

# Introduction

## Background

The housing market in Toronto is increasing day by day and many people consider buying a new house as an investment. Many second-home buyers intend to rent their new property and renting to university/college students might be very profitable. However, if the intention of the buyer is to rent to young people then it is fundamental to pick a location that provides different amenities and in a walking distance as grocery stores, bookstores, fast food and entertainments.

## Project

In this project we intend to provide a potential buyer different location in Toronto where he/she can invest his/her money. In order to do that, we will use all the available information that can be found through Foursquare. We want to help a new buyer in

1. location close to university
2. location close to stores selling food -bookstores
3. location close to entertainment

## Data

In order to identify the best location where to buy a house for investment, we will combine the data regarding the postal codes in Toronto (in specific, the ones close to the main universities) and the Foursquare location data. We will rank the venues provided by Foursquare as: grocery stores, bookstores, night clubs, subway stations and find the locations that in a walking distance are close to all of them.

From Wikipedia we will have access to the postal code of different areas in Toronto. Our goal is to focus on the areas where there is a university close by, then we will focus just on the neighbourhoods in downtown Toronto. Then, we will look at all the areas close to University of Toronto. Since we want to study the amenities close to each neighbourhood in the downtown borough, we used Foursquare to create a list of maximum 100 venues within radius of 1 km from the neighbourhood. Then we just focused on the 15 most common venues among all the neighbourhoods downtown.

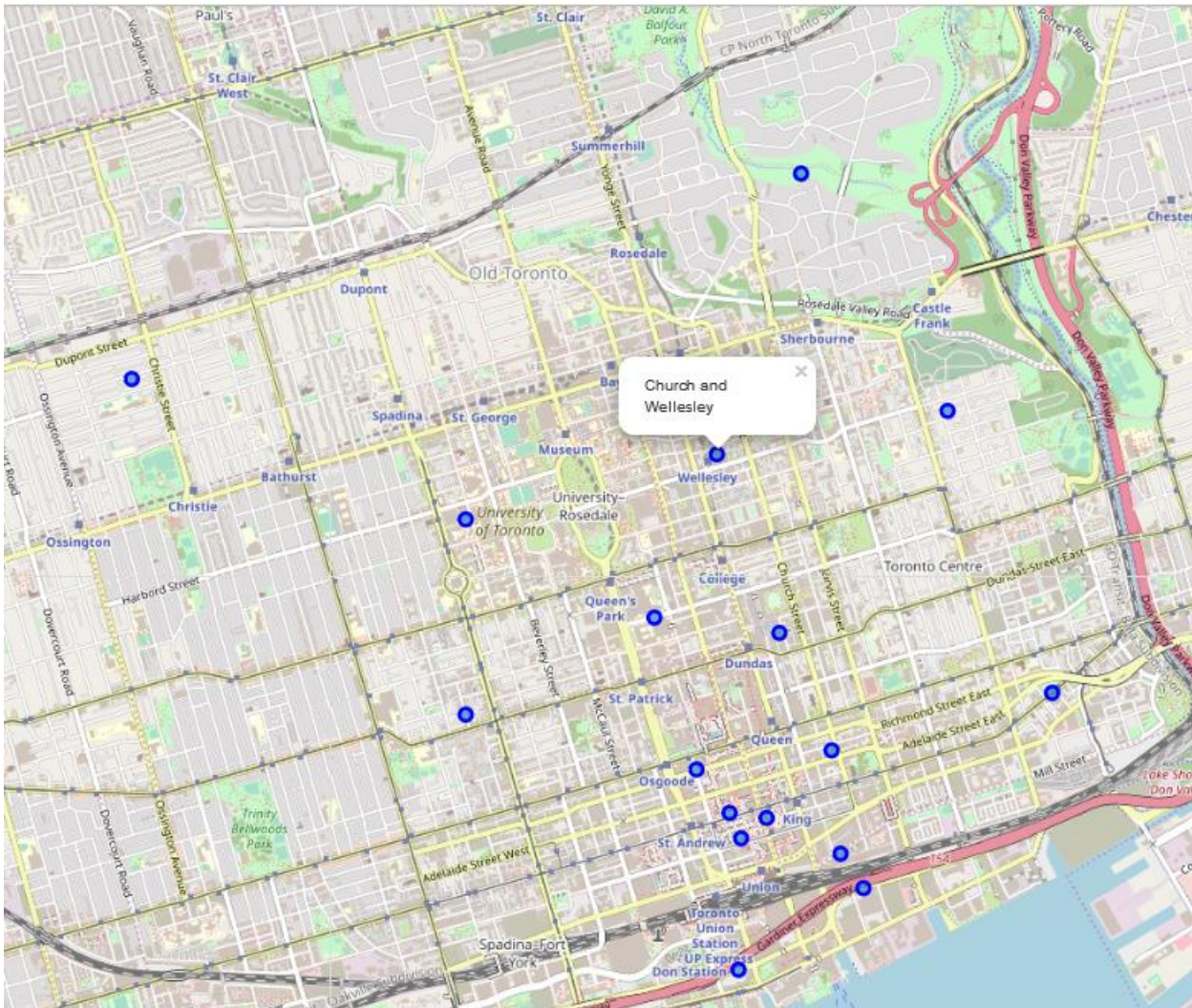
## Data cleaning

First of all it was necessary to export the table from Wikipedia website on the webpage related to Toronto postal codes (starting with M) and generate a data frame where postal codes, borough and neighbourhood are shown. Since we want to focus on specific areas of the city, we extracted from a map all the data related to geographical coordinates. Then, we analysed only the region close to downtown.

## Methodology

For our analysis we analyse the data related to Toronto postal codes and we divided it into sub classes depending on the borough. We focused just in studying downtown Toronto (Fig1). Observe that we can see different blue dots on the map indicating Toronto Downtown, but we need to understand which ones of these sub-neighbourhoods satisfy our demand.

Figure 1



Once we select only that specific area, we look at all the amenities that are within 1000 meters in this region by using access to Foursquare. After checking the frequencies of occurrence of each amenity, we looked at a specific area: Harbord, University of Toronto. We noticed that in this neighbourhood it is possible to find arts crafts stores, bagel shop, bar, beer bar, bookstore, grocery and restaurants in general. However, more areas needed to be analysed and so we ranked the first 15 common amenities among all the sub-neighbourhoods in Toronto Downtown. we were able to see how restaurants and bars were pretty much present in all the areas (first 3 columns in Fig2), but not the amenities that a university student needs, as bookstores or subway station.

Figure 2

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	11th Most Common Venue	12th Most Common Venue	13th Most Common Venue	14th Most Common Venue	15th Most Common Venue
Adelaide, King, Richmond	Café	Coffee Shop	Hotel	Theater	Sushi Restaurant	Clothing Store	American Restaurant	Del / Bodega	Pizza Place	Beer Bar	Movie Theater	Bar	Steakhouse	Concert Hall	Cosmetics Shop
Berczy Park	Coffee Shop	Hotel	Café	Japanese Restaurant	Beer Bar	Park	Restaurant	Bakery	Cocktail Bar	Seafood Restaurant	Farmers Market	Steakhouse	Breakfast Spot	Gastropub	Gym
CN Tower, Bathurst Quay, Island airport, Harbo...	Coffee Shop	Café	Harbor / Marina	Dog Run	Track	Garden	Sculpture Garden	Park	Scenic Lookout	Dance Studio	Airport Lounge	Airport	Dumpling Restaurant	Event Space	Falefale Restaurant
Cabbagetown, St. James Town	Park	Gastropub	Coffee Shop	Diner	Japanese Restaurant	Café	Pet Store	Bakery	Butcher	Farm	Filipino Restaurant	Rock Club	Restaurant	Bistro	Beer Store
Central Bay Street	Coffee Shop	Café	Vegetarian / Vegan Restaurant	Park	Japanese Restaurant	Ramen Restaurant	Italian Restaurant	Bubble Tea Shop	Burger Joint	Buncho Place	Clothing Store	Bar	Plaza	Gastropub	Bookstore
Chinatown, Grange Park, Kensington Market	Vegetarian / Vegan Restaurant	Café	Bar	Bakery	Coffee Shop	Mexican Restaurant	Dessert Shop	Art Gallery	Caribbean Restaurant	Burger Joint	Comfort Food Restaurant	Cocktail Bar	Yoga Studio	Ice Cream Shop	Ramen Restaurant
Christie	Korean Restaurant	Café	Coffee Shop	Grocery Store	Cocktail Bar	Indian Restaurant	Ice Cream Shop	Comedy Club	Karaoke Bar	Pizza Place	Ethiopian Restaurant	Park	Bar	Sandwich Place	Vegetarian / Vegan Restaurant
Church and Wellesley	Coffee Shop	Japanese Restaurant	Sushi Restaurant	Café	Italian Restaurant	Gay Bar	Mediterranean Restaurant	Diner	Dance Studio	Ramen Restaurant	Thai Restaurant	Gastropub	Men's Store	Park	Burger Joint
Commerce Court, Victoria Hotel	Coffee Shop	Hotel	Café	Japanese Restaurant	Beer Bar	American Restaurant	Steakhouse	Restaurant	Gastropub	Concert Hall	Thai Restaurant	Farmers Market	Plaza	Breakfast Spot	Cocktail Bar
Design Exchange, Toronto Dominion Centre	Hotel	Coffee Shop	Café	Italian Restaurant	Steakhouse	Restaurant	American Restaurant	Concert Hall	Theater	Beer Bar	Japanese Restaurant	Plaza	Lounge	Thai Restaurant	Park
First Canadian Place, Underground city	Hotel	Coffee Shop	Café	Steakhouse	Theater	Italian Restaurant	Japanese Restaurant	American Restaurant	Asian Restaurant	Sushi Restaurant	Plaza	Restaurant	Concert Hall	Thai Restaurant	Beer Bar
Harbord, University of Toronto	Café	Bakery	Bar	Vegetarian / Vegan Restaurant	Restaurant	Mexican Restaurant	Arts & Crafts Store	Bookstore	Burger Joint	Ice Cream Shop	Pub	Dessert Shop	Japanese Restaurant	Beer Bar	Thai Restaurant
Harbourfront East, Toronto Islands, Union Station	Coffee Shop	Hotel	Café	Aquarium	Italian Restaurant	Scenic Lookout	Bakery	Park	Brewery	Gym	Japanese Restaurant	Steakhouse	Fried Chicken Joint	Del / Bodega	Restaurant
Harbourfront, Regent Park	Coffee Shop	Café	Theater	Italian Restaurant	Bakery	Park	Diner	Breakfast Spot	Gym / Fitness Center	Restaurant	Performing Arts Venue	Brewery	Indian Restaurant	Pub	Gastropub
Rosedale	Park	Coffee Shop	Bank	Grocery Store	Pie Shop	Smoothie Shop	Building	Candy Store	Caribbean Restaurant	Metro Station	Breakfast Spot	Falefale Restaurant	Bistro	Sandwich Place	Filipino Restaurant
Ryerson, Garden District	Coffee Shop	Clothing Store	Italian Restaurant	Restaurant	Gastropub	Middle Eastern Restaurant	Café	Tea Room	Diner	Cosmetics Shop	Department Store	Bookstore	Theater	Japanese Restaurant	Plaza
St. James Town	Coffee Shop	Café	Restaurant	Hotel	Bakery	Gastropub	Breakfast Spot	Italian Restaurant	Seafood Restaurant	Cosmetics Shop	Diner	Cocktail Bar	Farmers Market	Japanese Restaurant	Gym
Stn A PO Boxes 25 The Esplanade	Coffee Shop	Café	Restaurant	Japanese Restaurant	Beer Bar	Hotel	Seafood Restaurant	Gastropub	Park	Farmers Market	Bakery	Cocktail Bar	Breakfast Spot	Art Gallery	American Restaurant

Hence, we clustered all these amenities (map with colourful dots Fig 3) and we saw how among all the clusters, 2 have sub neighbourhoods which satisfy our request: cluster 2 with Rosedale where there are food stores and subway stations (this can be seen as a secondary option) and cluster 3 with Harbord, presenting bookstores art stores and food stores (this is the first choice-light green spot close to UofT campus).

# Results

In our analysis we were first able to see what according to postal codes is defined as Toronto Downtown. After localizing this neighbourhood, we were able to understand which amenities were more present there. Mainly, all the stores are restaurants, bars, fast foods stores. Looking deeply in the other common amenities, we were able to see that one sub-neighbourhood, Harbord, has bookstores and art stores as well. These two stores are well used by all students; hence these are important factors to decide if buying a house close by or not. However, we found another location (Rosedale) where subway stations are presents. Of course, this can be an important factor as well since students might need to move among the city and the subway might be the easiest way.

Hence, we recommend the client to look at these two different locations.



Figure 3

