

Identifying better places to open restaurant

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Introduction

Mr Vikas Khanna is one of the famous restaurateurs in India. Now, since he is planning to move his base to Toronto, Canada, he wants to start his restaurant business in the city. With this exercise, we will try to find out the best possible location in the city.

Business problem

Now, the problem with Mr Khanna is, he has to set up everything from the beginning. Though, he is an experienced restaurateur, doing business in a new city will not be easy task. He has to deal with restaurants doing good and existing from quite a while. However, data science techniques like clustering are already there to find solutions.

Data

We will use the publicly available census data of Toronto for the year 2016 and Foursquare API to collect business competitors with the neighbourhood location.

Census data: <https://www.toronto.ca/city-government/data-research-maps/open-data/open-data-catalogue/#8c732154-5012-9afe-d0cd-ba3ffc813d5a>

Toronto neighbourhoodshapefile: <https://www.toronto.ca/city-government/data-research-maps/open-data/open-data-catalogue/#a45bd45a-ed8-730e-1abc-93105b2c439f>

Methodology

To access the geographical location we have used Foursquare API. Foursquare users can access details of any of the listed venue using their CLIENT ID and CLIENT KEY. We will also use Folium library for data visualization; it is used to create maps. Folium will help us in locating accurate location of the restaurants we want to access. It will help Mr. Khanna to identify the locations of his closest competitors and best possible location to setup his restaurant business. We will also utilize JSON library to read and write the data in prescribed format. We will also utilize K-means clustering methodology to see customer segmentation, pattern recognition etc.

In short following libraries are required to complete the exercise -

1. Numpy
2. Pandas
3. Foursquare API
4. JSON
5. Scikit - K-means clustering
6. Folium

```
import pandas as pd # library for data analysis
pd.set_option('display.max_columns', None)
pd.set_option('display.max_rows', None)

import json # library to handle JSON files

#!conda install -c conda-forge geopy --yes # uncomment this line if you
haven't completed the Foursquare API lab
from geopy.geocoders import Nominatim # convert an address into latitude
and longitude values

import requests # library to handle requests
from pandas.io.json import json_normalize # tranform JSON file into a p
andas dataframe

# Matplotlib and associated plotting modules
import matplotlib.cm as cm
import matplotlib.colors as colors

# import k-means from clustering stage
from sklearn.cluster import KMeans

#!conda install -c conda-forge folium=0.5.0 --yes # uncomment this line
if you haven't completed the Foursquare API lab
import folium # map rendering library

from bs4 import BeautifulSoup

print('Libraries imported.')
```

Results and Discussion

We have got a sight of the venues in Down Town borough and able to find out some interesting insights which might be useful for Mr. Khanna. It will help him in taking decision to select a perfect location to open his restaurant.

From the data analysis it can be seen that there are 89 unique venues.

We have also identified the top 5 venues of CN Tower, King and Spadina, Railway Lands, Harbourfront West, Bathurst Quay, South Niagara, Island airport, which are in

neighbourhood of Down Town borough. The most common places in these neighbourhood are pizza places and coffee shops.

Regent park, Harbourfront is the closest neighbourhood of Down Town borough with 1st most common venue is a Mexican restaurant followed by Medical centre and Bank at 2nd and 3rd place respectively.

Out[27]:

	Neighbourhood	Neighborhood Latitude	Neighborhood Longitude	Venue	Venue Latitude	Venue Longitude	Venue Category
0	Regent Park, Harbourfront	43.763573	-79.188711	RBC Royal Bank	43.766790	-79.191151	Bank
1	Regent Park, Harbourfront	43.763573	-79.188711	G & G Electronics	43.765309	-79.191537	Electronics Store
2	Regent Park, Harbourfront	43.763573	-79.188711	Sail Sushi	43.765951	-79.191275	Restaurant
3	Regent Park, Harbourfront	43.763573	-79.188711	Big Bite Burrito	43.766299	-79.190720	Mexican Restaurant
4	Regent Park, Harbourfront	43.763573	-79.188711	Enterprise Rent-A-Car	43.764076	-79.193406	Rental Car Location

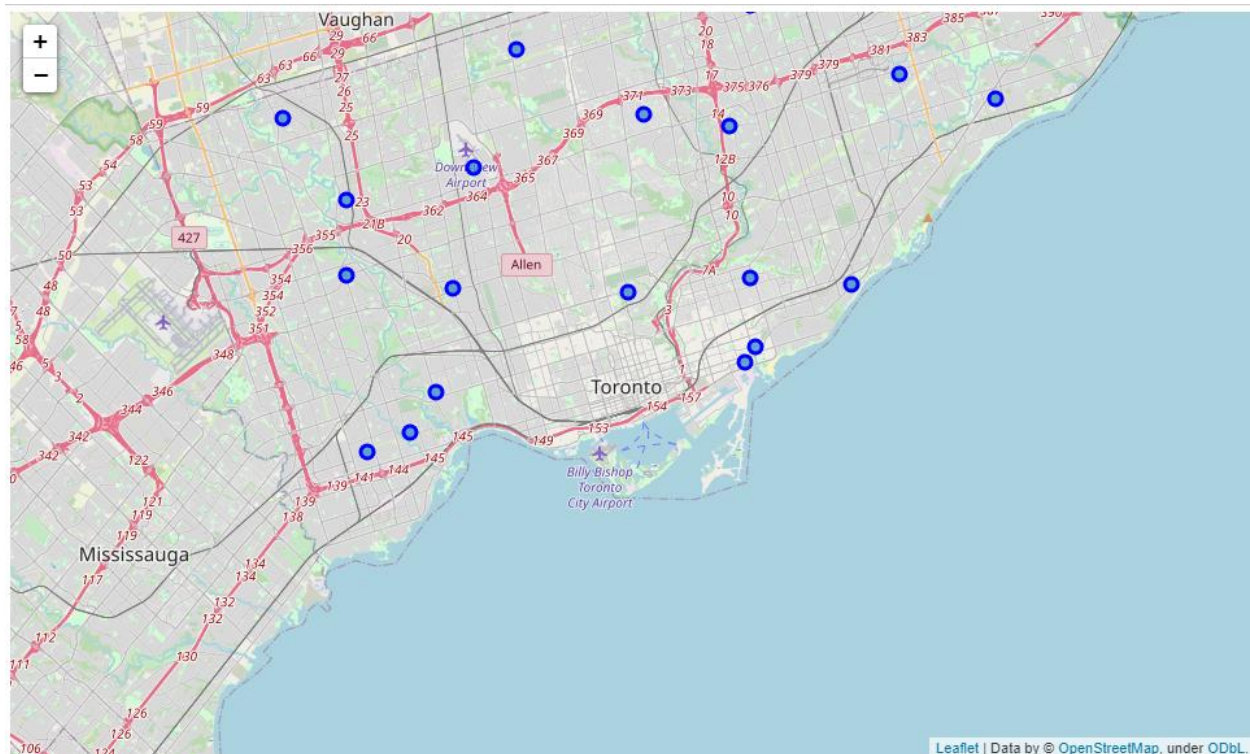


Fig1. Down Town borough map

Conclusion

We will need a location where we can catch out customers from "hot" location we have picked up from the map and stay in a certain distance so as to lessen the captivity of business.

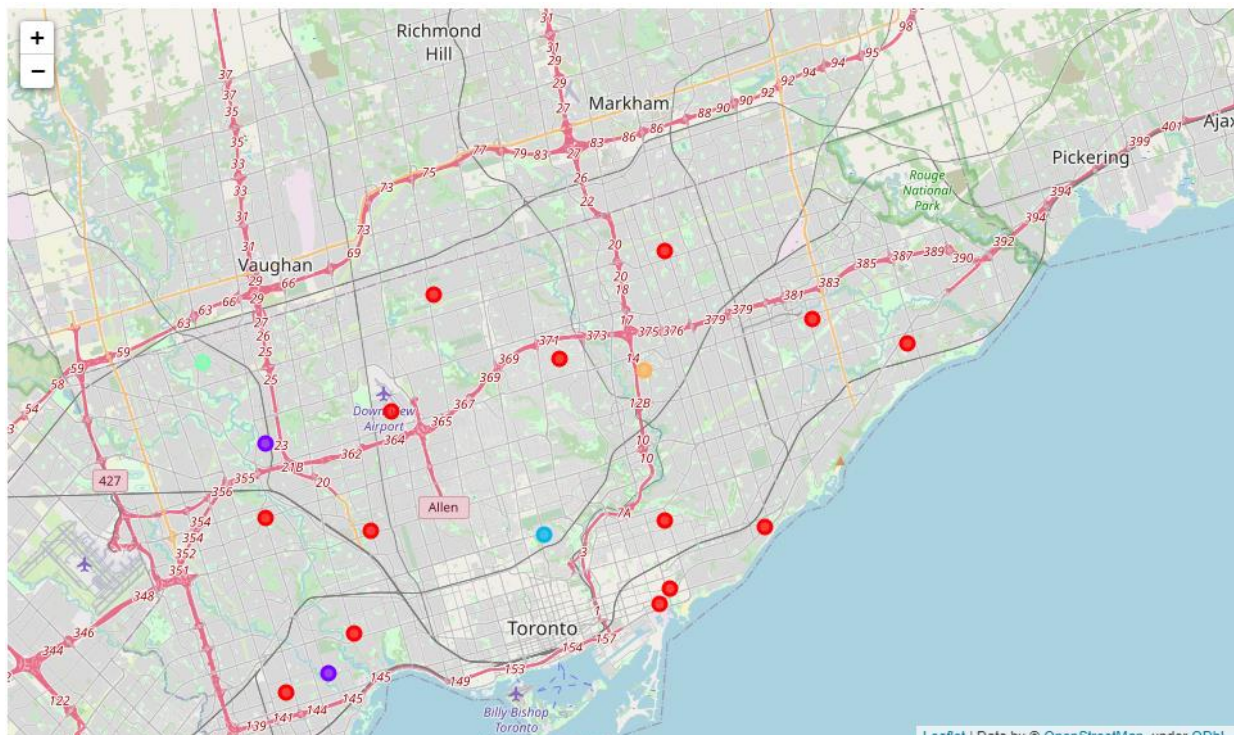


Fig 2. Clustering of venues in Down Town borough

According cluster analysis Christie neighbourhood is the perfect area for Mr. Khanna to open his restaurant. The 1st most common venue is Park. We believe people who will visit the park are more likely to visit the restaurant. Hence, it will be an idle neighbourhood to open the restaurant.

Cluster 1

	Neighbourhood	1st Most Common Venue	2nd Most Common Venue	3rd Most Common Venue	4th Most Common Venue	5th Most Common Venue	6th Most Common Venue	7th Most Common Venue	8th Most Common Venue	9th Most Common Venue	10th Most Common Venue
0	Regent Park, Harbourfront	Mexican Restaurant	Medical Center	Bank	Rental Car Location	Restaurant	Breakfast Spot	Electronics Store	Intersection	Yoga Studio	Falafel Restaurant
1	Queen's Park, Ontario Provincial Government	Athletics & Sports	Gas Station	Bakery	Bank	Thai Restaurant	Hakka Restaurant	Fried Chicken Joint	Caribbean Restaurant	Yoga Studio	Farmers Market
2	Garden District, Ryerson	College Stadium	General Entertainment	Café	Skating Rink	Falafel Restaurant	Convenience Store	Curling Ice	Dance Studio	Dessert Shop	Diner
3	St. James Town	Grocery Store	Fast Food Restaurant	Chinese Restaurant	Breakfast Spot	Coffee Shop	Pizza Place	Camera Store	Sandwich Place	Pharmacy	Bank
4	Berczy Park	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN
5	Central Bay Street	Pharmacy	Bank	Pizza Place	Coffee Shop	Butcher	Grocery Store	Bar	Baseball Field	Dance Studio	Dessert Shop
7	Richmond, Adelaide, King	Airport	Park	Other Repair Shop	Comic Shop	Curling Ice	Dance Studio	Dessert Shop	Diner	Discount Store	Electronics Store
8	Harbourfront East, Union Station, Toronto Islands	Pharmacy	Beer Store	Curling Ice	Dance Studio	Bus Stop	Skating Rink	Spa	Park	Athletics & Sports	Food Service
9	Toronto Dominion Centre, Design Exchange	Park	Burrito Place	Food & Drink Shop	Fish & Chips Shop	Fast Food Restaurant	Ice Cream Shop	Italian Restaurant	Liquor Store	Coffee Shop	Movie Theater
11	University of Toronto, Harbord	Turkish Restaurant	Sandwich Place	Discount Store	Skating Rink	Yoga Studio	Falafel Restaurant	Convenience Store	Curling Ice	Dance Studio	Dessert Shop
12	Kensington Market, Chinatown, Grange Park	Café	Coffee Shop	Pizza Place	Italian Restaurant	Sushi Restaurant	Pub	Fish & Chips Shop	Latin American Restaurant	Indie Movie Theater	Health Food Store
13	CN Tower, King and Spadina, Railway Lands, Har...	Light Rail Station	Garden	Brewery	Park	Garden Center	Pizza Place	Butcher	Recording Studio	Restaurant	Burrito Place
15	Stn A PO Boxes	Gym	Supplement Shop	Discount Store	Kids Store	Sandwich Place	Burger Joint	Fast Food Restaurant	Hardware Store	Convenience Store	Grocery Store
				Chinese	Middle	Sandwich		Discount	Electronics		Dance

Cluster 2

[43]:

	Neighbourhood	1st Most Common Venue	2nd Most Common Venue	3rd Most Common Venue	4th Most Common Venue	5th Most Common Venue	6th Most Common Venue	7th Most Common Venue	8th Most Common Venue	9th Most Common Venue	10th Most Common Venue
14	Rosedale	Baseball Field	Yoga Studio	Fast Food Restaurant	Curling Ice	Dance Studio	Dessert Shop	Diner	Discount Store	Electronics Store	Falafel Restaurant
17	First Canadian Place, Underground city	Baseball Field	Food Service	Yoga Studio	Fast Food Restaurant	Curling Ice	Dance Studio	Dessert Shop	Diner	Discount Store	Electronics Store

Cluster 3

[44]:

	Neighbourhood	1st Most Common Venue	2nd Most Common Venue	3rd Most Common Venue	4th Most Common Venue	5th Most Common Venue	6th Most Common Venue	7th Most Common Venue	8th Most Common Venue	9th Most Common Venue	10th Most Common Venue
10	Commerce Court, Victoria Hotel	Trail	Yoga Studio	Fast Food Restaurant	Convenience Store	Curling Ice	Dance Studio	Dessert Shop	Diner	Discount Store	Electronics Store

Cluster 4

[5]:

	Neighbourhood	1st Most Common Venue	2nd Most Common Venue	3rd Most Common Venue	4th Most Common Venue	5th Most Common Venue	6th Most Common Venue	7th Most Common Venue	8th Most Common Venue	9th Most Common Venue	10th Most Common Venue
6	Christie	Park	Food & Drink Shop	Yoga Studio	Farmers Market	Curling Ice	Dance Studio	Dessert Shop	Diner	Discount Store	Electronics Store

Visit nbviewer.org to view folium maps.

https://nbviewer.jupyter.org/github/PraviinSNegii/Neighborhood_week1/blob/master/https%3A/github.com/PraviinSNegii/Neighborhood_week1/Battle_of_neighbourhood.ipynb