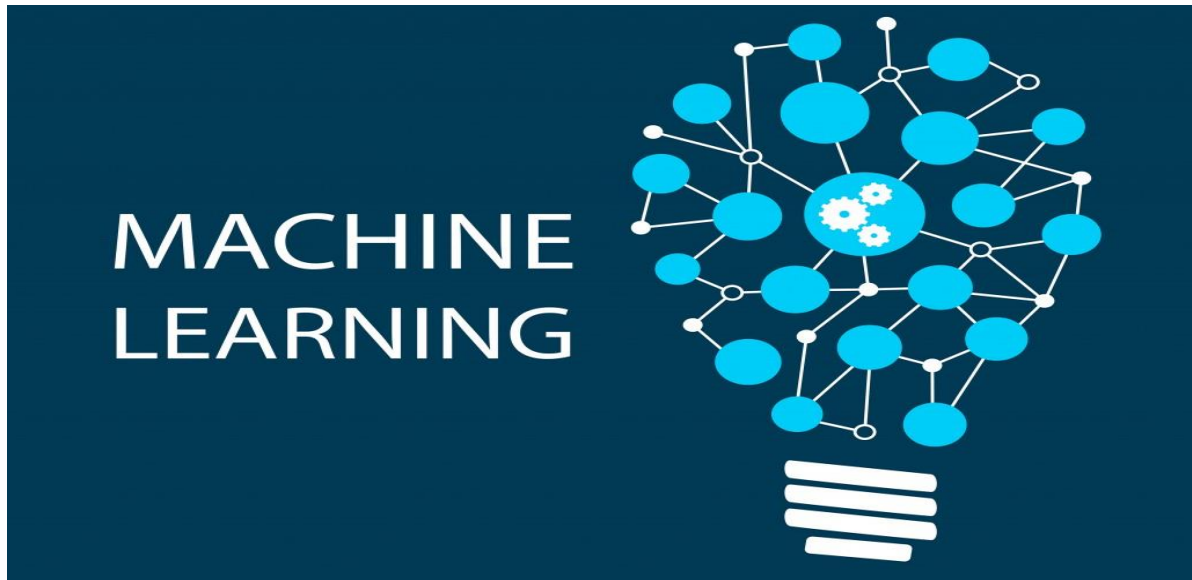


IBM-Data-Science-Project---Neighbourhood-Classification-with-Machine-Learning



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A brief description of the Problem

In this final project we were invited to explore a hypothetical situation. We live in Toronto and love our neighborhood mainly because we have everything we need to feel like “home”. Great amenities and other types of venues such as gourmet fast food joints, pharmacies, parks, grad schools, we have all.

But “sadly” we receive a job offer from our dream company on the other side of the city with great career prospects and it is not feasible to keep living on our current place, and we need to move if we decide to accept the offer.

So, the challenge is to discover similar neighborhoods on the other side of the city! And the objective of this Capstone project is to analyze and select the most likely neighborhoods in the city of Toronto to move in if we accept changing job.

Toronto in Wikipedia words

«The strength and vitality of the many neighbourhoods that make up Toronto, Ontario, Canada has earned the city its unofficial nickname of "the city of neighbourhoods." There are 140 neighbourhoods officially recognized by the City of Toronto and upwards of 240 official and unofficial neighbourhoods within the city's boundaries. Before 1998, Toronto was a much smaller municipality and formed the core of Metropolitan Toronto. When the city amalgamated that year, Toronto grew to encompass the former municipalities of York, East York, North York, Etobicoke, and Scarborough. Each of these former municipalities still maintains, to a certain degree, its own distinct identity, and the names of these municipalities are still used by their residents, sometimes for disambiguation purposes as amalgamation resulted in duplicated street names. The area known as Toronto before the amalgamation is sometimes called the "old" City of Toronto, the Central District or simply "Downtown".»

https://en.wikipedia.org/wiki/List_of_neighbourhoods_in_Toronto

Data

Toronto City data containing the neighborhoods and boroughs will be obtained from the open data source: http://cocl.us/Geospatial_data. After it, we will get the geographical coordinates of the neighborhoods (postal code, latitude and longitude).

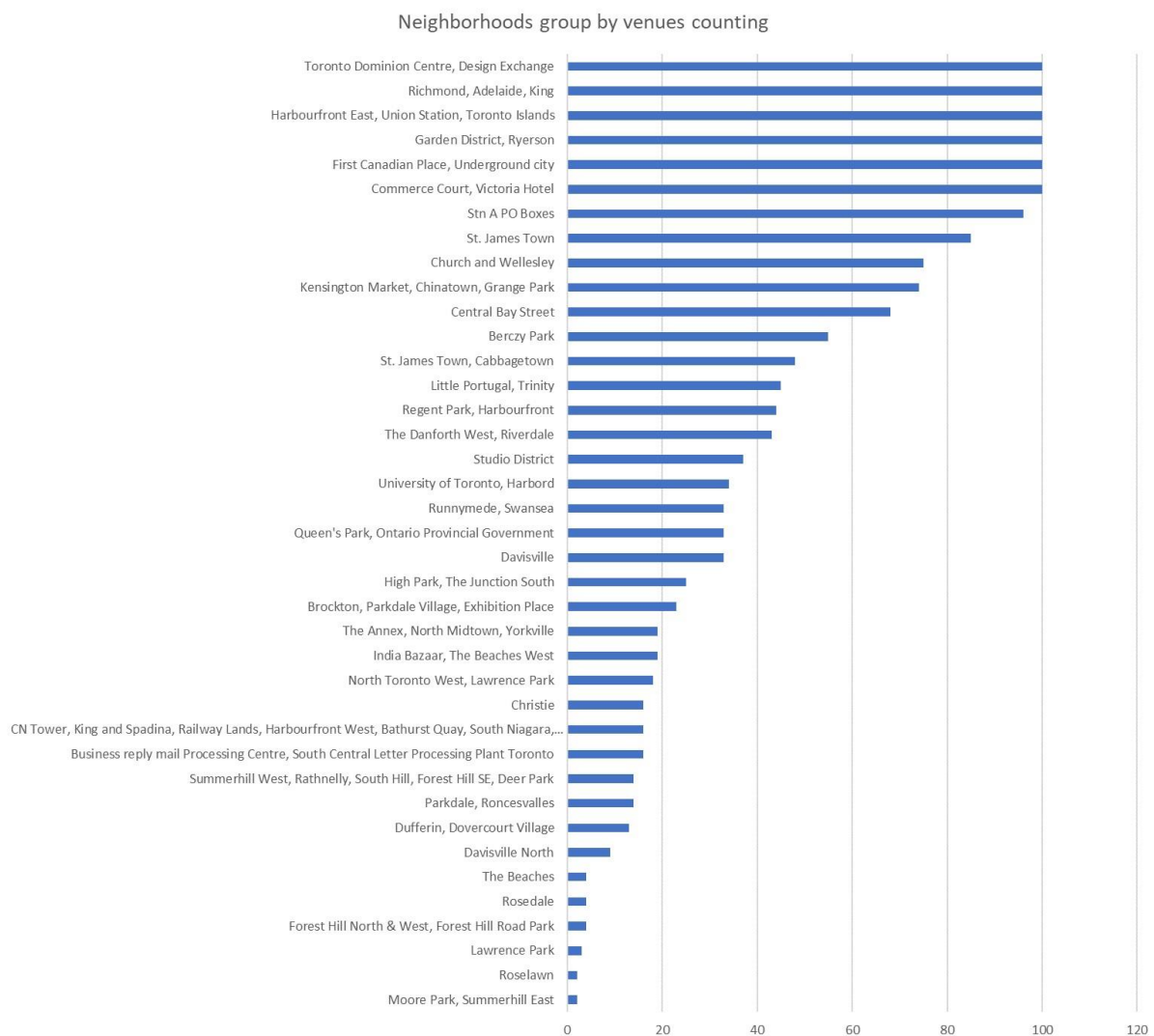
Methodology

After upload the data, we used Foursquare API to get the venue data for the neighborhoods defined at the previous step. Foursquare has one of the largest databases providing many categories of the venue data, that will help us to better decide.

Additionally, this project required to apply many data science skills, such as web scrapping (open source dataset), working with API (Foursquare), data cleaning, data wrangling, and to map visualization (Folium).

Results

The results made possible to organize the neighborhoods by venues (a counting of them ordered descendent).



After that, was possible visualize the most common venues per neighbourhood, allowing to choose the place accordingly the venue we most like or prefer.

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
Berczy Park	Coffee Shop	Bakery	Restaurant	Cheese Shop	Beer Bar	Cocktail Bar	Seafood Restaurant	Farmers Market	Breakfast Spot	Pharmacy
Brockton, Parkdale Village, Exhibition Place	Café	Breakfast Spot	Nightclub	Coffee Shop	Grocery Store	Burrito Place	Bakery	Intersection	Italian Restaurant	Restaurant
Business reply mail Processing Centre, South C...	Park	Pizza Place	Skate Park	Brewery	Burrito Place	Farmers Market	Fast Food Restaurant	Restaurant	Butcher	Recording Studio
CN Tower, King and Spadina, Railway Lands, Har...	Airport Lounge	Airport Service	Sculpture Garden	Boutique	Plane	Rental Car Location	Coffee Shop	Boat or Ferry	Harbor / Marina	Bar
Central Bay Street	Coffee Shop	Café	Sandwich Place	Italian Restaurant	Burger Joint	Department Store	Bubble Tea Shop	Thai Restaurant	Japanese Restaurant	Salad Place

Then, all neighborhoods were grouped into cluster accordingly the most prevalent venues in each.

Were created 6 distinct clusters for that purpose.

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
Central Toronto	0	Park	Swim School	Bus Line	Electronics Store	Eastern European Restaurant	Dumpling Restaurant	Donut Shop	Doner Restaurant	Dog Run	Distribution Center

Some neighbourhoods are present in several cluster once they have some venues in equal quantity.

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
Central Toronto	2	Trail	Playground	Women's Store	Deli / Bodega	Electronics Store	Eastern European Restaurant	Dumpling Restaurant	Donut Shop	Doner Restaurant	Dog Run

Now, we would have the knowledge to better decide to where we would like to move in.

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
Downtown Toronto	1	Park	Trail	Playground	Dance Studio	Eastern European Restaurant	Dumpling Restaurant	Donut Shop	Doner Restaurant	Dog Run	Distribution Center
Central Toronto	1	Park	Sushi Restaurant	Jewelry Store	Trail	Electronics Store	Eastern European Restaurant	Dumpling Restaurant	Donut Shop	Doner Restaurant	Dog Run

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
East Toronto	4	Greek Restaurant	Coffee Shop	Italian Restaurant	Restaurant	Furniture / Home Store	Bookstore	Ice Cream Shop	Pub	Pizza Place	Lounge
East Toronto	4	Park	Pizza Place	Fast Food Restaurant	Pub	Fish & Chips Shop	Steakhouse	Sushi Restaurant	Burrito Place	Italian Restaurant	Restaurant
East Toronto	4	Coffee Shop	Bakery	Gastropub	Brewery	Café	American Restaurant	Convenience Store	Seafood Restaurant	Cheese Shop	Clothing Store
Central Toronto	4	Park	Sandwich Place	Dance Studio	Hotel	Food & Drink Shop	Dog Run	Breakfast Spot	Gym / Fitness Center	Department Store	Donut Shop
Central Toronto	4	Coffee Shop	Clothing Store	Yoga Studio	Bagel Shop	Furniture / Home Store	Ice Cream Shop	Fast Food Restaurant	Diner	Mexican Restaurant	Chinese Restaurant
Central Toronto	4	Sandwich Place	Dessert Shop	Pizza Place	Gym	Italian Restaurant	Sushi Restaurant	Café	Coffee Shop	Toy / Game Store	Indoor Play Area
Central Toronto	4	Coffee Shop	Supermarket	Restaurant	Bagel Shop	Sushi Restaurant	Bank	Fried Chicken Joint	Pizza Place	American Restaurant	Liquor Store
Downtown Toronto	4	Coffee Shop	Restaurant	Café	Pizza Place	Chinese Restaurant	Pub	Italian Restaurant	Bakery	Market	Park
Downtown Toronto	4	Coffee Shop	Sushi Restaurant	Japanese Restaurant	Gay Bar	Restaurant	Yoga Studio	Men's Store	Café	Bubble Tea Shop	Pub
Downtown Toronto	4	Coffee Shop	Park	Pub	Bakery	Café	Theater	Breakfast Spot	Brewery	Spa	Beer Store
Downtown Toronto	4	Clothing Store	Coffee Shop	Café	Bubble Tea Shop	Cosmetics Shop	Japanese Restaurant	Pizza Place	Ramen Restaurant	Bookstore	Middle Eastern Restaurant
Downtown Toronto	4	Coffee Shop	Café	Cocktail Bar	Restaurant	Gastropub	Beer Bar	American Restaurant	Lingerie Store	Hotel	Cosmetics Shop
Downtown Toronto	4	Coffee Shop	Bakery	Restaurant	Cheese Shop	Beer Bar	Cocktail Bar	Seafood Restaurant	Farmers Market	Breakfast Spot	Pharmacy
Downtown Toronto	4	Coffee Shop	Café	Sandwich Place	Italian Restaurant	Burger Joint	Department Store	Bubble Tea Shop	Thai Restaurant	Japanese Restaurant	Salad Place
Downtown Toronto	4	Coffee Shop	Café	Restaurant	Hotel	Bar	Gym	Clothing Store	Thai Restaurant	Juice Bar	Concert Hall
Downtown Toronto	4	Coffee Shop	Aquarium	Hotel	Café	Restaurant	Fried Chicken Joint	Scenic Lookout	Brewery	Music Venue	Park
Downtown Toronto	4	Coffee Shop	Hotel	Restaurant	Café	American Restaurant	Seafood Restaurant	Salad Place	Japanese Restaurant	Asian Restaurant	Concert Hall
Downtown Toronto	4	Coffee Shop	Restaurant	Hotel	Café	Gym	American Restaurant	Seafood Restaurant	Deli / Bodega	Japanese Restaurant	Beer Bar
Central Toronto	4	Sandwich Place	Café	Coffee Shop	History Museum	Liquor Store	Burger Joint	Indian Restaurant	BBQ Joint	Donut Shop	Middle Eastern Restaurant
Downtown Toronto	4	Café	Bookstore	Japanese Restaurant	Sandwich Place	Bar	Bakery	Beer Bar	Beer Store	Italian Restaurant	Comfort Food Restaurant
Downtown Toronto	4	Mexican Restaurant	Coffee Shop	Vegetarian / Vegan Restaurant	Café	Bar	Vietnamese Restaurant	Bakery	Dessert Shop	Park	Pizza Place
Downtown Toronto	4	Airport Lounge	Airport Service	Sculpture Garden	Boutique	Plane	Rental Car Location	Coffee Shop	Boat or Ferry	Harbor / Marina	Bar
Downtown Toronto	4	Coffee Shop	Italian Restaurant	Pub	Hotel	Seafood Restaurant	Japanese Restaurant	Beer Bar	Restaurant	Café	Farmers Market

Conclusions

In this project we need to identify the business problem, specifying the data required, extracting and preparing the data and performing data analysis. During the project, there were applied different data science methods as well as instruments to answer to our main question:

“What Toronto’s neighborhoods share similar venues?” The findings of this project should help to decide what neighborhoods/boroughs should be chosen to move in if we accept the new job offer.