



BATTLE OF NEIGHBORHOODS

Towards IBM Data Science Certification Organized By Coursera

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1. Business Understanding

1.1. Background

- ❑ The report is for a friend who is hoping to leave **Toronto Islands** in **Downtown Toronto** (the most populated borough in Toronto) for an undecided place but would like to go for a place similar to where he currently stays i.e. The city must be similar to **Toronto Island** and must in the same capital city of Toronto
- ❑ Also, we would also like to find the optimal location for a new **restaurant**. Our location of interest is a **densely populated area with few restaurants or no restaurant**.

1.2. Interest

- ❑ The first part of this project involves comparing two most populated Boroughs in the city of Toronto to seek for clusters or patterns among neighborhoods.
- ❑ The second part involves analyzing and recommend a place in any of the neighborhoods for anyone planning to open a restaurant.

2. Data Acquisition and Cleaning

2.1. Data Acquisition

❑ The link below has the follow;

- Canada data:

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

- Population Information:

<https://www12.statcan.gc.ca/censusrecensement/2016/dp-pd/hlt-fst/pd-pl/Table.cfm?Lang=Eng&T=1201&SR=1&S=22&O=A&RPP=9999&PR=0>

- Geocoordinates of Canada by Postal codes: http://cocl.us/Geospatial_data

2.2. Data Cleaning

- ❑ Some of the table scraped from the website contains some missing data , some of which were deleted , replaced and merged. The resulting data frame is shown below;

```
In [272]: # Cocatenate the dataframes of West Toronto and Downtown Toronto
West_Downtown_Tor = pd.concat([West_Tor, Downtown_Tor], join='inner').reset_index(drop=True)
West_Downtown_Tor.head()
```

Out[272]:

	Borough	Neighbourhood	Population	Latitude	Longitude
0	West Toronto	Dufferin,Dovercourt Village	44950.0	43.669005	-79.442259
1	West Toronto	Parkdale Village,Exhibition Place,Brockton	40957.0	43.636847	-79.428191
2	West Toronto	High Park,The Junction South	40035.0	43.661608	-79.464763
3	West Toronto	Swansea,Runnymede	34299.0	43.651571	-79.484450
4	West Toronto	Trinity,Little Portugal	32684.0	43.647927	-79.419750

Fig. 1 : Datasets of West and Downtown Toronto

Neighborhood Visualization Map

- We can visualize the neighborhoods in West and Downtown Toronto by creating a map of Toronto and add the neighborhoods as markers

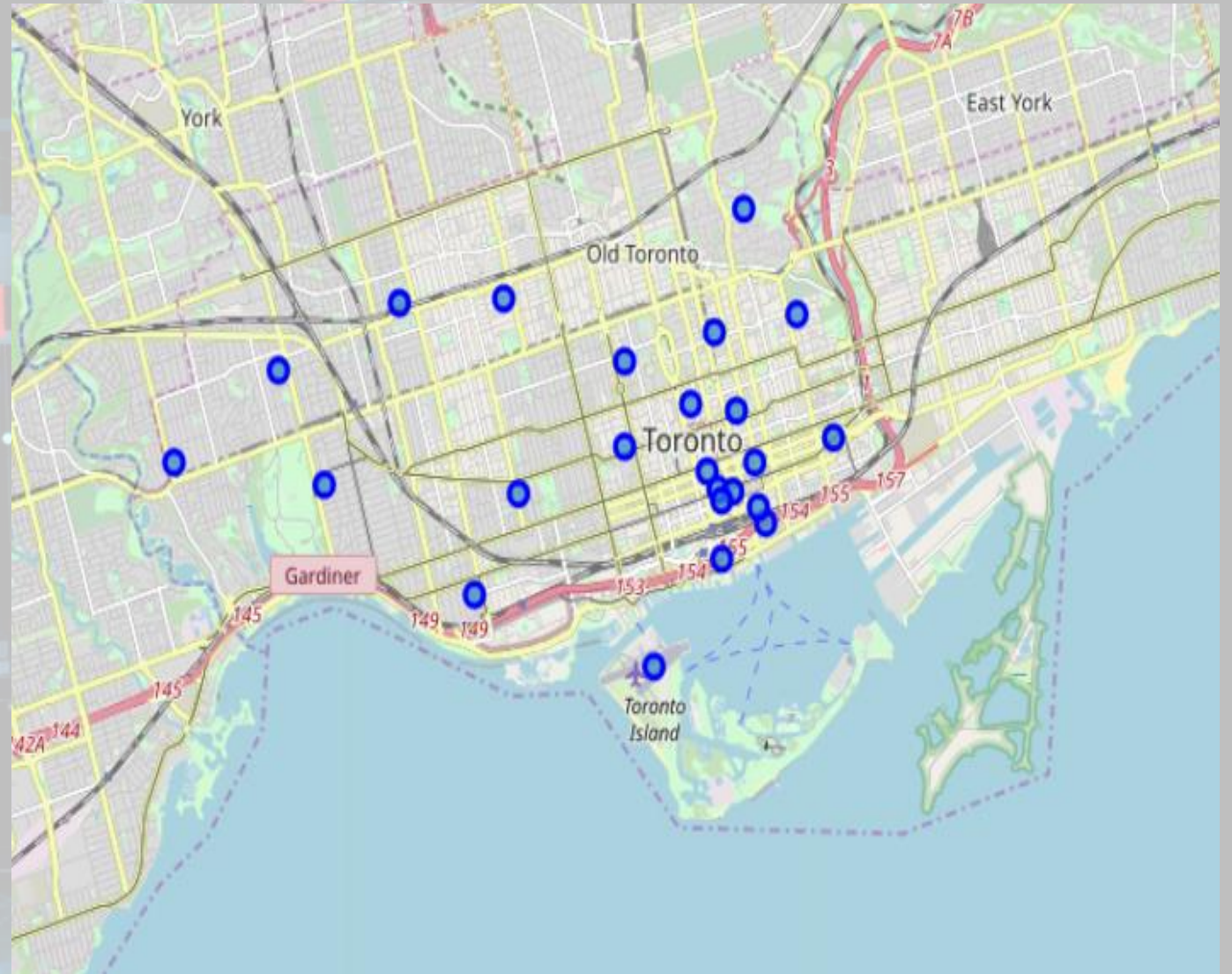


Fig. 2 : Map of Toronto with some neighborhoods

3. Analysis

- ❑ Using Foursquare API, the top 100 venues in each neighborhood was extracted.
- ❑ The neighborhoods with the highest number of venues is shown in Fig. 3
- ❑ Similarly, the number of restaurants in all neighborhoods with West and Downtown Toronto is displayed in Fig.4
- ❑ The top 5 restaurant types in the whole neighborhoods was extracted (Fig. 5) and also, the top 20 neighborhoods were ranked according to the number of restaurants as shown in Fig. 6

```
In [345]: #Sort dataframe by venues in descending order
West_Downtown_most_venues_sorted = West_Downtown_most_venues.sort_values('Venue', ascending=False)
# Since the max is 100 , we print dataframe with venues equal to the maximum values
West_Downtown_most_venues_sorted = West_Downtown_most_venues[West_Downtown_most_venues['Venue']==100]
West_Downtown_most_venues_sorted
```

Out[345]:

Neighbourhood	Neighbourhood Latitude	Neighbourhood Longitude	Venue	Venue Latitude	Venue Longitude	Venue Category
Adelaide,Richmond,King	100	100	100	100	100	100
Chinatown,Kensington Market,Grange Park	100	100	100	100	100	100
Commerce Court,Victoria Hotel	100	100	100	100	100	100
Design Exchange,Toronto Dominion Centre	100	100	100	100	100	100
First Canadian Place,Underground city	100	100	100	100	100	100
Ryerson,Garden District	100	100	100	100	100	100
St. James Town	100	100	100	100	100	100
Union Station,Toronto Islands,Harbourfront East	100	100	100	100	100	100

Fig. 3: Neighborhoods with the highest number of venues

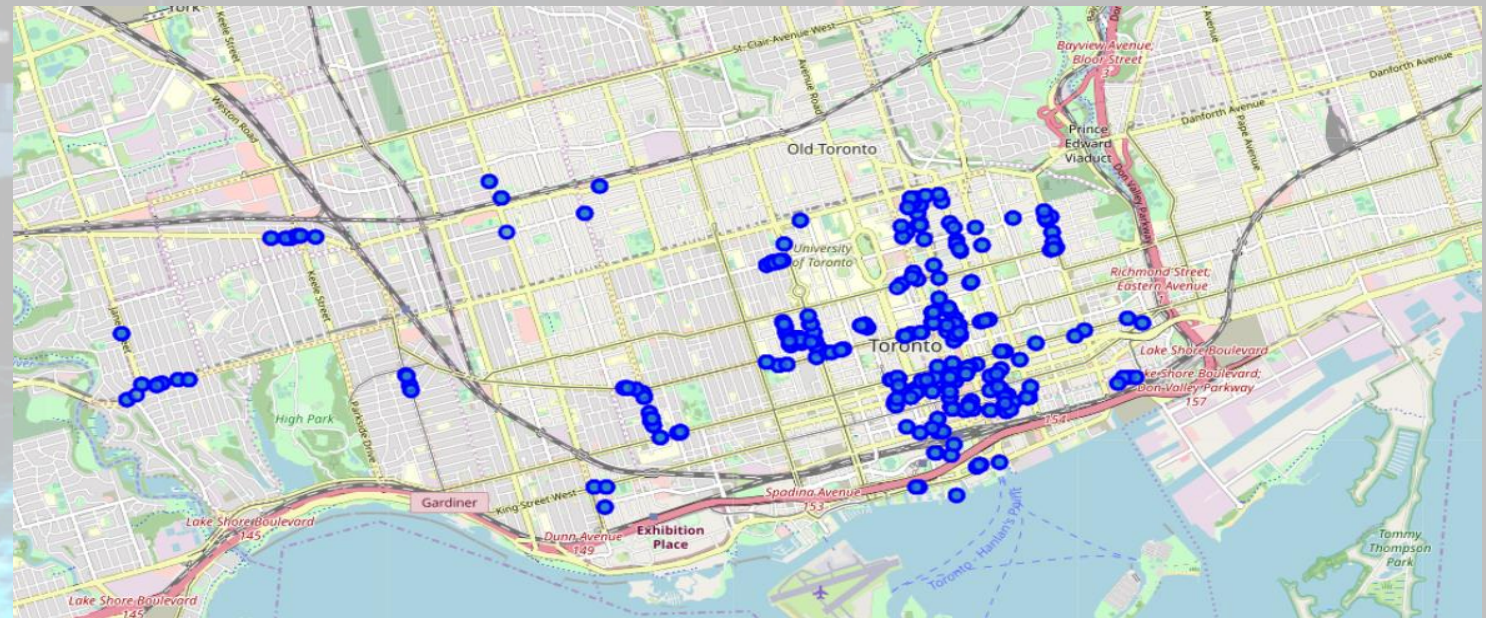


Fig. 4: Map of Toronto with the restaurants in West and Downtown Toronto

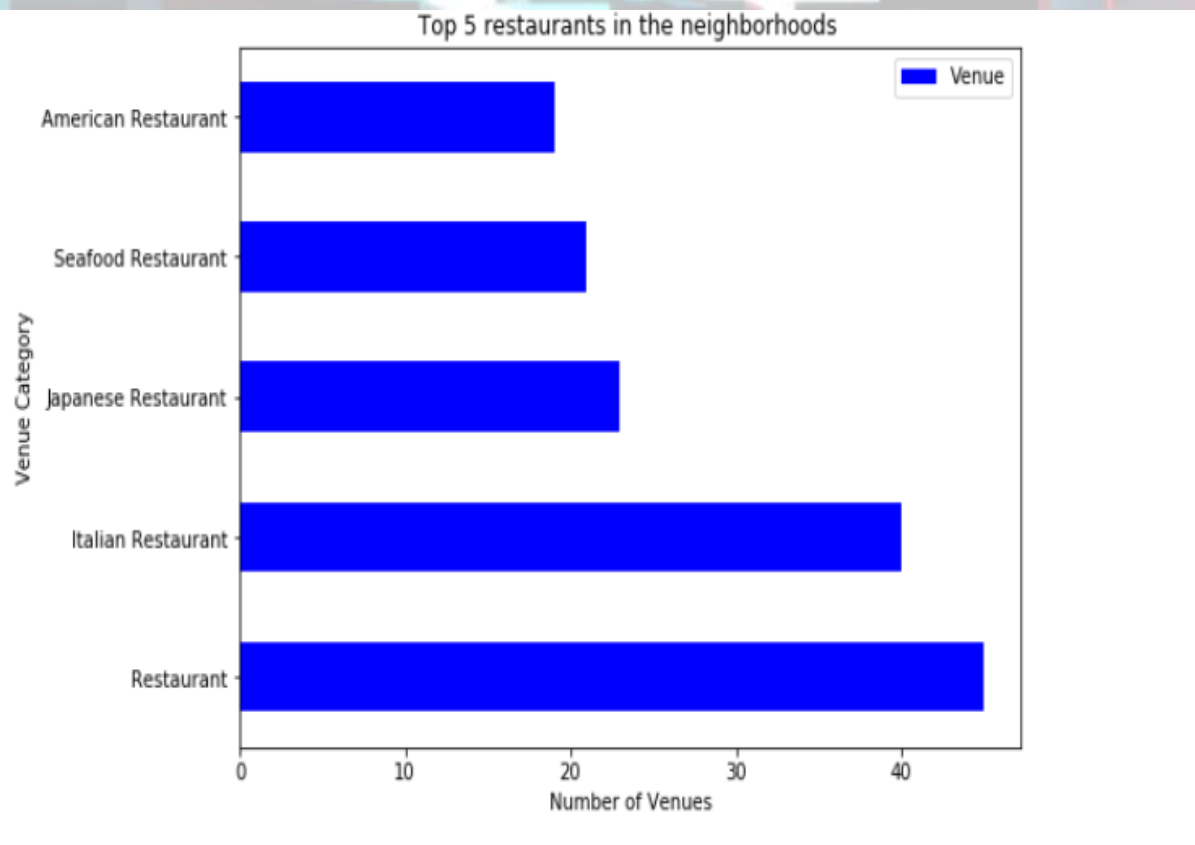


Fig. 5 : Horizontal Bar Graph representing the top 5 restaurants in the neighborhoods

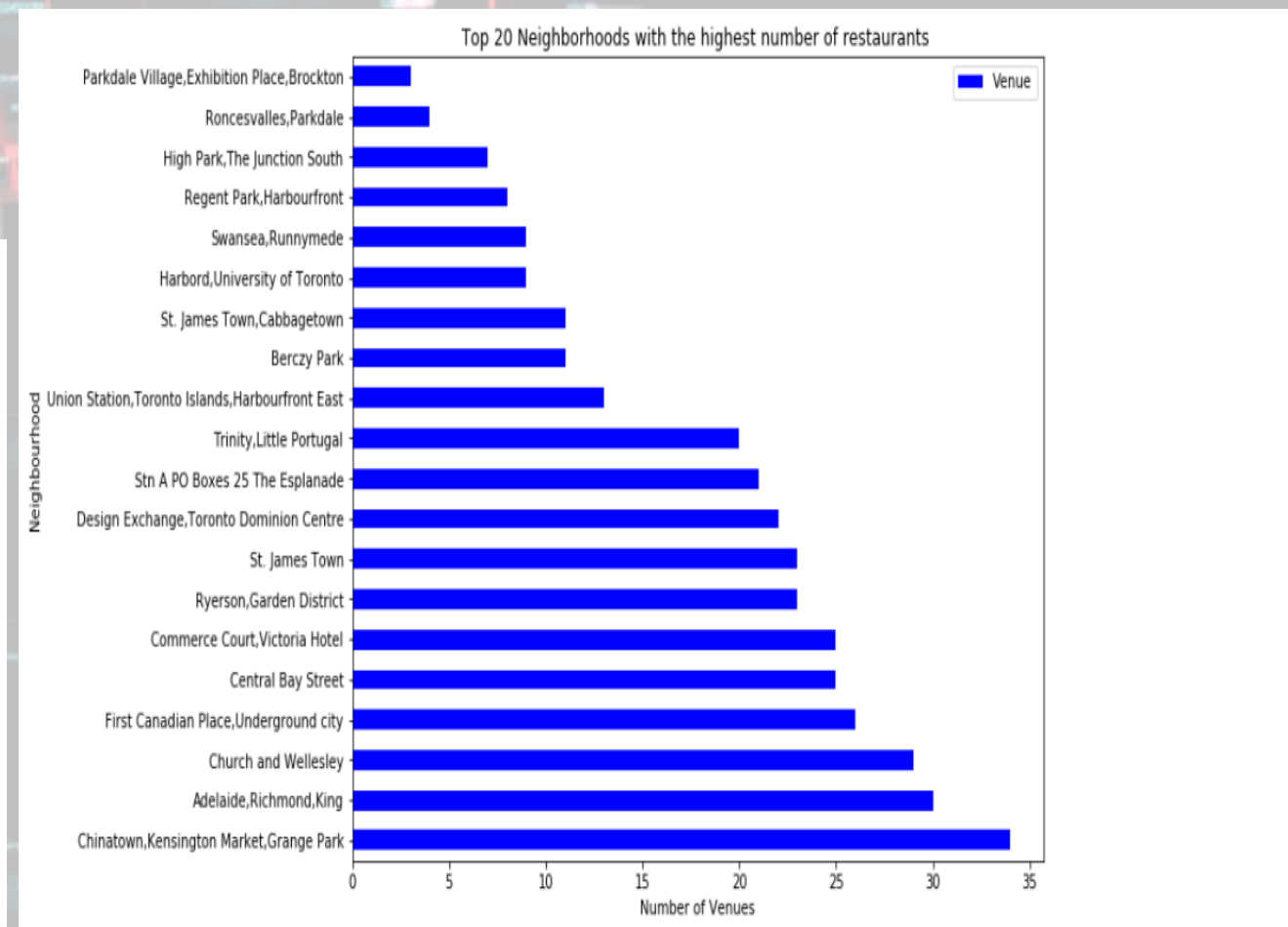


Fig. 6 : Horizontal Bar Graph representing the ranking of neighborhoods according to the number of restaurants

Out[314]:

	Neighbourhood	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, Richmond, King	Coffee Shop	Café	American Restaurant	Thai Restaurant	Bar	Steakhouse	Burger Joint	Hotel	Restaurant	Asian Restaurant
1	Bathurst Quay, CN Tower, Railway Lands, South Nia...	Airport Service	Airport Lounge	Airport Terminal	Boutique	Sculpture Garden	Plane	Boat or Ferry	Bar	Harbor / Marina	Airport Gate
2	Berczy Park	Coffee Shop	Cocktail Bar	Cheese Shop	Bakery	Steakhouse	Beer Bar	Seafood Restaurant	Café	Farmers Market	Jazz Club
3	Central Bay Street	Coffee Shop	Italian Restaurant	Café	Sandwich Place	Burger Joint	Ice Cream Shop	Gym / Fitness Center	Salad Place	Chinese Restaurant	Bar
4	Chinatown, Kensington Market, Grange Park	Café	Chinese Restaurant	Vegetarian / Vegan Restaurant	Bar	Mexican Restaurant	Vietnamese Restaurant	Coffee Shop	Dumpling Restaurant	Bakery	Donut Shop

Fig 7: Top 10 venues in each neighborhood

----Adelaide, Richmond, King----

	venue	freq
0	Coffee Shop	0.07
1	Café	0.05
2	Thai Restaurant	0.04
3	Bar	0.04
4	American Restaurant	0.04

----Bathurst Quay, CN Tower, Railway Lands, South Nia...

	venue	freq
0	Airport Service	0.18
1	Airport Lounge	0.12
2	Airport Terminal	0.12
3	Boutique	0.06
4	Airport	0.06

----Berczy Park----

	venue	freq
0	Coffee Shop	0.07
1	Cocktail Bar	0.05
2	Farmers Market	0.04
3	Steakhouse	0.04
4	Beer Bar	0.04

----Central Bay Street----

	venue	freq
0	Coffee Shop	0.15
1	Italian Restaurant	0.07
2	Café	0.05
3	Ice Cream Shop	0.03
4	Burger Joint	0.03

----Trinity, Little Portugal----

	venue	freq
0	Bar	0.10
1	Coffee Shop	0.06
2	Men's Store	0.06
3	Asian Restaurant	0.04
4	Pizza Place	0.03

----Union Station, Toronto Islands, South Nia...

	venue	freq
0	Coffee Shop	0.13
1	Hotel	0.05
2	Aquarium	0.05
3	Café	0.04
4	Scenic Lookout	0.03

----Stn A PO Boxes 25 The Esplanade----

	venue	freq
0	Coffee Shop	0.11
1	Café	0.04
2	Restaurant	0.04
3	Beer Bar	0.03
4	Hotel	0.03

----Swansea, Runnymede----

	venue	freq
0	Café	0.09
1	Coffee Shop	0.09
2	Sushi Restaurant	0.06
3	Pizza Place	0.06
4	Italian Restaurant	0.06

Fig 8: Top 5 venues and their frequencies

Analysis Contd.



Fig. 9 : Clusters of the neighborhoods on Map of Toronto

4. Results and Discussion

- ❑ Toronto Island is in the same cluster as Parkdale village, Trinity, Little Portugal, and others.
- ❑ Chinatown, Kensington Market and Grange Park neighborhood has about 34 restaurants, the highest among the neighborhoods.
- ❑ Most of the restaurants are clustered around the downtown part of Toronto
- ❑ There are more Italian restaurants in the neighborhoods.
- ❑ Toronto Island , despite having more venues in the neighborhood , has fewer restaurant.

5. CONCLUSION

□ I was able to identify a neighborhood with a similar feature by k-means clustering. With the stakeholder also considering a little densely populated neighborhood, I considered the next-in-line city after downtown Toronto in terms of population and further did an exploratory analysis of its neighborhoods. Also, I considered the top 20 neighborhoods with the highest number of restaurants and the top 5 restaurants in the neighborhoods. I realized a distinct neighborhood (Toronto Island) location with an opportunity, because despite having more venues than most neighborhoods, there are fewer restaurants.

6. RECOMMENDATIONS

- ❑ I believe having additional information like population demographics, wellbeing, income per household & spending power of the people in the neighborhood would have a great impact on the project.