Store	Department Store	Dessert Shop	Dim Sum Restaurant	Diner	Discount Store	Dog Run	Doner Restaurant

Cluster 3

We have analyzed that the 1st most common venue category is Park.

Cluster 3

```
toronto_merged.loc[toronto_merged['Cluster Labels'] == 2, toronto_merged.columns[[1] + list(range(5, toronto_merged.shape[1]))]]
```

	Borough	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	8th Most Common Venue	9th Most Common Venue	10th Most Common Venue
5	Scarborough	2.0	Playground	Women's Store	Doner Restaurant	Department Store	Dessert Shop	Dim Sum Restaurant	Diner	Discount Store	Dog Run	Donut Shop
14	Scarborough	2.0	Park	Playground	Women's Store	Doner Restaurant	Department Store	Dessert Shop	Dim Sum Restaurant	Diner	Discount Store	Dog Run
23	North York	2.0	Park	Convenience Store	Bank	Donut Shop	Dim Sum Restaurant	Diner	Discount Store	Dog Run	Doner Restaurant	Women's Store
25	North York	2.0	Park	Food & Drink Shop	Women's Store	Doner Restaurant	Dessert Shop	Dim Sum Restaurant	Diner	Discount Store	Dog Run	Donut Shop
30	North York	2.0	Park	Airport	Women's Store	Donut Shop	Dessert Shop	Dim Sum Restaurant	Diner	Discount Store	Dog Run	Doner Restaurant



Results

- For Neighborhood Borrow 'Scarborough' most common venue category is 'Fast Food Restaurant'.
- For Neighborhood Borrow 'Etobicoke' most common venue category is 'Pizza Place Store'.
- For Neighborhood Borrow 'East Toronto' most common venue category is 'Coffee Shop'.
- For Neighborhood Borrow 'Central Toronto' most common venue category is Gym'.
- For Neighborhood Borrow 'Downtown Toronto' most common venue category is 'Coffee Shop'.
- For Neighborhood Borrow 'North York' most common venue category are 'Baseball Field', 'Grocery Store', 'Park'.
- We have seen that the 1st most common venue category in cluster 1 is Baseball Field, in cluster 2 are Fast Food Restaurant, Coffee Shop, Pizza Place, and in cluster 3 is Park.



Conclusion

- Our analysis shows that although there is a great number of different types of venue category in neighborhoods of Toronto.
- The purpose of this project was to identify the most common venue category in neighborhoods of Toronto, in order to aid stakeholders in narrowing down the search for the optimal venue category in the neighborhoods of Toronto.
- Final decision on optimal neighborhoods venue category will be made by stakeholders based on specific characteristics of neighborhoods, taking into consideration additional factors like the attractiveness of each neighborhood, levels of noise/proximity to major roads, real estate availability, prices, social and economic dynamics of every neighborhood, etc.