<center>Choosing a Neighborhood in Toronto – a Data-driven Approach</center>

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The Problem

Roberto is a San Francisco-based data analyst that was recently displaced due to COVID-19-related layoffs. While there are numerous opportunities in the Bay Area for gainful employment, he has decided to leverage this opportunity to relocate to Toronto. He has already received clearance from the Canadian government and satisfied all requirements for the move.

Initially, Roberto was open to neighborhoods throughout Toronto; however, upon further investigation, he realized there are over 103 neighborhoods to choose from. Roberto currently lives in Nob Hill, an affluent neighborhood in San Francisco centrally located near the city-center, and decided to initially limit his investigation to the 19 neighborhoods in Downtown Toronto.

Since he will be primarily searching for his next residence virtually, he wanted to organize the neighborhoods with corresponding zip codes. This will help him efficiently search for housing options on sites like Rent.com, Apartments.com, and Trulia.

Roberto's top priorities for his new neighborhood are:

(1) Must be in Downtown Toronto Borough
(2) Must be near LGBTQ establishments
(3) Must have assortment of coffee shops, pubs, and bars

Roberto has decided to leverage his data analyst background to make a data-driven decision for his upcoming move. The neighborhood(s) identified that match his above criterion will be used as the centroids for his residential search and upcoming exploratory visit(s).

The Data Used

For the neighborhood data, Roberto scraped a Wikipedia page he used in a previous project that contains postal code, borough, and neighborhood information for all of Canada. (https://en.wikipedia.org/wiki/List_of_postal_codes_of_Canada:_M) The Toronto neighborhood (and later only Downtown Toronto neighborhoods) were pulled from this dataset.

Since Roberto also wanted to utilized the FourSquare API for venue information within each neighborhood, he needed to associate the longitude and latitude for the centers of each neighborhood. Roberto utilized a spreadsheet of geographical coordinates for each postal code from a previous project. (http://cocl.us/Geospatial_data)

Methodology
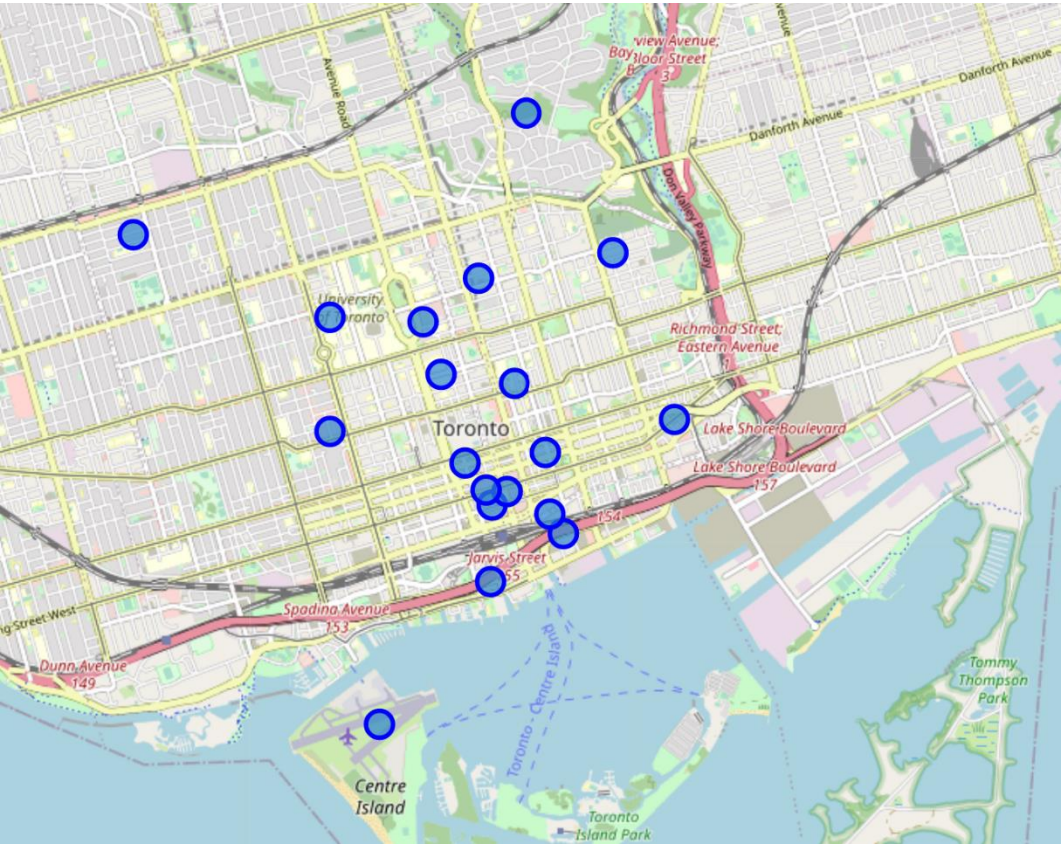
Building the Dataframe & Cleaning the Data

Roberto utilized the BeautifulSoup4 package to scrape the Wikipedia page for postal code, borough and neighborhood information for all of Canada and convert it into a pandas dataframe. Because some neighborhoods are not within a defined borough, he dropped all the undefined boroughs. Then, to simplify the dataframe, all neighborhoods with the same postal code were combined into a single row, as the neighborhoods were so closely centered that deeper FourSquare analysis would be redundant based on the geographic coordinate data he would be utilizing. Then the data from the Geospatial

CSV file was pulled and merged with the dataframe. Now that the Canadian dataframe was built, the data for neighborhoods in Downtown Toronto was pulled into a new dataframe.

Postal Code	Borough	Neighbourhood	Latitude	Longitude
M5A	Downtown Toronto	Regent Park, Harbourfront	43.654260	-79.360636
M7A	Downtown Toronto	Queen's Park, Ontario Provincial Government	43.662301	-79.389494
M5B	Downtown Toronto	Garden District, Ryerson	43.657162	-79.378937
M5C	Downtown Toronto	St. James Town	43.651494	-79.375418
M5E	Downtown Toronto	Berczy Park	43.644771	-79.373306
M5G	Downtown Toronto	Central Bay Street	43.657952	-79.387383
M6G	Downtown Toronto	Christie	43.669542	-79.422564
M5H	Downtown Toronto	Richmond, Adelaide, King	43.650571	-79.384568
M5J	Downtown Toronto	Harbourfront East, Union Station, Toronto Islands	43.640816	-79.381752
M5K	Downtown Toronto	Toronto Dominion Centre, Design Exchange	43.647177	-79.381576
M5L	Downtown Toronto	Commerce Court, Victoria Hotel	43.648198	-79.379817
M5S	Downtown Toronto	University of Toronto, Harbord	43.662696	-79.400049
M5T	Downtown Toronto	Kensington Market, Chinatown, Grange Park	43.653206	-79.400049
M5V	Downtown Toronto	CN Tower, King and Spadina, Railway Lands, Har...	43.628947	-79.394420
M4W	Downtown Toronto	Rosedale	43.679563	-79.377529
M5W	Downtown Toronto	Stn A PO Boxes	43.646435	-79.374846
M4X	Downtown Toronto	St. James Town, Cabbagetown	43.667967	-79.367675
M5X	Downtown Toronto	First Canadian Place, Underground city	43.648429	-79.382280
M4Y	Downtown Toronto	Church and Wellesley	43.665860	-79.383160

Then, a map of the Downtown Toronto neighborhoods was generated via folium.

Now we accessed the FourSquare API to pull venue information for each neighborhood. He decided to pull the Top 100 venues and venue categories within 500 meters of the center of the neighborhood to build the neighborhood profiles. He then analyzed each neighborhood by determining the mean of the frequency of each category, followed by printing the top 10 most common venues. We followed up by narrowing down to the top 5 most common venues per neighborhood to create our exploratory list of neighborhoods for his upcoming visit.

	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	Berczy Park	Coffee Shop	Seafood Restaurant	Farmers Market	Beer Bar	Cocktail Bar	Fountain	Bakery	Museum	Park	Comfort Food Restaurant
1	CN Tower, King and Spadina, Railway Lands, Har...	Airport Lounge	Airport Service	Plane	Boat or Ferry	Boutique	Harbor / Marina	Coffee Shop	Sculpture Garden	Rental Car Location	Airport Terminal
2	Central Bay Street	Coffee Shop	Café	Italian Restaurant	Yoga Studio	Sandwich Place	Ramen Restaurant	Portuguese Restaurant	Poke Place	Bubble Tea Shop	Miscellaneous Shop
3	Christie	Grocery Store	Café	Park	Italian Restaurant	Coffee Shop	Nightclub	Candy Store	Baby Store	Restaurant	Athletics & Sports
4	Church and Wellesley	Coffee Shop	Gay Bar	Pub	Creperie	Beer Bar	Salon / Barbershop	Juice Bar	Restaurant	Bookstore	Ramen Restaurant
5	Commerce Court, Victoria Hotel	Café	Gastropub	Coffee Shop	American Restaurant	Restaurant	Japanese Restaurant	Hotel	Seafood Restaurant	Steakhouse	Pub
6	First Canadian Place, Underground city	Café	Coffee Shop	Restaurant	Seafood Restaurant	Gym	Pizza Place	Pub	Bookstore	Japanese Restaurant	Bakery
7	Garden District, Ryerson	Café	Clothing Store	Coffee Shop	Theater	Electronics Store	Bookstore	Japanese Restaurant	Sandwich Place	Plaza	Shopping Mall
8	Harbourfront East, Union Station, Toronto Islands	Park	Hotel	Café	Plaza	Japanese Restaurant	Skating Rink	IT Services	Ice Cream Shop	Salad Place	Roof Deck
9	Kensington Market, Chinatown, Grange Park	Café	Vietnamese Restaurant	Mexican Restaurant	Wine Bar	Beer Bar	Jazz Club	Dessert Shop	Record Shop	Comfort Food Restaurant	Caribbean Restaurant
10	Queen's Park, Ontario Provincial Government	Coffee Shop	Yoga Studio	Portuguese Restaurant	Italian Restaurant	Bank	Bar	Beer Bar	Sandwich Place	Creperie	Mexican Restaurant
11	Regent Park, Harbourfront	Coffee Shop	Bakery	Park	Pub	Breakfast Spot	Historic Site	Spa	Distribution Center	Dessert Shop	Chocolate Shop
12	Richmond, Adelaide, King	Coffee Shop	Café	Bakery	Jazz Club	Restaurant	Plaza	Colombian Restaurant	Hotel	Monument / Landmark	Seafood Restaurant
13	Rosedale	Park	Playground	Trail	Wine Bar	Colombian Restaurant	Dance Studio	Creperie	Cosmetics Shop	Concert Hall	Comic Shop
14	St. James Town	Gastropub	Farmers Market	Café	Restaurant	Japanese Restaurant	Coffee Shop	New American Restaurant	Camera Store	Middle Eastern Restaurant	Cosmetics Shop
15	St. James Town, Cabbagetown	Coffee Shop	Café	Italian Restaurant	Restaurant	Bakery	Pet Store	Playground	Butcher	Market	Deli / Bodega
16	Stn A PO Boxes	Cocktail Bar	Beer Bar	Farmers Market	Seafood Restaurant	Concert Hall	Japanese Restaurant	Jazz Club	Restaurant	Creperie	Pub
17	Toronto Dominion Centre, Design Exchange	Coffee Shop	Café	Restaurant	Japanese Restaurant	Beer Bar	Asian Restaurant	Pizza Place	Concert Hall	Pub	Deli / Bodega
18	University of Toronto, Harbord	Café	Japanese Restaurant	Bookstore	Sandwich Place	Bar	Bakery	Italian Restaurant	Noodle House	College Arts Building	College Gym

Results

The clear winning neighborhood that satisfies all of Roberto's priorities is Church & Wesley. This neighborhood has a high density of Gay Bars along with a wide assortment of coffee shops and eateries. He will also be examining the Stn A PO Boxes and Berczy Park neighborhoods with their high propensity of eateries and nightlife venues.

Conclusion

This was quite an intriguing capstone project! I have learned so much working through this certification and look forward to a deeper dive as I pursue a Master's Degree in Business Analytics in the Spring of 2021!