

Finding the best location for opening Japanese Restaurant in Toronto, Canada

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1. Introduction

Opening a restaurant is not easy. There are a lot of things to think about such as a menu, price of foods, employees, chefs, etc. Some of these can change after you start your business for better fitting with the customers. But one thing that cannot change easily or take so much cost to change is "Location". Choosing a location of your restaurant is the challenge. If it is the right place it can boost your profit. But if it is not it can make your restaurant to end easily. So the question is "Where is the best location for your restaurant".

This project will focus on choosing location for opening a Japanese restaurant in Toronto, Canada.

2. Data acquisition and preparing

2.1 Data

To open a Japanese restaurant in Toronto need to choose the place that people may like to eat Japanese foods. So the data will be used are:

1. A mean number of likes of each restaurant in each Toronto's neighbourhood. It shows how many people like the restaurant. And it can also represent the number of restaurant customers too.
2. A mean number of likes of each Japanese restaurant in each Toronto's neighbourhood. It shows how many people like the Japanese restaurant. And it can also represent the number of Japanese restaurant customers too.

2.2 Data preparing

Toronto's neighbourhood data can be scraped from [https://en.wikipedia.org/wiki/](https://en.wikipedia.org/wiki/List_of_postal_codes_of_Canada:_M)

List of postal codes of Canada: M. And the latitude and longitude of those Neighbourhood is from the data provided by IBM team for the Applied Data Science Capstone Course on Coursera

(here). I used the neighbourhood and its latitude and longitude to get the list of venues for each neighbourhood using Foursquare API to explore top 100 venue within 1,500 meters. The data contains Neighbourhood, Venue ID, Venue name, Venue Latitude, Venue Longitude, and Venue category. In this project It need only restaurant category. Then used the data of restaurants for getting the number of likes for each restaurant using Foursquare API. Then I selected the data of restaurants that its category contains “Japanese” to create the Japanese Data. And using Foursquare API to get its likes data. There were 1,695 restaurants data of all neighbourhood and contains 57 Japanese restaurant. See in Figure 1 for number of all restaurants and Japanese restaurant in each neighbourhood.

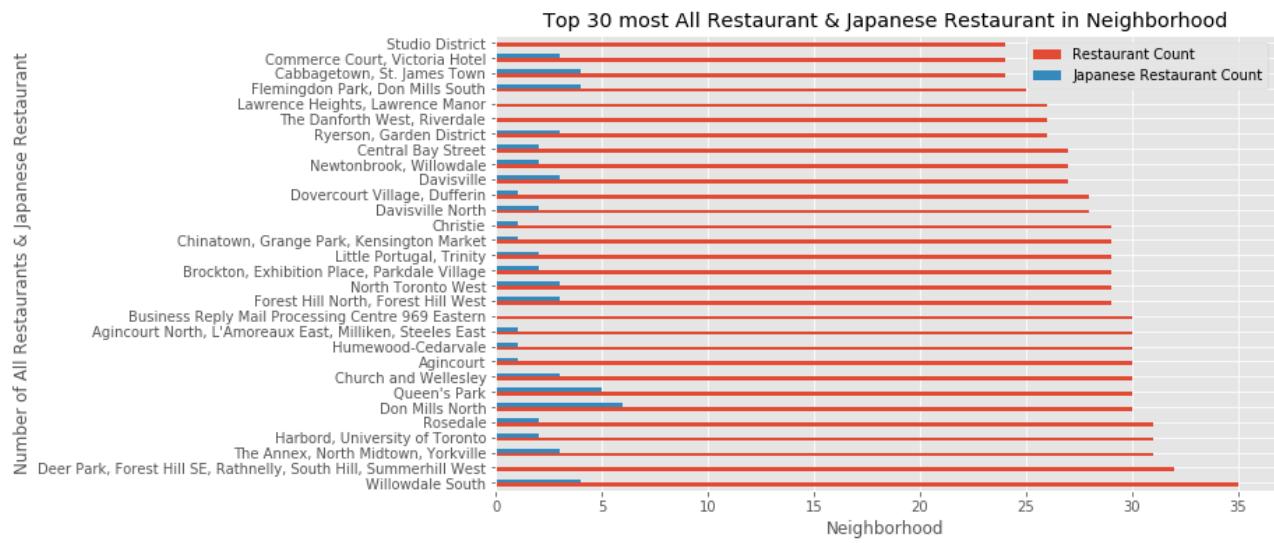


Figure 1. Top 30 most restaurant & Japanese restaurant in Neighbourhood

3. Methodology

After getting the data, the first step of the project was to find the mean of likes of all restaurants and the mean of likes of Japanese restaurants in each neighbourhood to use for segmenting the neighbourhood using k-Means clustering algorithm. After grouping the neighbourhood using mean of likes of all restaurant data, the result return 102 neighbourhood that has the restaurant likes data. And the result of grouping the neighbourhood using mean of likes of Japanese restaurant data returns 57 neighbourhood that has the Japanese likes data. The mean number of likes in each neighbourhood can see in Figure2.

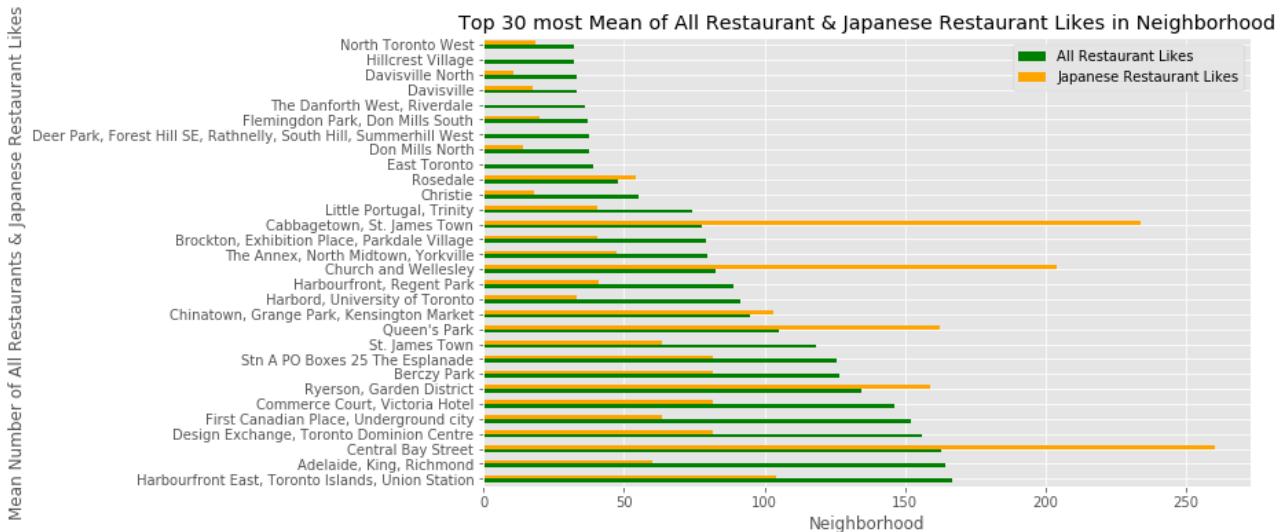


Figure 2. Top 30 most mean of all restaurant & Japanese restaurant in each neighbourhood

After getting the mean number of all restaurant and Japanese restaurant in each neighbourhood. For better result, the neighbourhood that does not have Japanese restaurant likes data were dropped from the data frame. Then, the mean of likes of all restaurants and the mean of likes of Japanese restaurants (Figure 3) were used to train a k-Means clustering algorithm with 3 number of clusters.

Neighborhood	All Restaurant Likes	Japanese Restaurant Likes
Harbourfront East, Toronto Islands, Union Station	166.928571	104.000000
Adelaide, King, Richmond	164.171875	60.076923
Central Bay Street	162.962121	260.222222
Design Exchange, Toronto Dominion Centre	156.090909	81.571429
First Canadian Place, Underground city	152.143836	63.312500
Commerce Court, Victoria Hotel	146.092593	81.571429
Ryerson, Garden District	134.710938	159.062500
Berczy Park	126.844262	81.571429
Stn A PO Boxes 25 The Esplanade	125.877863	81.571429
St. James Town	118.144928	63.312500

Figure 3. Top 10 the mean of likes of all restaurants and the mean of likes of Japanese restaurants in each neighbourhood.

4. Result

k-means clustering algorithm can cluster neighbourhood to 3 segment base on the mean number of likes:

Cluster 0: Neighbourhoods with low number of both all restaurant likes and Japanese restaurant likes.

Cluster 1: Neighbourhoods with high number of likes of both all restaurant and Japanese restaurant and number of likes of Japanese restaurant is higher than the number of all restaurants likes.

Cluster 2: Neighbourhoods with high number of likes of both all restaurant and Japanese restaurant and number of likes of Japanese restaurant is lower than the number of all restaurants likes.

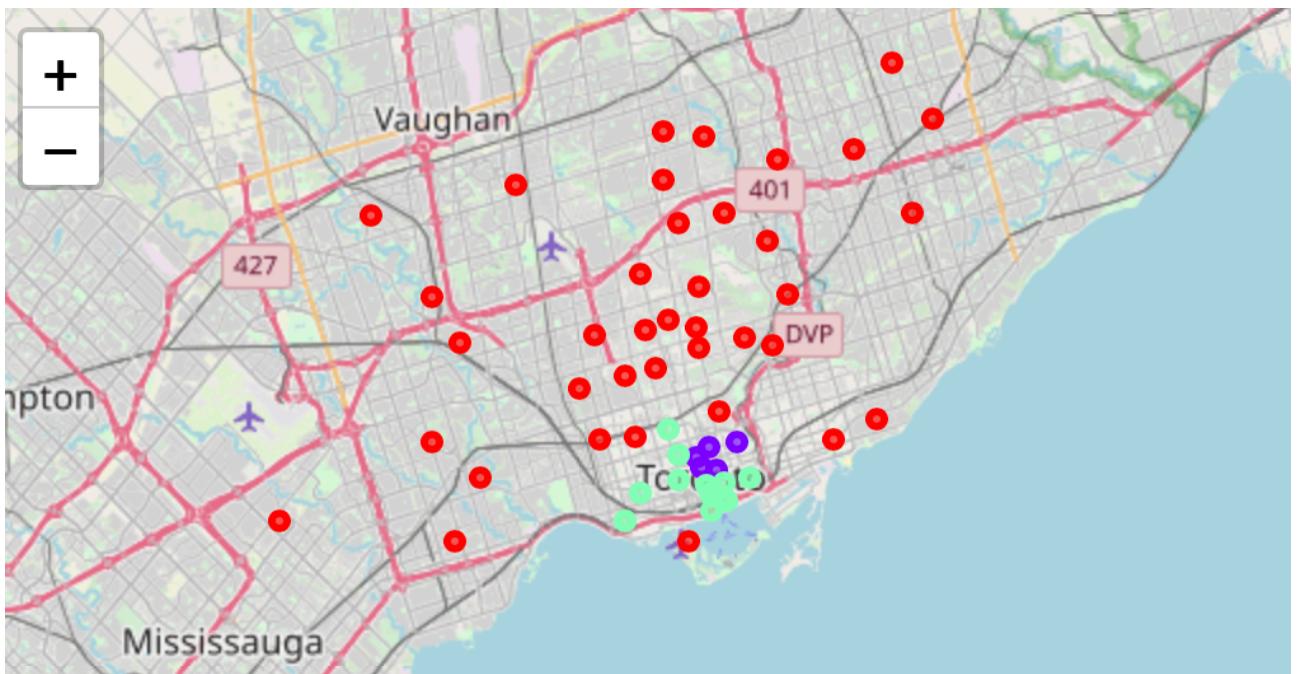


Figure 4. The map show neighbourhood into 3 clusters

The results in the above map show cluster 0 in red, cluster 1 in purple, and cluster 2 in green point.

Cluster 0 has 38 neighbourhoods, Cluster 1 has 5 neighbourhoods, and Cluster 2 has 14 neighbourhoods.

5. Discussion

From the results, neighbourhoods with cluster 0 has the low number of likes of all restaurant and low number of likes of Japanese restaurant. That also means the number of customer in those neighbourhoods are low. So the neighbourhoods with cluster 0 is not the choice for opening the Japanese restaurant. Neighbourhoods with cluster 1 has the high number of likes of all restaurant and high number of likes of Japanese restaurant. That means the number of customer may be high too. And the number of likes of Japanese restaurant is higher than the all restaurant likes. That means the customer may like to eat the Japanese foods than the other restaurant. So neighbourhoods with cluster 1 is the best choice for opening Japanese restaurant. Neighbourhoods with cluster 1 are Queen's Park, Ryerson and Garden District, Central Bay Street, Cabbagetown and St. James Town, and Church and Wellesley. These neighbourhoods are in Downtown Toronto. I would recommend to open Japanese restaurant here.



Figure 5. The map show neighbourhoods with cluster 1

For the neighbourhoods with cluster 2, it has the high number of likes of all restaurant and high number of likes of Japanese restaurant. So it means the number of customer may be high. the number of likes of Japanese restaurant is lower than the number of all restaurant likes. This means customer may prefer other restaurant than Japanese restaurant. But because it still has the high number of Japanese restaurant likes, so these neighbourhoods are optional choice for opening Japanese restaurant. Neighbourhoods with cluster 2 are Harbourfront and Regent Park, St. James Town, Berczy Park, Adelaide and King and Richmond, Harbourfront East and Toronto Islands and Union Station, Little Portugal and Trinity, Design Exchange and Toronto Dominion Centre, Brockton and Exhibition Place and Parkdale Village, Commerce Court and Victoria Hotel, The Annex and North Midtown and Yorkville, Harbord and University of Toronto, Chinatown and Grange Park and Kensington Market, Stn A PO Boxes 25 The Esplanade, and First Canadian Place and Underground city. These neighbourhoods are in or around downtown Toronto.

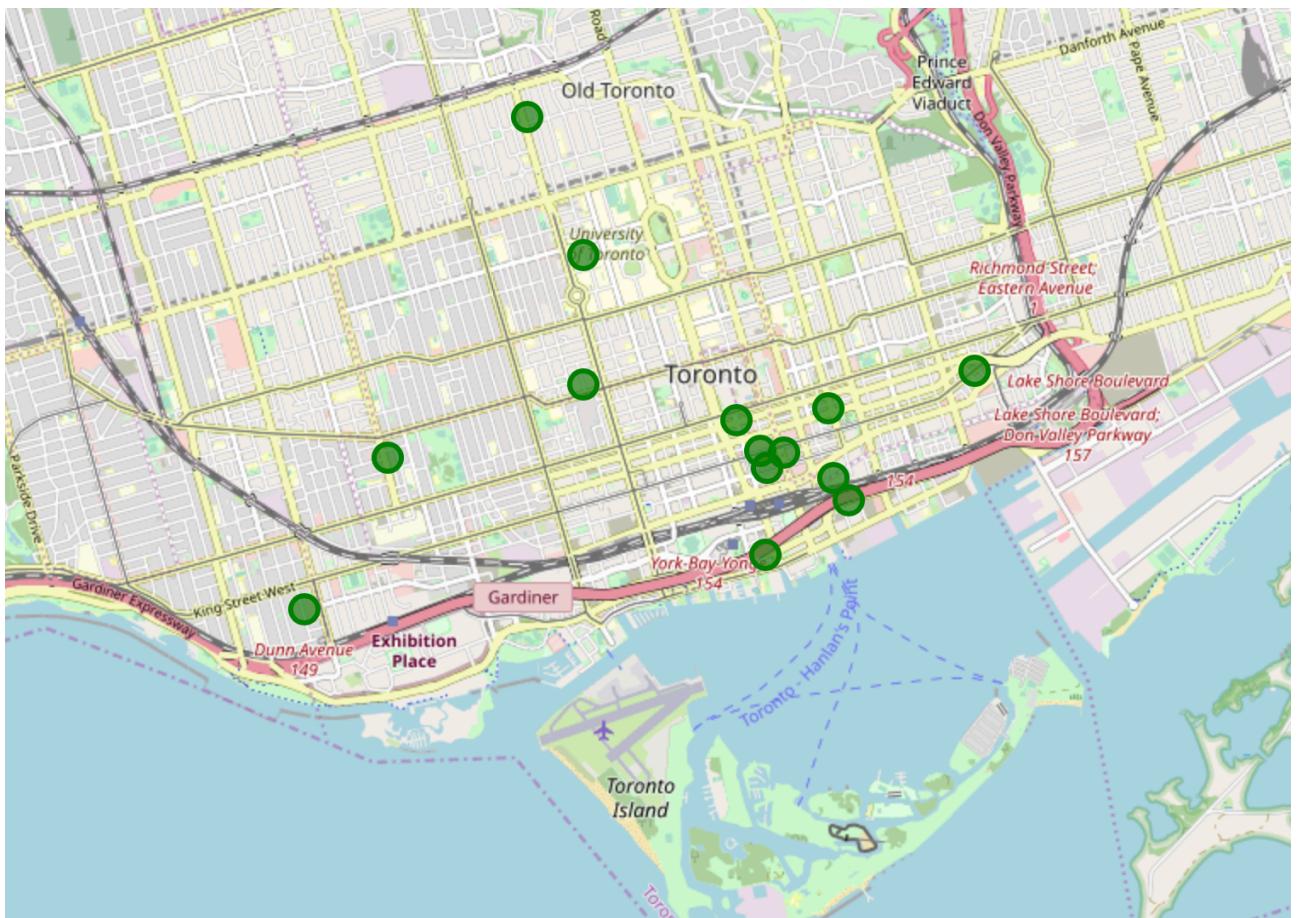


Figure 6. The map show neighbourhoods with cluster 2

6. Conclusion

For the entrepreneurs who want to open the Japanese restaurant, it is the challenge to choose the location for the restaurant. It need to be on the place that people would like to eat Japanese foods. This project use k-Means Clustering algorithm to cluster the neighbourhoods in Toronto, Canada which love to eat Japanese foods by using the number of restaurants likes in each neighbourhoods including the Japanese restaurants. The result get 5 neighbourhoods that seems to like to eat Japanese foods that other foods because the likes of Japanese restaurant is higher than the average of all restaurant. So I recommend to open Japanese restaurant there in Queen's Park, Ryerson and Garden District, Central Bay Street, Cabbagetown and St. James Town, and Church and Wellesley.

7. Future directions

In this project, I just only use the likes of restaurants to clustering the neighbourhoods. However, there are many factors to think about when choosing the location for opening a restaurant such as the renting price, car parking, transportation, and etc. In the future these factors need to be the feature used to train the model for better result of clustering neighbourhood.