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Coursera - IBM Data Science Professional Certification

Natalie N Brooks Powell | Today 9:32 PM   Like

Today, I finally finished the IBM Data Science Professional Certification. This program consists of 9 courses providing all the skills and techniques to pursue a career in Data Science. It covered a wide array of data science topics including: open source tools and libraries, methodologies, Python, databases, SQL, data visualization, data analysis, and machine learning. In addition there was a large amount of hands-on IBM Cloud practice using real data science tools and real-world data sets.

The final course was a capstone with a final project. For my final capstone project, I selected to battle the Neighborhoods of Toronto. I selected Toronto since I knew where to find an authentic data set for Toronto.

Toronto is often referred to as "New York City run by the Swiss." The department of tourism says that you can find world-class theater, shopping and restaurants in Toronto. So if someone was to open a business in Toronto ...

Where should they open the business?

What is the most popular type of venue/business to open in each of Toronto's Boroughs?

Who is the competition in that location?

What is the Market Segmentation of the Borough -- Untapped markets or Saturated markets?

--- First I sorted the Postal Codes by Borough and Neighborhood. I had to remove the data that was not assigned data and consolidate the neighborhoods that share the same postal code.

	Postcode	Borough	Neighbourhood
0	M1B	Scarborough	Rouge,Malvern
1	M1C	Scarborough	Highland Creek,Rouge Hill,Port Union
2	M1E	Scarborough	Guildwood,Morningside,West Hill
3	M1G	Scarborough	Woburn
4	M1H	Scarborough	Cedarbrae

Next, I built the data frame of the postal code of each neighborhood, the borough name, neighborhood name and latitude and the longitude coordinates of each neighborhood. This was necessary in order to utilize the Foursquare location data.

	Postcode	Borough	Neighbourhood	Latitude	Longitude
0	M1B	Scarborough	Rouge,Malvern	43.8067	-79.1944
1	M1C	Scarborough	Highland Creek,Rouge Hill,Port Union	43.7845	-79.1605
2	M1E	Scarborough	Guildwood,Morningside,West Hill	43.7636	-79.1887
3	M1G	Scarborough	Woburn	43.771	-79.2169
4	M1H	Scarborough	Cedarbrae	43.7731	-79.2395

I had to limit the number of venues returned from the Foursquare API to the top 209 venues.

For each neighborhood, returning the top 5 venues:

```
----First Canadian Place,Underground city----
         venue  freq
0  Coffee Shop  0.09
1         Café  0.07
2        Hotel  0.04
3   Restaurant  0.04
4   Steakhouse  0.04


----Harbord,University of Toronto----
            venue  freq
0            Café  0.13
1        Bookstore  0.08
2       Restaurant  0.05
3          Bakery  0.05
4  Sandwich Place  0.05


----Harbourfront----
            venue  freq
0     Coffee Shop  0.16
1            Park  0.06
```

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```
2            Bakery   0.06
3               Pub   0.06
4    Breakfast Spot   0.04


----Harbourfront East,Toronto Islands,Union Station----
         venue  freq
0   Coffee Shop  0.13
1         Hotel  0.05
2      Aquarium  0.05
3          Café  0.04
4    Restaurant  0.03


----Rosedale----
          venue  freq
0          Park  0.50
1    Playground  0.25
2         Trail  0.25
3   Yoga Studio  0.00
4   Music Venue  0.00


----Ryerson,Garden District----
                      venue  freq
0               Coffee Shop  0.09
1            Clothing Store  0.07
2            Cosmetics Shop  0.04
3   Middle Eastern Restaurant  0.03
4       Fast Food Restaurant  0.03


----St. James Town----
          venue  freq
0          Café  0.06
1   Coffee Shop  0.06
2    Restaurant  0.05
3   Clothing Store  0.04
4         Hotel  0.04


----Stn A PO Boxes 25 The Esplanade----
               venue  freq
0        Coffee Shop  0.10
1               Café  0.04
2         Restaurant  0.04
3              Hotel  0.03
4   Japanese Restaurant  0.03
```
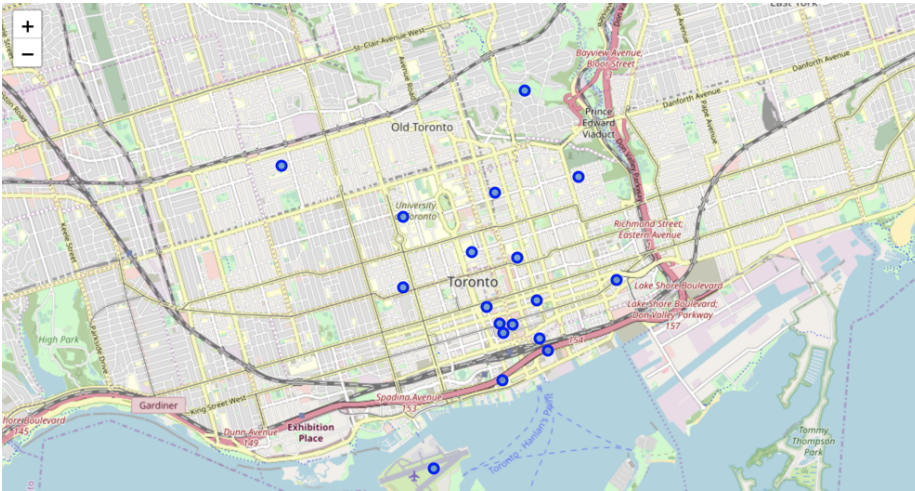
I used **Foursquare API** to get the most common venues of Toronto.

	Postcode	Borough	Neighbourhood	Latitude	Longitude	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	M4W	Downtown Toronto	Rosedale	43.6796	-79.3775	1	Park	Playground	Trail	Deli / Bodega	Electronics Store	Dumpling Restaurant	Donut Shop	Doner Restaurant	Dog Run	Discou Sto
1	M4X	Downtown Toronto	Cabbagetown,St. James Town	43.668	-79.3677	0	Coffee Shop	Restaurant	Pub	Italian Restaurant	Café	Pizza Place	Bakery	Yoga Studio	General Entertainment	Breakfa Sp
2	M4Y	Downtown Toronto	Church and Wellesley	43.6659	-79.3832	0	Sushi Restaurant	Coffee Shop	Japanese Restaurant	Gay Bar	Restaurant	Café	Gastropub	Pub	Hotel	Gy
3	M5A	Downtown Toronto	Harbourfront	43.6543	-79.3606	0	Coffee Shop	Park	Bakery	Pub	Breakfast Spot	Mexican Restaurant	Café	Theater	Ice Cream Shop	Beer Sto
4	M5B	Downtown Toronto	Ryerson,Garden District	43.6572	-79.3789	0	Coffee Shop	Clothing Store	Cosmetics Shop	Café	Fast Food Restaurant	Middle Eastern Restaurant	Tea Room	Ramen Restaurant	Bookstore	Piz Plac

I used python **folium** library to visualize geographic details of Toronto and its boroughs using latitude and longitude values to get the visual as below:

Next I created a table which shows list of top 10 venue category for each borough in below table.

	Postcode	Borough	Neighbourhood	Latitude	Longitude	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 Mo Commo Venu
0	M4W	Downtown Toronto	Rosedale	43.6796	-79.3775	1	Park	Playground	Trail	Deli / Bodega	Electronics Store	Dumpling Restaurant	Donut Shop	Doner Restaurant	Dog Run	Discou Sto
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3	M5A	Downtown Toronto	Harbourfront	43.6543	-79.3606	0	Coffee Shop	Park	Bakery	Pub	Breakfast Spot	Mexican Restaurant	Café	Theater	Ice Cream Shop	Beer Sto
4	M5B	Downtown Toronto	Ryerson,Garden District	43.6572	-79.3789	0	Coffee Shop	Clothing Store	Cosmetics Shop	Café	Fast Food Restaurant	Middle Eastern Restaurant	Tea Room	Ramen Restaurant	Bookstore	Piz Pla

Then I determined the **Most Common Venue** in each cluster.

Cluster 1: the most common venue type is Coffee Shop, followed by restaurants and bars.

	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 Mos Commo Venu
0	Adelaide,King,Richmond	Coffee Shop	Café	Steakhouse	Thai Restaurant	Restaurant	Bar	Bakery	Salad Place	Asian Restaurant	Burger Join
1	Berczy Park	Coffee Shop	Cheese Shop	Café	Farmers Market	Bakery	Beer Bar	Steakhouse	Seafood Restaurant	Cocktail Bar	Clothing Stor
2	CN Tower,Bathurst Quay,Island airport,Harbourf...	Airport Service	Airport Lounge	Airport Terminal	Harbor / Marina	Coffee Shop	Sculpture Garden	Boat or Ferry	Rental Car Location	Bar	Plan
3	Cabbagetown,St. James Town	Coffee Shop	Restaurant	Pub	Italian Restaurant	Café	Pizza Place	Bakery	Yoga Studio	General Entertainment	Breakfas Spo
4	Central Bay Street	Coffee Shop	Italian Restaurant	Sandwich Place	Burger Joint	Café	Chinese Restaurant	Ice Cream Shop	Fried Chicken Joint	Salad Place	Bubble Tea Shop

Cluster 2: the most common venue type is Park or Playground.

	Borough	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 Mo Common Venu
0	Downtown Toronto	1	Park	Playground	Trail	Deli / Bodega	Electronics Store	Dumpling Restaurant	Donut Shop	Doner Restaurant	Dog Run	Discount Sto

Cluster 3: the most common venue type is Airport Service.

	Borough	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 M Common Ver
14	Downtown Toronto	2	Airport Service	Airport Lounge	Airport Terminal	Harbor / Marina	Coffee Shop	Sculpture Garden	Boat or Ferry	Rental Car Location	Bar	Pl

Cluster 4: the most common venue type is Grocery Store.

	Borough	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 M Common Ver
17	Downtown Toronto	3	Grocery Store	Café	Park	Athletics & Sports	Italian Restaurant	Diner	Nightclub	Convenience Store	Candy Store	Restau

The most popular venue type in Downtown Toronto is Coffee Shop, containing 16 venues total.

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