

Chinese restaurant in Toronto

Introduction

As the population of Chinese immigrants is increasing in Toronto, Canada, more Chinese restaurant is needed in this city. Where to open this restaurant to make it more popular and earn more is the first important question to answer.

Based on the population composition and business activities in this city, this project is going to find ten ideal places to open a Chinese restaurant in Toronto. People plan to opening a Chinese restaurant can be interested in this report. Also, people interested in opening other kind of restaurant can refer to the model we build in this project.

Data

The data we use are all about the city of Toronto. What we need is:

Neighborhood and borough information to identify our object of study. This information is from Wikipedia^[1].

To get the venue information, position of each neighborhood is needed. This information can also help us to eliminate the isolated neighborhoods on map. Position information about Toronto is from Geocoder^[2].

Getting to know the number of Chinese restaurant in each neighborhood, as well as other venues information is a must. Venues information in each neighborhood is from foursquare.com^[3].

Chinese restaurant is more popular among Chinese immigrants, so our decision making also needs the information of the Chinese immigrants fraction. To identify neighborhood with higher potential customers, we also get the demographics of Toronto from Wikipedia^[4]

Methodology

We choose the neighborhoods in four aspects: 1. There are not much Chinese restaurant nearby; 2. Higher amount of venues in this neighborhood; 3. This neighborhood is not isolated from other neighborhoods; 4. A neighborhoods with higher Chinese immigrant will be better.

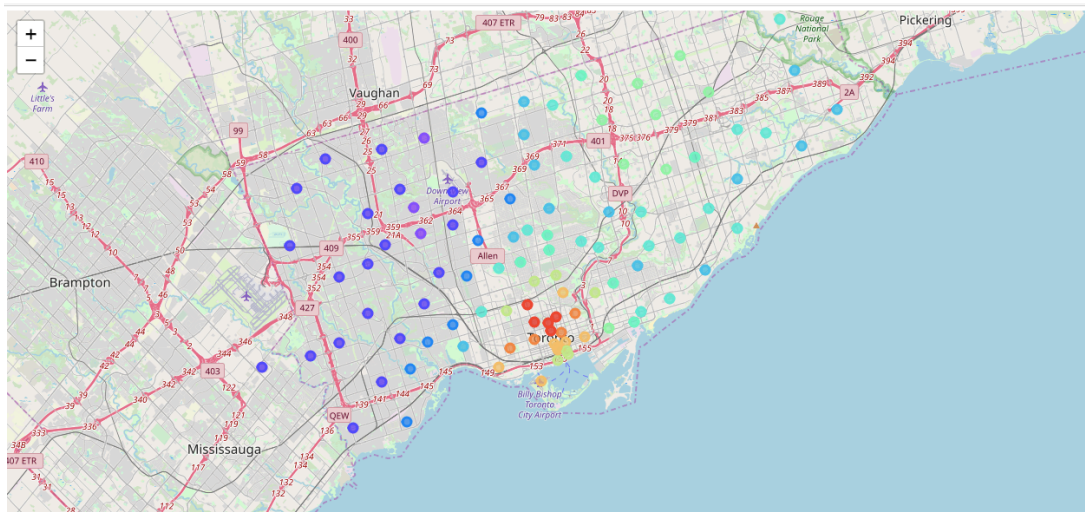
1. Average number of Chinese restaurants nearby
 - a. Calculate the distance from one neighborhood to all other neighborhoods
 - b. From near to far, divide the neighborhoods into ten groups, calculate the sum of Chinese restaurant in each group
 - c. Calculate weighted average of the Chinese restaurant numbers, the closer the group, the higher the weight.
 - d. Loop and calculate the average number of Chinese restaurants nearby for all the neighborhoods
 - e. Normalize the result
2. Reachable by more people (more venue numbers in this neighborhood)
 - a. Get the total number of venues in this neighborhood
 - b. Normalize the result

3. Not isolated
 - a. Use DBSCAN method, choose epsilon = 0.02, and minimumSamples = 3, get the density-based clusters for the neighborhoods in Toronto
 - b. For the outliers in the cluster result, make this index to 0.6, other, index = 1
4. Number of Chinese immigrants
 - a. Get the fraction of Chinese immigrants in each borough, assign the number to each neighborhood
 - b. Normalize it
5. Assembly

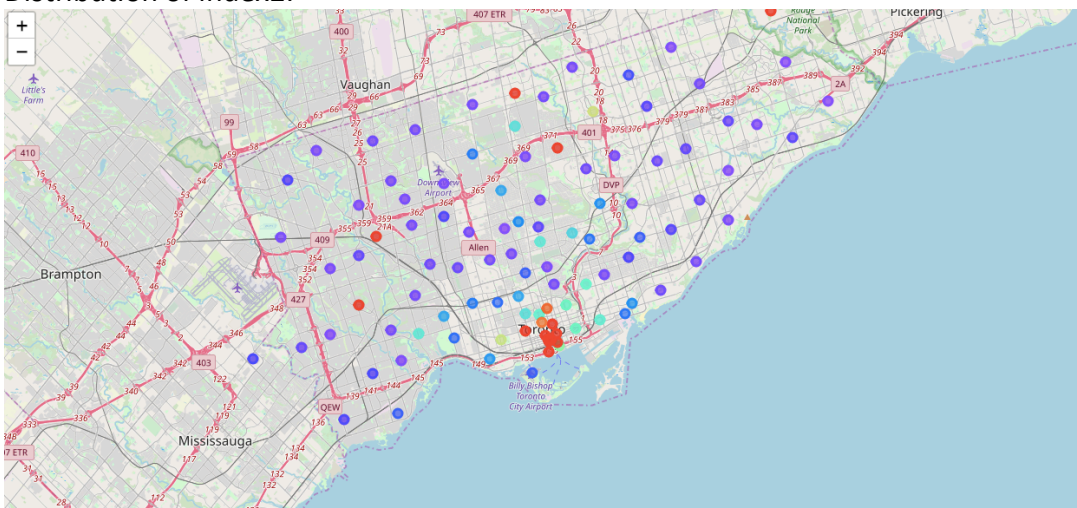
$\text{Index1} * \text{index2} * \text{index3} * \text{index4}$, get the final recommendation index. Higher index means more recommended.

Result

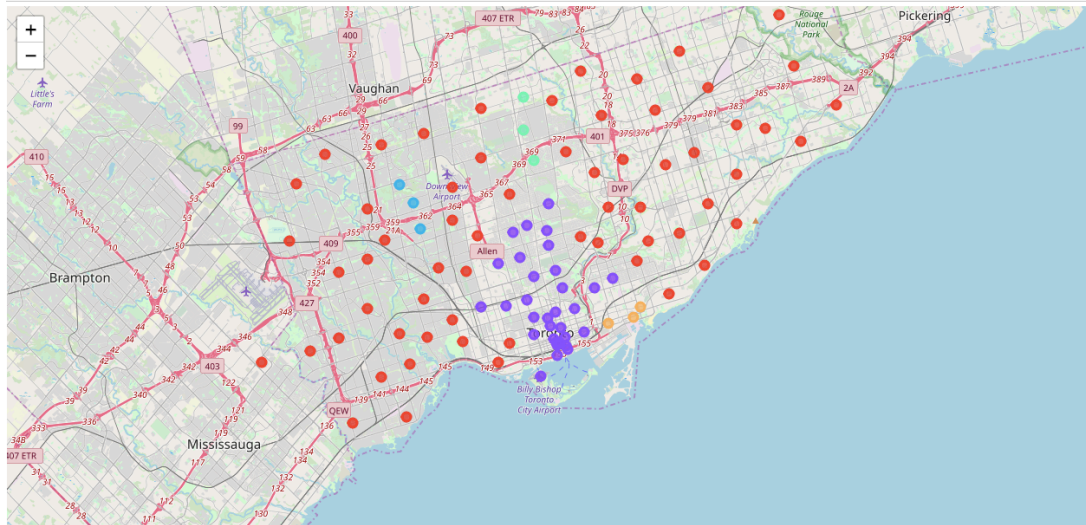
Distribution of index1:



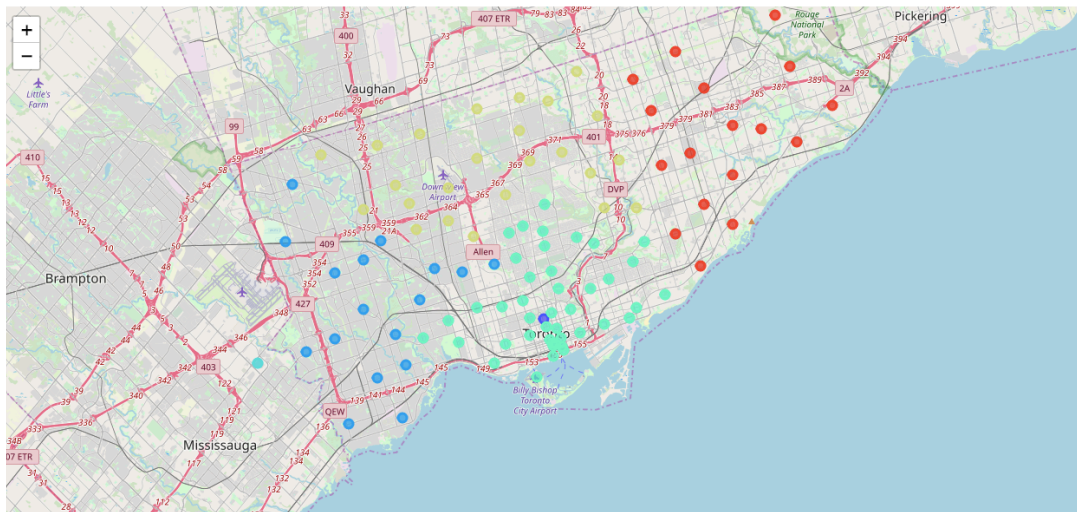
Distribution of index2:



Distribution of index 3 (the clusters, reds means outliers):



Distribution of index 4:



Our final recommendations:

	Postcode	Borough	Neighbourhood	Latitude	Longitude	Nearby Restaurant	Venue number	Cluster label	Chinese fraction	Final index
92	MSW	Downtown Toronto	Stn A PO Boxes 25 The Esplanade	43.646435	-79.374846	0.814815	0.94	1.0	0.473684	0.362807
36	MSJ	Downtown Toronto	Harbourfront East, Toronto Islands, Union Station	43.640816	-79.381752	0.722222	1.00	1.0	0.473684	0.342105
97	MSX	Downtown Toronto	First Canadian Place, Underground city	43.648429	-79.382280	0.722222	1.00	1.0	0.473684	0.342105
48	MSL	Downtown Toronto	Commerce Court, Victoria Hotel	43.648198	-79.379817	0.722222	1.00	1.0	0.473684	0.342105
42	MSK	Downtown Toronto	Design Exchange, Toronto Dominion Centre	43.647177	-79.381576	0.722222	1.00	1.0	0.473684	0.342105
30	MSH	Downtown Toronto	Adelaide, King, Richmond	43.650571	-79.384568	0.722222	1.00	1.0	0.473684	0.342105
15	MSC	Downtown Toronto	St. James Town	43.651494	-79.375418	0.722222	1.00	1.0	0.473684	0.342105
9	MSB	Downtown Toronto	Ryerson, Garden District	43.657162	-79.378937	0.537037	1.00	1.0	0.473684	0.254386
58	M2N	North York	Willowdale South	43.770120	-79.408493	0.907407	0.35	1.0	0.684211	0.217300
20	MSE	Downtown Toronto	Berczy Park	43.644771	-79.373306	0.814815	0.55	1.0	0.473684	0.212281

Discussions

These are the top ten neighbourhoods that we recommend to open a Chinese restaurant. These neighborhoods are almost all in downtown Toronto. In this region, Chinese Canadian fraction is very high, ensuring that the potential customer is in a large number. Also, venue number in these neighbourhoods is high, and they are close to other neighbourhoods, so enough number of people can live or visit these neighbourhoods. Finally, the number of nearby

Chinese restaurant is low in these neighborhoods, so the competition is not that high, and people opening a restaurant here can earn more.

Result:

We will recommend opening a Chinese restaurant in the following neighborhoods:

- 1 Harbourfront East, Toronto Islands, Union Station
- 2 Stn A PO Boxes 25 The Esplanade
- 3 Design Exchange, Toronto Dominion Centre
- 4 Adelaide, King, Richmond
- 5 First Canadian Place, Underground city
- 6 Commerce Court, Victoria Hotel
- 7 St. James Town
- 8 Willowdale South
- 9 Chinatown, Grange Park, Kensington Market
- 10 Ryerson, Garden District

Reference

- [1] https://en.wikipedia.org/wiki/List_of_postal_codes_of_Canada:_M
- [2] <https://geocoder.readthedocs.io/index.html>
- [3] <https://foursquare.com/>
- [4] https://en.wikipedia.org/wiki/Demographics_of_Toronto