Title: Recommendation to open an Asian food restaurant in Toronto

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1. Introduction and Business Problem:

   In this assignment, I will be working on a business related problem and try to find a solution. Let us think that an entrepreneur wants to start a restaurant business in Toronto. I am selecting Toronto because I am living in Canada currently. As an international student and an Asian person, I always try to find a restaurant that produces the food like in my region. Now, let us say that the entrepreneur also from Asia and he/she wants me to find him a suitable location in Toronto to start his business which is to open a restaurant. My task is to find him/her best suitable location to place the restaurant. I will be using the data science knowledge that I have acquired so far from the applied data science capstone course such as clustering machine-learning technique.

2. Target Audience:

   The target audience would be Asian people for the entrepreneur and find a suitable location in Toronto to maximize the business profit.

3. Data:

I am using the web scrapping technique to make the dataset. I have used the following web link to get the dataset and pre-processed it:

https://en.wikipedia.org/wiki/List_of_postal_codes_of_Canada:_M

The dataset sample:

Out[5]:

	Borough	Neighborhood	PostalCode
0	North York	Parkwoods	M3A
1	North York	Victoria Village	M4A
2	Downtown Toronto	Regent Park, Harbourfront	M5A
3	North York	Lawrence Manor, Lawrence Heights	M6A
4	Queen's Park	Ontario Provincial Government	M7A

Then I have used the course provided CSV file to get the co-ordinates that contains the latitude and longitude of these locations in the above figure.

Out[7]:

	PostalCode	Borough	Neighborhood	Latitude	Longitude
0	M1B	Scarborough	Malvern, Rouge	43.806686	-79.194353
1	M1C	Scarborough	Rouge Hill, Port Union, Highland Creek	43.784535	-79.160497
2	M1E	Scarborough	Guildwood, Morningside, West Hill	43.763573	-79.188711
3	M1G	Scarborough	Woburn	43.770992	-79.216917
4	M1H	Scarborough	Cedarbrae	43.773136	-79.239476

Then I have used foursquare API to get the nearby venues in Toronto. An example is:

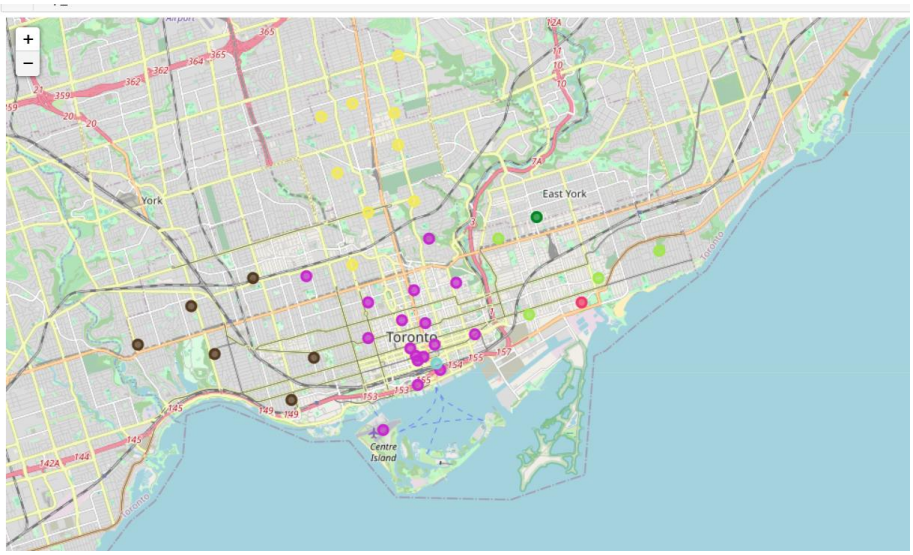
```
# create the API request URL
url = 'https://api.foursquare.com/v2/venues/explore?&client_id={}&client_secret={}&v={}&ll={},{}&radius={}&limit={}'
    CLIENT_ID,
    CLIENT_SECRET,
    VERSION,
    lat,
    lng,
    radius,
    LIMIT)

# make the GET request
results = requests.get(url).json()["response"]['groups'][0]['items']
```

4. Methodology:

In order to perform the desire goal, I have created the dataset based on the techniques that I have mentioned in section 3. At the first step, I cleaned the dataset, which is data pre-processing. Then I have selected some specific place from Toronto by using borough column to narrow it and visualize the neighbors on the maps.

[22]:

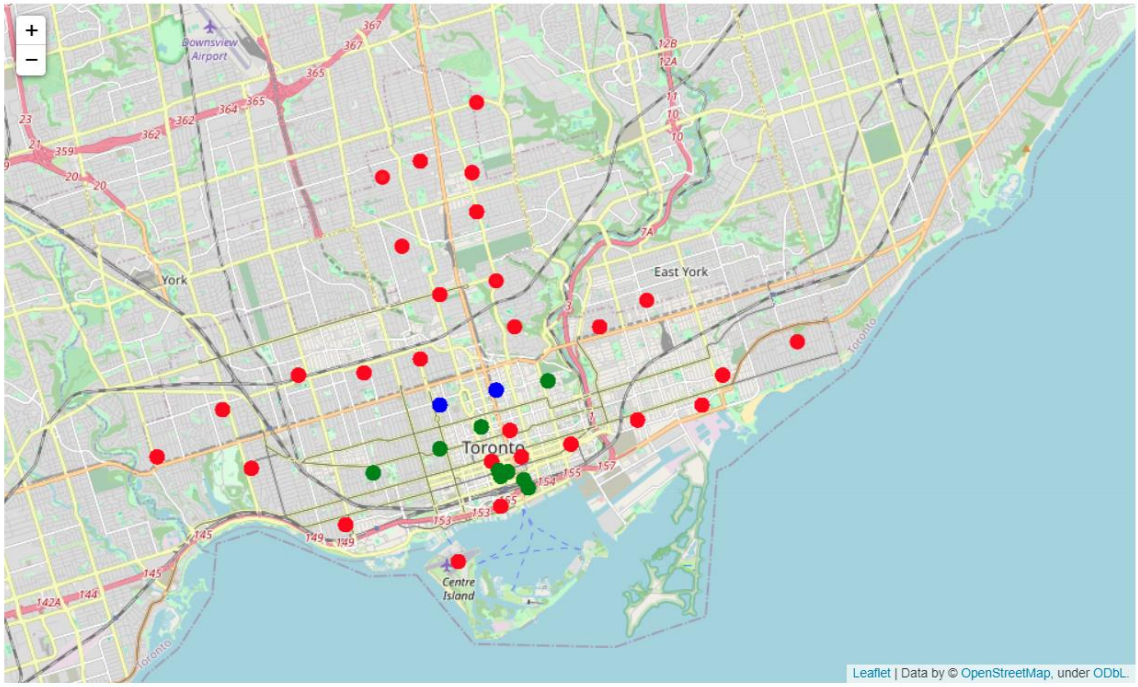


Then I have used foursquare APIs to get the nearby venues of those neighborhoods in the above image. After that, I have examined all the unique venues in category. That is where I have found different types of Asian restaurant. Then, I have noticed that the Japanese and Thai restaurants are the most available in the neighborhoods. Then I have decided to use both Japanese and Thai restraint to do machine leaning clustering algorithm and cluster the restaurant into three section. I have used k means clustering algorithm.

5. Result, Discussion, and Conclusion:

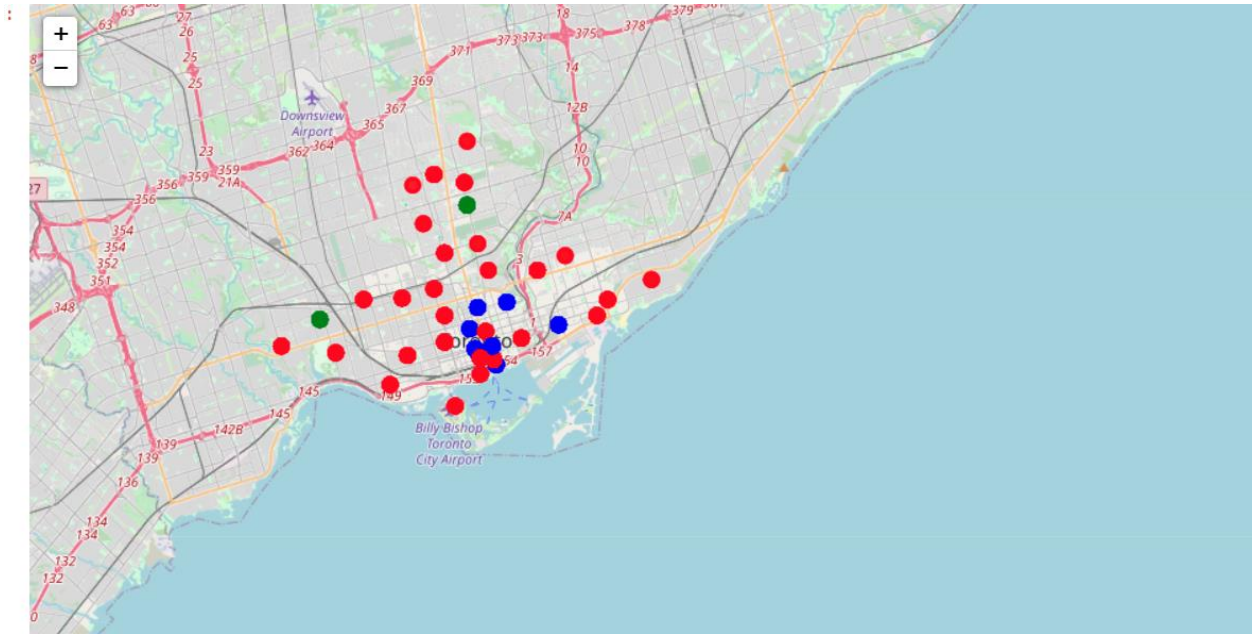
From the first clustering, I have observed that most of the Japanese restaurant are located in cluster 2 and most prime neighborhoods are Richmond, Adelaide, King and central Bay. The map visualization are given below:

Out[54]:



In the above figure, green means there are some restaurant located, blue means there are no Japanese restaurant is located in these neighborhoods, and red means these neighborhood contains the highest number of Japanese restraint.

Then I did same procedure for Thai restaurant as well and found out that cluster one contains the most Thai restaurants. Two prime locations are same as before, which are Richmond, Adelaide, King and central Bay.



In conclusion, we can observe that most of the Japanese restaurant are in cluster 2. Since I took the lead with Japanese and Thai restaurant, I would suggest the entrepreneurs choose either Japanese food or Thai food as a lead to open the business. If Japanese then suitable place would be cluster 2 which is near Richmond, Adelaide, King or Central Bay Street area. If Thai then choose the cluster 1 which is near Richmond, Adelaide, King and central Bay. In overall, the entrepreneurs could take lead with both Japanese and Thai food in the Richmond, Adelaide, King and central Bay area because the cluster result suggest that these two place are prime places for these kinds of restaurant.