

Best location for a company building installation

1. Introduction

a. Background

A new multinational company working in the domain of telecommunication want to install its offices in Toronto city. But, it hasn't any idea where in Toronto should be localized. Thus, it provides her plan and what should be present in the area of the company buildings to help selecting the best location for it. The company will open more than 10 000 positions with different skills and accessible also for non-Canadian people. It will not integrate restaurants in the buildings. Thus, the presence of restaurants near the company is something critical. As it will be open for many origins, many culinary specialties are recommended. The company will receive many customers from all over the world. The presence of an airport not far from the company will be a good criterion for location selection. The company wants also that employees could take advantage of the means of leisure (e.g. gym, coffee, spa, yoga studio, Park, etc.) close to the company during the break time or after the end of work. Thus, the presence of these means will be a good criterion of selection.

b. Objective

As a final objective, the company wants to have a classification of different neighbourhoods in Toronto city based on the requirements it gave. The neighbourhood with the higher score will be the best location to install its buildings.

2. Data

The Foursquare location data will be used to fetch for restaurants, airports, and means of leisure in each neighbourhood in Toronto city. The list of different postal codes of Canada will be retrieved from "https://en.wikipedia.org/wiki/List_of_postal_codes_of_Canada:_M" in order to keep those linked to Toronto city only.

	Postal Code	Borough	Neighbourhood
0	M5A	Downtown Toronto	Regent Park / Harbourfront
1	M5B	Downtown Toronto	Garden District, Ryerson
2	M5C	Downtown Toronto	St. James Town
3	M4E	East Toronto	The Beaches
4	M5E	Downtown Toronto	Berczy Park

Geolocalization attributes for each neighbourhood are then added using the following url:
 "https://cocl.us/Geospatial_data"

	Postal Code	Borough	Neighbourhood	Latitude	Longitude
0	M5A	Downtown Toronto	Regent Park / Harbourfront	43.654260	-79.360636
1	M5B	Downtown Toronto	Garden District, Ryerson	43.657162	-79.378937
2	M5C	Downtown Toronto	St. James Town	43.651494	-79.375418
3	M4E	East Toronto	The Beaches	43.676357	-79.293031
4	M5E	Downtown Toronto	Berczy Park	43.644771	-79.373306

3. Methodology

Using the Foursquare API, we get the top 10 venues within a radius of 500 meters for each neighbourhood.

	Neighbourhood	Neighbourhood Latitude	Neighbourhood Longitude	Venue	Venue Latitude	Venue Longitude	Venue Category
0	Regent Park / Harbourfront	43.65426	-79.360636	Roselle Desserts	43.653447	-79.362017	Bakery
1	Regent Park / Harbourfront	43.65426	-79.360636	Tandem Coffee	43.653559	-79.361809	Coffee Shop
2	Regent Park / Harbourfront	43.65426	-79.360636	Cooper Koo Family YMCA	43.653249	-79.358008	Distribution Center
3	Regent Park / Harbourfront	43.65426	-79.360636	Impact Kitchen	43.656369	-79.356980	Restaurant
4	Regent Park / Harbourfront	43.65426	-79.360636	Body Blitz Spa East	43.654735	-79.359874	Spa

Once venues are collected, we select important ones based on the company requirements. Based on the data we got from the Foursquare API, the list of the following venues is required:

['Coffee Shop', 'Restaurant', 'Park', 'Breakfast Spot', 'Gym / Fitness Center', 'Burrito Place', 'Pizza Place', 'Café', 'Ramen Restaurant', 'Japanese Restaurant', 'Creperie', 'Middle Eastern Restaurant', 'Food Truck', 'Hotel', 'Gym', 'Health Food Store', 'Vegetarian / Vegan Restaurant', 'Beer Bar', 'Cocktail Bar', 'Thai Restaurant', 'Modern European Restaurant', 'Italian Restaurant', 'Steakhouse', 'Seafood Restaurant', 'Bar', 'Brewery', 'Bank', 'Supermarket', 'Salad Place', 'Asian Restaurant', 'Korean Restaurant', 'Cuban Restaurant', 'Greek Restaurant', 'Yoga Studio', 'Fast Food Restaurant', 'Sushi Restaurant', 'Bus Line', 'Garden', 'Food & Drink Shop', 'Sandwich Place', 'Mexican Restaurant', 'Chinese Restaurant', 'Indian Restaurant', 'Eastern European Restaurant', 'French Restaurant', 'College Gym', 'Falafel Restaurant', 'Vietnamese Restaurant', 'American Restaurant', 'Theme Restaurant', 'Airport', 'Airport Lounge', 'Airport Food Court', 'Airport Terminal', 'Airport Gate']

Then, we perform a one hot encoding to transform categories to binary columns:

	Neighbourhood	Airport Food Court	Airport Gate	Airport Lounge	Airport Terminal	American Restaurant	Asian Restaurant	Bank	Bar	Beer Bar	...	Salad Place	Sandwich Place	Seafood Restaurant
0	Berczy Park	0	0	0	0	0	0	0	0	1	...	0	0	0
1	Brockton / Parkdale Village / Exhibition Place	0	0	0	0	0	0	0	1	0	...	0	0	0
2	CN Tower / King and Spadina / Railway Lands / ...	1	1	2	1	0	0	0	0	0	...	0	0	0
3	Central Bay Street	0	0	0	0	0	0	0	0	0	...	0	0	0
4	Christie	0	0	0	0	0	0	0	0	0	...	0	0	0

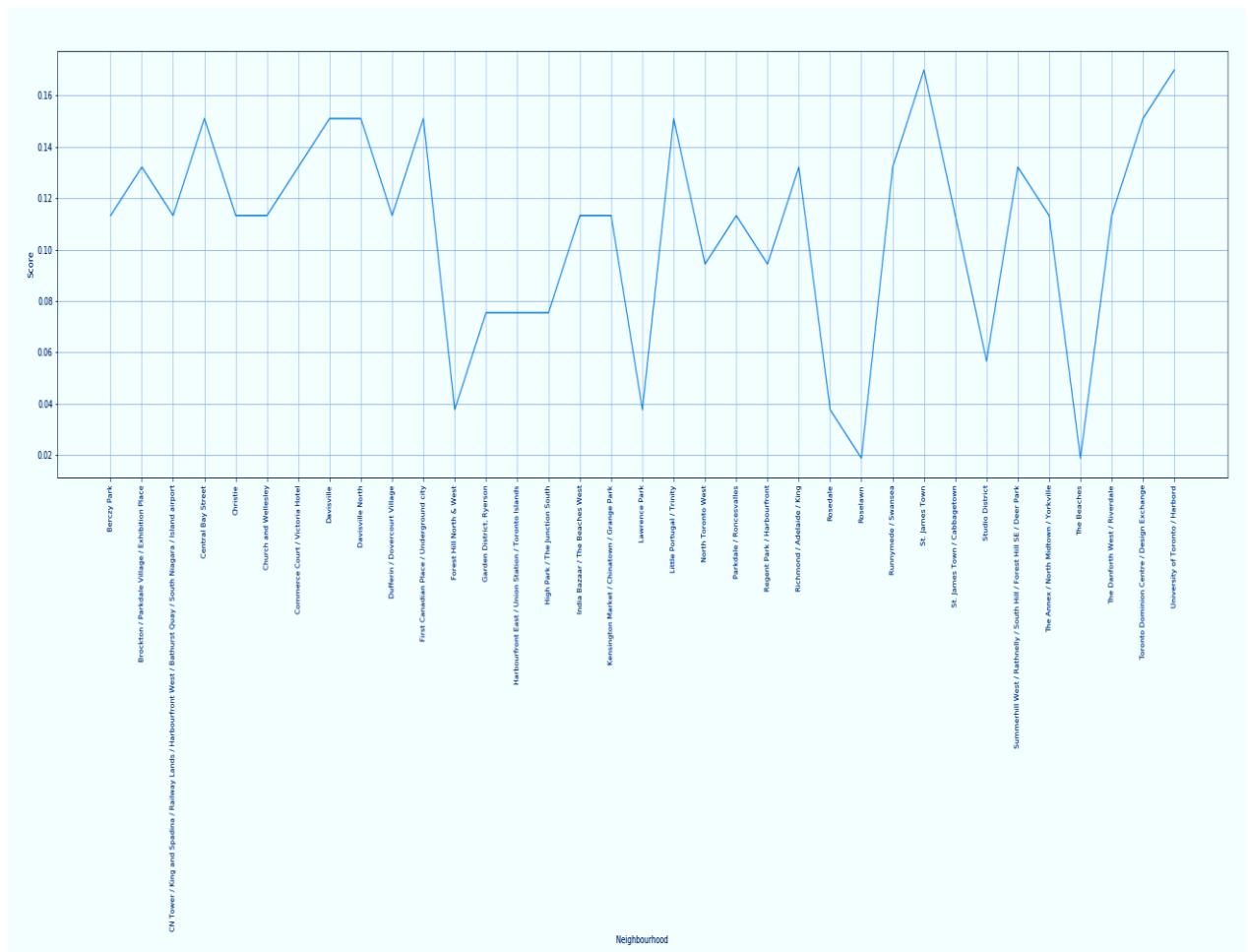
As it is very complicated to have all venues in the same neighbourhood, we calculate a score based on the presence of venues in the neighbourhood. The presence of an airport is critical for the company building. Thus, the neighbourhood with the highest score that has an airport in its surrounding will be selected to build the company.

We use a simple formula for calculating the score. Indeed, for each neighbourhood, we calculate the mean of venues' presence values.

	Neighbourhood	Score	Airport Terminal
0	Berczy Park	0.113208	0
1	Brockton / Parkdale Village / Exhibition Place	0.132075	0
2	CN Tower / King and Spadina / Railway Lands / ...	0.113208	1
3	Central Bay Street	0.150943	0
4	Christie	0.113208	0
5	Church and Wellesley	0.113208	0
6	Commerce Court / Victoria Hotel	0.132075	0
7	Davisville	0.150943	0
8	Davisville North	0.150943	0
9	Dufferin / Dovercourt Village	0.113208	0
10	First Canadian Place / Underground city	0.150943	0

4. Results

The following figure shows the repartition for neighbourhoods based on their scores:



The neighbourhood with the highest score while an airport terminal is present is selected for the company building.

5.Conclusion

As a result, the best neighbourhood for the company building is : 'CN Tower / King and Spadina / Railway Lands / Harbourfront West / Bathurst Quay / South Niagara / Island airport'