

IBM Applied Data Science Capstone – Battle of the Neighborhoods

INTRODUCTION

Toronto and Vancouver represent the first and third largest Census Metropolitan Area's (CMA's) in Canada with a 2016 census population of [5,928,040](#) and [2,463,431](#) respectively. Toronto is located in eastern Canada on the shores of Lake Ontario and Vancouver is located in Western Canada on the shores of the Pacific Ocean (Figure 1).

The Toronto CMA has the largest proportion of foreign-born residents ([46%](#)) as a share of the total population out of all metropolitan areas with the largest groups being Asian, African, Latin/Central/South American. In contrast the Vancouver CMA showed that [48.6%](#) of the population was of European heritage with the largest visible minorities being Asian, and Latin Americans.

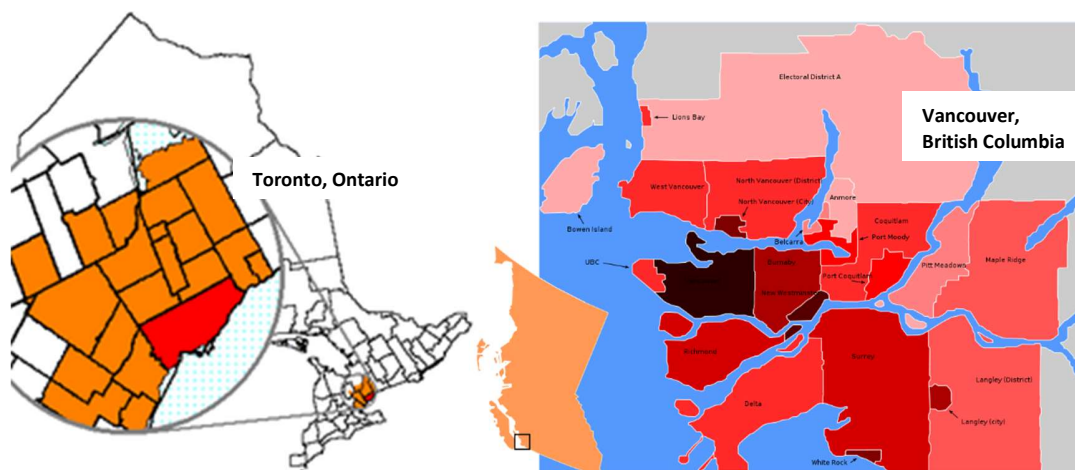


Figure 1. Maps of Toronto and Vancouver Census Metropolitan Area's.

PURPOSE AND INTENDED AUDIENCE

The purpose of this project is to analyze the similarity and dissimilarity of municipalities/neighborhoods of Toronto and Vancouver CMA's. An analysis of this type will inform individuals on the multi-cultural nature of the two cities as reflected in the diversity of venues sourced from Foursquare.

DATA

The following data will be used:

- List of FSA's (Postal Codes) and neighborhoods in the CMA's of Toronto, Ontario and Vancouver, British Columbia Canada.
 - Toronto, Ontario:
 - https://en.wikipedia.org/wiki/List_of_postal_codes_of_Canada:_M
 - Vancouver, British Columbia:
 - https://en.wikipedia.org/wiki/List_of_postal_codes_of_Canada:_V

Sample of Postal Code and Neighborhood Data

```
PostalCode,Borough,Neighborhood  
M1B,Scarborough,"Malvern, Rouge"  
M1C,Scarborough,"Rouge Hill, Port Union, Highland Creek"
```

- Latitude and Longitude of the postal codes.
 - Toronto, Ontario:
 - http://cocl.us/Geospatial_data
 - Vancouver, British Columbia:
 - <https://www12.statcan.gc.ca/census-recensement/2011/geo/bound-limit/bound-limit-2016-eng.cfm>

Sample of Postal Code and Latitude/Longitude Data

```
Postal Code,Latitude,Longitude  
M1B,43.8066863,-79.1943534  
M1C,43.7845351,-79.1604971  
M1E,43.7635726,-79.1887115
```

- Foursquare venue data of Toronto and Vancouver queried by postal code and filtered on the Food venue category for a list of restaurant types (ex. Italian Restaurant).
 - Food Category ID: 4d4b7105d754a06374d81259
 - <https://foursquare.com/developers/login?continue=%2Fdevelopers%2Fapps>

Sample Venue Data from Foursquare

```
Neighborhood,Neighborhood Latitude,Neighborhood Longitude,Venue,Venue Latitude,Venue Longitude,Venue Category  
"The Danforth West, Riverdale",43.6795571,-79.352188,Cafe Fiorentina,43.677743,-79.350115,Italian Restaurant
```

METHODOLOGY

The postal codes and geographic coordinates of the Vancouver and Toronto CMA's were web scraped to produce a dataframe for each CMA containing the postal codes, boroughs and neighborhoods and their geographic coordinates (Figure 1 and 2).

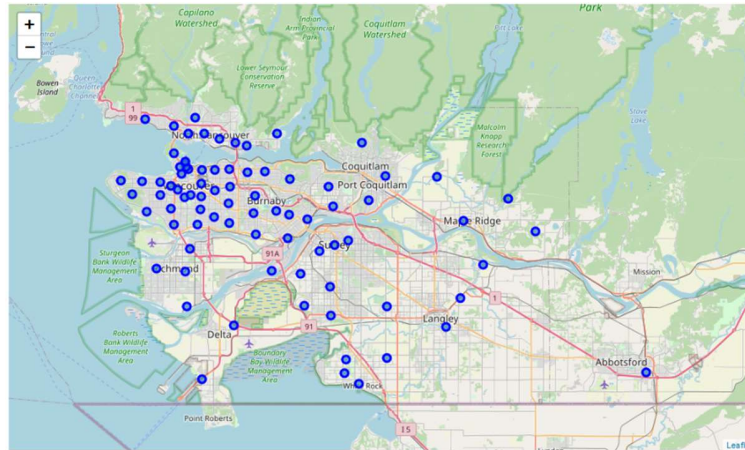


Figure 1. Map of Vancouver CMA Neighborhoods.

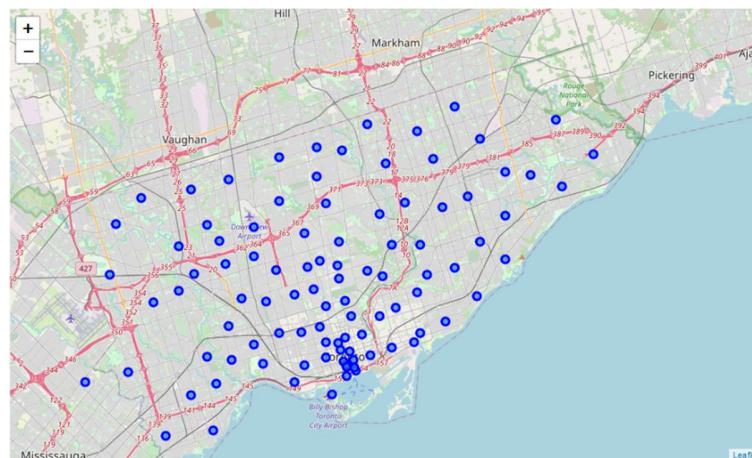


Figure 2. Map of Toronto CMA Neighborhoods.

Using the neighborhood latitude and longitude derived from each CMA's postal codes Foursquare Food venue categories were queried and stored in a dataframe. For each CMA the data was summarized by neighborhood and the frequency of the top 5 restaurant types and the top 10 most common restaurant types calculated. A wordcloud of the top 10 most common restaurants was produced for each CMA.

Vancouver

[illegible]

Figure 3. Wordcloud of the predominant restaurant types in the Vancouver CMA.

A wordcloud (Figure 4) of the top 10 most common restaurant types in the Toronto CMA suggests that the restaurant types are quite diverse. North American restaurants appear to dominate followed by Asian, Eastern European, European and African restaurant types. There are a number of smaller different restaurant types listed such as UK Fish and Chips, Mexican and Italian.



DISCUSSION

Overall it appears that both Vancouver and Toronto have multicultural restaurants in their CMA. Vancouver appears to have more evenly distributed restaurant types with Asian and European restaurants dominated followed by many evenly weighted multicultural restaurants. In contrast Toronto's restaurant types appear to be heavily dominated by a few followed by a low number but diverse selection of restaurant types. For example North American dominates closely followed by Asian and Eastern European but then there are a large number of smaller multicultural restaurants scattered throughout.

CONCLUSION

Both Vancouver and Toronto CMA's multicultural nature is reflected in the diversity of restaurants in the cities. North American and Asian restaurant types dominate in each CMA.