The Battle of Neighborhoods

A Chinese Restaurants Food Delivery platform

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Introduction

Background

Toronto is the provincial capital of the province of Ontario, and is the most populous city in Canada. It is known to have huge populations of immigrants and ethnic enclaves.

At the most recent (2016) census, the wider Greater Toronto Area (GTA) population was 6,417,516. This makes the GTA the largest metropolitan area in Canada and the seventh largest metropolitan area in North America.

Business Problem

According to the latest census, there are 332,830 ethnic Chinese living in the city of Toronto. It's the largest ethnic origin in Toronto. There are well over 120,000 ethnic Chinese living in the Scarborough borough itself. It is the most populous borough for ethnic Chinese in Toronto.

With the huge ethnic Chinese population in the area, plus a constant influx of Chinese students, immigrants and tourists within the GTA, a business start up is looking to setup a food delivery platform for the Chinese speaking segment, with the aim to expand to other Asian ethnic groups like Korean and Japanese. Unlike other food delivery platforms such as UberEats or DoorDash, this platform will feature some distinguish features that would be attracted to its future users and potential restaurants partner. Features like:

a. Provide a Chinese interface on the ordering app, both the menu and its order itself can be in Chinese language. That's a critical feature for Chinese users as a lot of English menus in restaurants are vary difference from the Chinese ones. A lot of food items are not available on English menu. This feature would attract Chinese users over other existing food delivery platforms.

b. Non English speaking Chinese cooks and staffs work in the restaurant can read the orders by themselves in Chinese. This can prevent those lost in translation errors and minimize ordering errors. A huge convenience for Chinese speaking restaurant owners

and cooks. It is a bonus in comparing to other platforms that only give out orders in English.

c. Beside credit cards, the platform will setup a payment options that are hugely popular by mainland Chinese students, immigrants and Chinese visitors, namely the Wechat Pay and Alipay. The Chinese payment options would bring additional segment of customers to the platform. That's another incentive for restaurants owner to join the network.

Target audience

This project will do a demographical and location based analysis, and will become part of market analysis for the startup to choose which neighborhood or borough to be start up with building up their restaurants network. Before this analysis, the company is considering to target restaurants in the Scarborough borough area first as it has the largest Chinese population resides there. This project will help the company to better understand the distribution of Chinese restaurants within the City and whether it is viable to start the network in most populous borough only.

Data

Data Source

The data source and tools for the analysis are the following:

a. Toronto borough/neighborhood Data: A postal code table for Toronto was pulled from Wikipedia page. The table was transformed into a Pandas dataframe for further use.

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

b. The coordinate data for each neighborhood in Toronto was read from a CSV file in http://cocl.us/Geospatial_data . The data was merged into a dataframe that contains the postal code for further analysis.

c. Utilizing Foursquare API to explore the neighborhoods and find outs all the Chinese restaurants in the neighborhoods. The results of its search is used to analysis the distributions of Chinese restaurants within the city.

Data cleaning

a. To start with our analysis, we import the postal code data from Wikipeidia web page. With using the Pandas package, the table can be easily read into a Pandas dataframe by using the read_html command. Within the dataframe there are rows of postal code with the “Not Assigned” column on the Borough or Neighborhood column. For the “Non Assigned” Borough column , those are mainly non used postal code and can be dropped .As for “Non Assigned” neighborhood column, it can be dropped as well as it is occupied by a park. It is not revelant for this anslysis. Those rows with the same postal code but difference neighborhood name were merged into a single row. The cleaned dataframe will have a unique postal code for each row of data.

b. The imported postal code dataframe is without the co-ordinate data. The coordinates are needed for Foursquare API to work with in order to explore the neighborhoods. We fetch the coordinate data for all the neighborhoods in Toronto using the csv file. The CSV file is then merged into the dataframe.

Methodology:

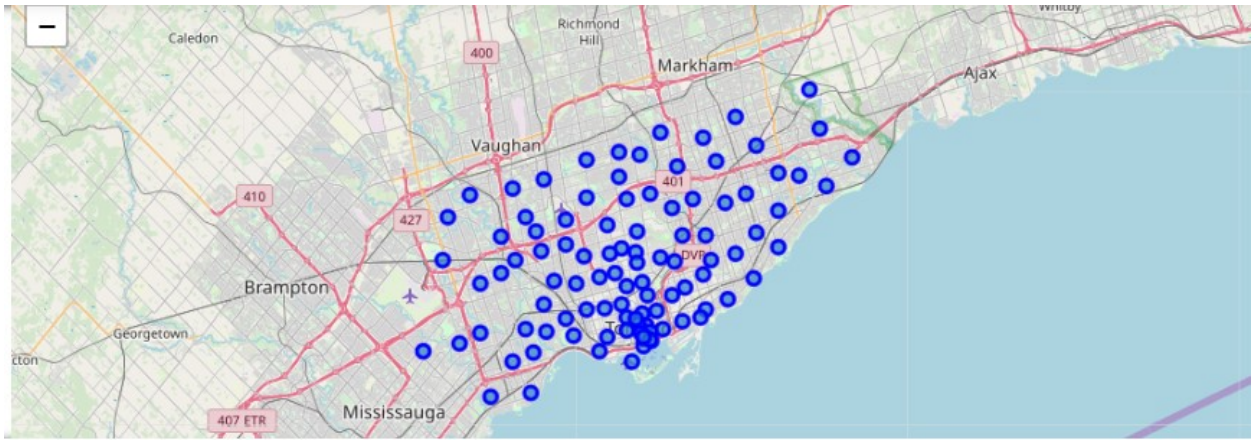
Scrape the Wikipedia page and gathering data into a Pandas dataframe

Using the Pandas read_html method, the Wikipedia data is read into a Pandas dataframe , the data is cleaned and was merged with CSV file that contains all the coordinates of the postal code.

	Postcode	Borough	Neighborhood	Latitude	Longitude
0	M1B	Scarborough	Rouge, Malvern	43.806686	-79.194353
1	M1C	Scarborough	Highland Creek, Rouge Hill, Port Union	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
5	M1J	Scarborough	Scarborough Village	43.744734	-79.239476
6	M1K	Scarborough	East Birchmount Park, Ionview, Kennedy Park	43.727929	-79.262029
7	M1L	Scarborough	Clairlea, Golden Mile, Oakridge	43.711112	-79.284577
8	M1M	Scarborough	Cliffcrest, Cliffside, Scarborough Village West	43.716316	-79.239476
9	M1N	Scarborough	Birch Cliff, Cliffside West	43.692657	-79.264848
10	M1P	Scarborough	Dorset Park, Scarborough Town Centre, Wexford ...	43.757410	-79.273304

Create a map of Toronto with neighborhoods superimposed on top

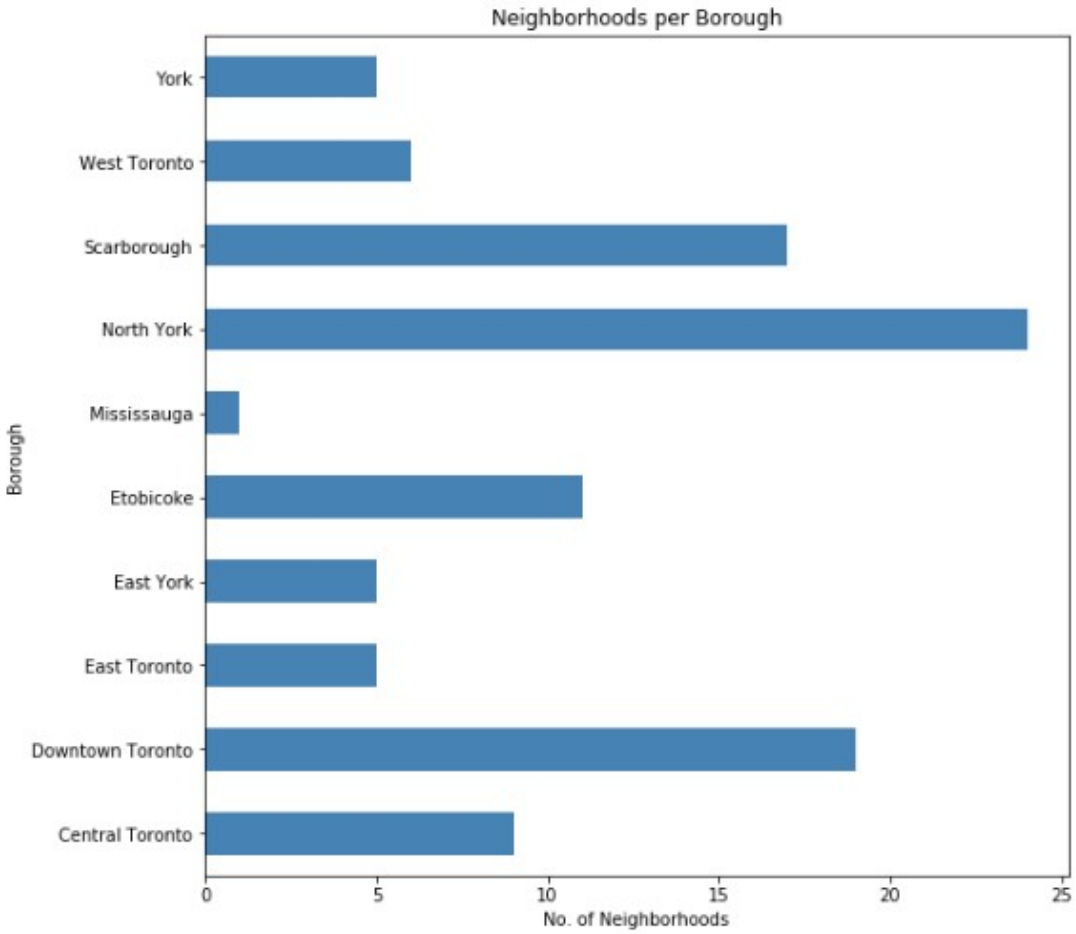
Using the dataframe above, we apply the python folium library to visualize geographic details of Toronto and its boroughs. A map of Toronto with boroughs superimposed on top using the latitude and longitude values was created as below:



Neighborhoods per borough

With the initial dataframe, let's start analyzing it. First, we can find out how many neighborhoods that each borough has. The following were obtained from the data. We can see the borough of "Downtown Toronto", "York" and "Scarborough" have the most neighborhoods within its boundary.

Borough	
Central Toronto	9
Downtown Toronto	19
East Toronto	5
East York	5
Etobicoke	11
Mississauga	1
North York	24
Scarborough	17
West Toronto	6
York	5



Utilizing Foursquare API to explore Chinese restaurants within the city

Let's analyze further and see how many Chinese restaurants are there in each borough and graph the results. We are going to start utilizing the Foursquare API to explore the neighborhoods.

There are two approaches for the search using the Foursquare API:

a. Using the API to list all venues nearby a neighborhood and select only those with a "Venue Category" of "Chinese Restaurant". However, this approach only returns a very disappointing result. A lot of venues which indeed are Chinese restaurant are missing on the result. Another approach is needed for a better search result.

b. With further research and investigation, a new approach was found for this analysis. Instead of filter the "Venue Category" of the search result, a categoryId 4bf58dd8d48988d145941735 was used in the search request. This categoryId includes

all the different locals of Chinese restaurant. i.e. Cantonese restaurant, Dim Sum restaurant. The search result is greatly improved by using the categoryId in the API request:

url='https://api.foursquare.com/v2/venues/explore?&client_id={}&client_secret={}&v={}&ll={},{}&**categoryId**={}&radius={}&limit={}'

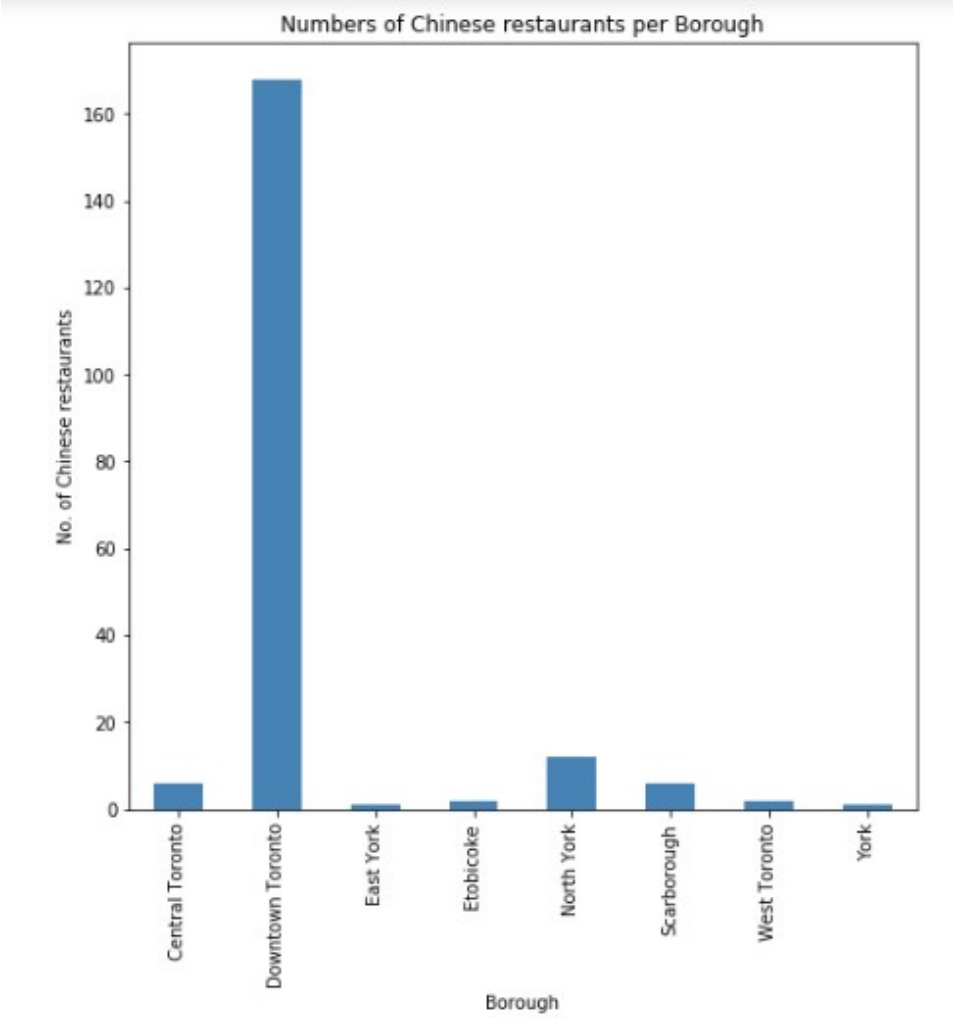
A snapshot of the much improved search result by using the categoryId.

12	6	North York	Flemingdon Park, Don Mills South	43.725900	-79.340923	Congee Star 帝王名粥	43.726586	-79.341833	Chinese Restaurant
13	7	North York	Flemingdon Park, Don Mills South	43.725900	-79.340923	Asian Legend	43.726591	-79.342188	Dim Sum Restaurant
14	8	North York	Bathurst Manor, Downsview North, Wilson Heights	43.754328	-79.442259	China Court	43.755780	-79.437437	Chinese Restaurant
15	9	North York	Northwood Park, York University	43.767980	-79.487262	Carribean Heat	43.764155	-79.490227	Chinese Restaurant
16	10	North York	Northwood Park, York University	43.767980	-79.487262	Yunnan Kitchen Delights Restaurant	43.764600	-79.489271	Chinese Restaurant
17	11	North York	Downsview Northwest	43.761631	-79.520999	China Wok	43.758039	-79.519970	Chinese Restaurant
18	0	East York	Leaside	43.709060	-79.363452	Tao Northern Chinese Cuisine	43.712281	-79.364335	Peking Duck Restaurant
19	0	Central Toronto	Lawrence Park	43.728020	-79.388790	Dim Sum Deluxe	43.726953	-79.394260	Dim Sum Restaurant
20	1	Central Toronto	North Toronto West	43.715383	-79.405678	C'est Bon	43.716785	-79.400406	Chinese Restaurant
21	2	Central Toronto	Davisville	43.704324	-79.388790	South China Restaurant	43.701899	-79.387649	Chinese Restaurant
22	3	Central Toronto	Deer Park, Forest Hill SE, Rathnelly, South Hi...	43.686412	-79.400049	SuperBuffet	43.685091	-79.397906	Chinese Restaurant

Analyze the distribution of Chinese Restaurants

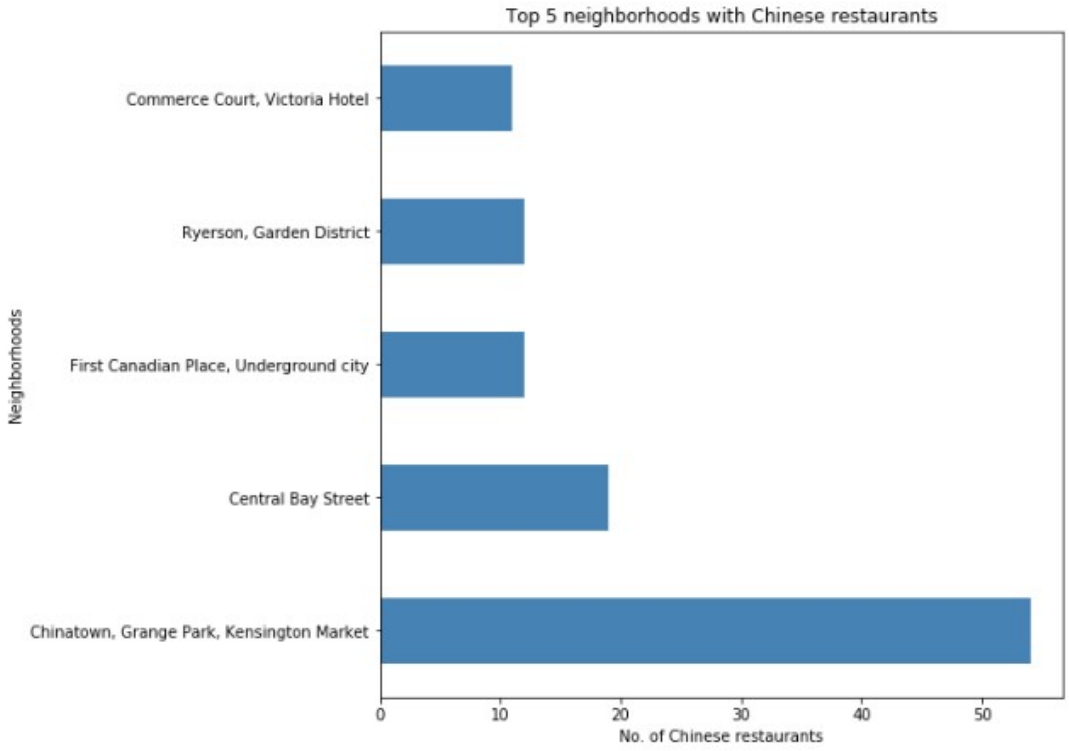
The summary of the FourSquare API search result

```
Borough
Central Toronto       6
Downtown Toronto    168
East York             1
Etobicoke             2
North York           12
Scarborough           6
West Toronto          2
York                  1
```


Numbers of Chinese restaurants per Borough
No. of Chinese restaurants
0
20
40
60
80
100
120
140
160
Central Toronto
Downtown Toronto
East York
Etobicoke
North York
Scarborough
West Toronto
York
Borough

Top 5 neighborhoods with Chinese restaurants

To further analyze, below chart is the top 5 neighborhoods with Chinese restaurant, it indicates the neighborhoods in Downtown Toronto has the largest concentration.



Conclusion:

As the borough of Scarborough has the highest concentration of Chinese living there, it's logical for the company to lure restaurants in Scarborough in joining the network first. However, based on the analysis, it clearly indicates most Chinese restaurants are located in Downtown Toronto neighborhoods. Downtown Toronto has wide lead over other boroughs and is the place to be for Chinese food. That's suggests where do people get their Chinese food from. It's critical for the food delivery platform to signs up more Chinese restaurants in downtown area as its partners even though most Chinese live in Scarborough. By signing up more Chinese restaurants in Downtown Toronto, it greatly expands the choice of menus and greater variety items for its app users to choose from. As a final note, the analysis of this report is highly depended on the adequacy and accuracy of FourSquare's data. A more comprehensive analysis and future work is needed to incorporate data from other external databases as well.