

Location Recommendation for Coffee Shops Based on Foursquare Data

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1. Introduction

1.1 Background

For offline physical stores, in addition to brand positioning, the first step of business development is to choose a location to open stores. As the core element of entry level in the competition conditions of physical restaurant industry, the address has natural spatial barriers. A good location can bring considerable customer flow and greatly increase turnover for the enterprise, which is also a great competitive advantage and intangible assets. Therefore, it is crucial to find out where is the appropriate places to establish the stores, especially for coffee shops.

1.2 Problem

First of all, the success of a store depends on the quality of the property itself in addition to the surrounding consumer characteristics, such as whether it is convenient to enter, whether the door head is eye-catching enough, the area and rent the landlord can provide, and the management level of its own personnel. In my experience, these factors account for 60 percent in China.

Machine learning trains for variables that can be uniformly accessed without subjective factors. However, the collection process of a large number of variables containing subjective factors is manually selected. No matter how intelligent a machine is, it cannot predict the rentable area of a new location or whether the door head can be seen from all directions, so artificial intelligence is powerless.

Secondly, a very important story in the site selection is how to avoid cannibalization between sister stores, especially chain enterprises.

1.3interest

Once the location of a coffee shop has been chosen, it would costs considerable resource to change. Besides location of the store is linked to the customer flow, environment, customer type, etc., a series of factors on the income of the shop. It is vital for the shop owner to choose an appropriate place for business.

2.Data Source and Description

2.1Data acquisition and source

Open Data Source via Toronto Government:

<https://www.toronto.ca/city-government/data-research-maps/open-data/open-datalist/>

Foursquare API

The Foursquare provided a series of API, which can help to obtain related geography information in Toronto including the location, name ,cartography, rating.

2.2 Usage of the data

Having considered that Toronto is a metropolis, which contains a bunch of existing coffee shop or restaurant providing similar drinks, it is convenient to take advantage of those venues' information to help on the location choosing.

Location: Using the location data of the venues, a distribution of cafes and densely populated area can be drawn.

Environment: Exploring existing coffee shops with high rating score to know what kinds of venues consists of the environment of a good coffee shop.

Popularity: Foursquare venue API can provide the rating score and number of likes of the venue. By collecting and rank the shops with different colors, a heat map can be drawn to find the most popular place voting by the consumers without considering the diverse factors.

The above method is particularly suitable for brand owners who want to launch the brand's first store in a strange city. The operation of the store completely affects the brand's influence in the city, but due to the unfamiliarity with the city and the difficulty in obtaining information, it is often difficult to find the best location. And the heat map of the whole city hit the nail on the head.

3.Methodology

Firstly, as for the database, Foursquare API has been used to explore the popular coffee shops around the neighborhoods in Toronto. The master data which has the main components ID, Name, Latitude and Longitude informations of the shops.

The response object given by Foursquare are multi-stage dictionaries, which is complicated to obtain required data features of desired venues. So the text type data in response must be cleaned. After detection operation, an appropriate database has been obtained as follow:

	ID	Name	Latitude	Longitude
0	5a8743ed1543c734d2840194	Starbucks Reserve Bar	43.735764	-79.344156
1	4e11eea96284edb6badbaa31	Aroma Espresso Bar	43.734400	-79.345204
2	57e286f2498e43d84d92d34a	Tim Hortons	43.760668	-79.326368
3	50c3ae15e4b08c3b596c6069	Baretto Caffé	43.744456	-79.346460
4	4d8b9b3137c6a143040bae0c	Tim Hortons	43.752814	-79.314067

Figure 3.1 A Segment of coffee shops data

The Borough in Toronto is the basic research unit of this report, their information can be find in official website of city Toronto as below:

	Postal Code	Borough	Neighborhood	Latitude	Longitude
0	M3A	North York	Parkwoods\n	43.753259	-79.329656
1	M4A	North York	Victoria Village\n	43.725882	-79.315572
2	M5A	Downtown Toronto	Harbourfront\n,Regent Park\n	43.654260	-79.360636
3	M6A	North York	Lawrence Heights\n,Lawrence Manor\n	43.718518	-79.464763
4	M7A	Queen's Park	Not assigned\n	43.662301	-79.389494

Figure3.2 Borough data segment

3.1 Coffee shop distribution

I used python **folium** library to visualize geographic details of the neighborhoods Toronto and its nearly coffee shops and I created a map of Toronto with coffee shops superimposed on top. I used latitude and longitude values to get the visual as below:

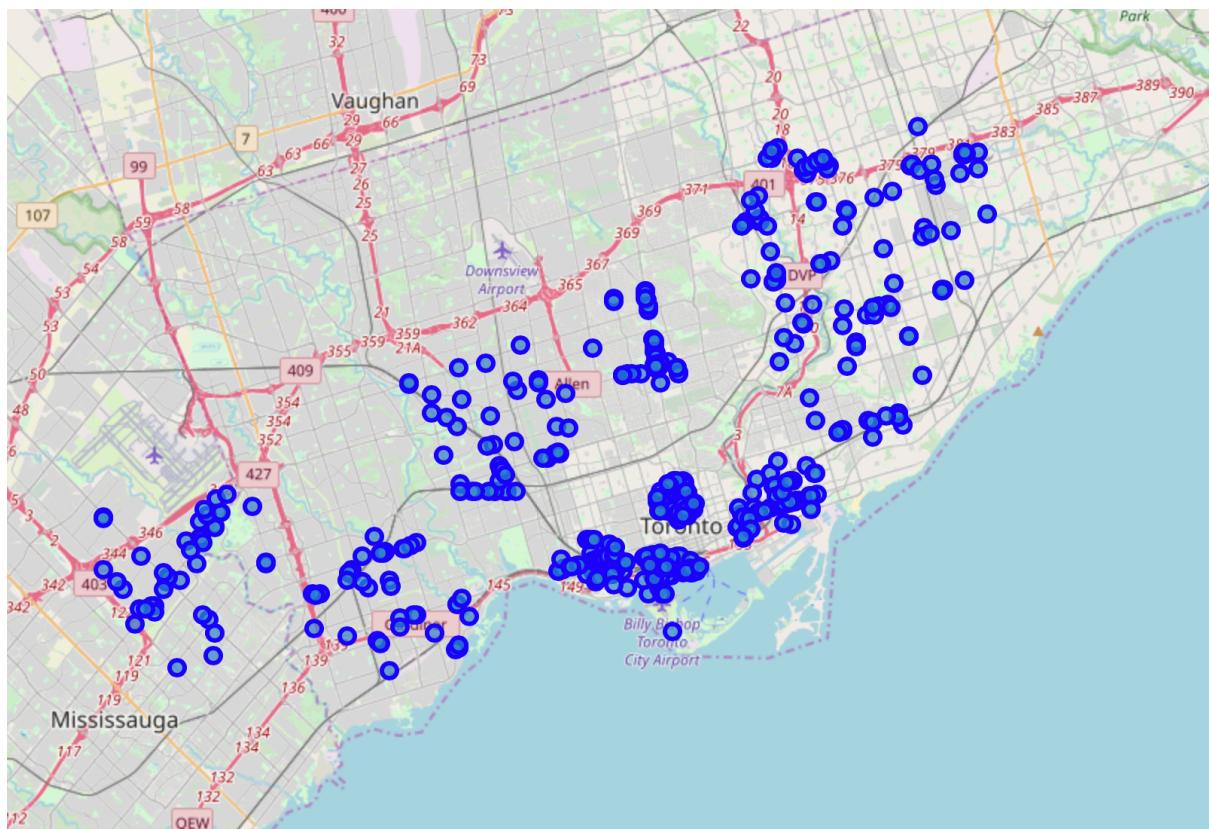


Figure3.3 Coffee shops distribution in Toronto

If the purpose is to find out the proper position in a specific neighborhood, the cast map can focus on that area for detailed observation. For instance, if the business man want to get decision support on where to open a coffee shop in Parkwoods, a map can be illustrated as follow:

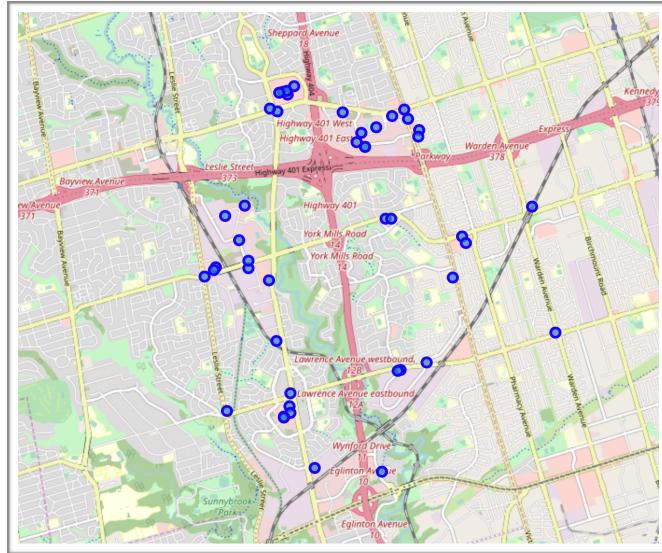


Figure3.4 Coffee shop distribution in Parkwoods

Through the distribution map, it can be observed the density of coffee shop in each borough. The more coffee shops a borough has, the more target consumers it may contain. More important, it can prove that there are more appropriate places to open a coffee shop.

It can be seen that Mississauge, Central Toronto, West Toronto how reached over 50 coffee shops. On the other hand, Some are below 35 Coffee shops, in below graph.

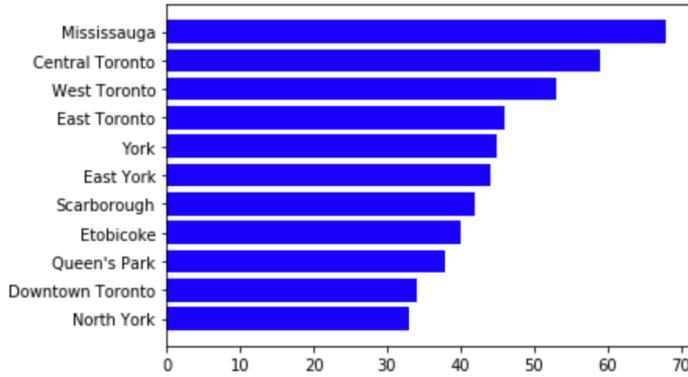


Figure3.5 Bar chart of the coffee shops distribution

Having some common coffee shop categories in boroughs, in this reason, it is proper to use unsupervised learning K-means algorithm to cluster the shops, in order to obtain the final recommendation results. K-Means algorithm is one of the most common cluster method of unsupervised learning.

4.Result

In result section, the recommended place for opening a new coffee shop in Toronto has been plotted in the following map

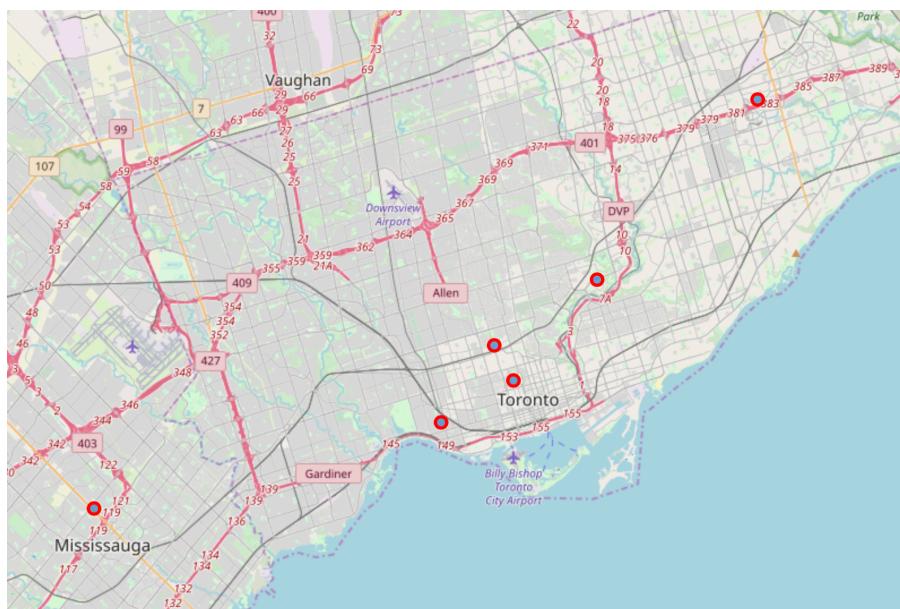


Figure4.1 Recommendation result

5. References:

- [1] Toronto-Wikipedia
- [2] Foursquare API
- [3] Open Data Source via Toronto Government: <https://www.toronto.ca/city-government/data-research-maps/open-data/open-datacatalogue/>
- [4] Google Map