Choosing an Optimal Site for a New Ethiopian Restaurant in Toronto, Ontario Canada

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I. Introduction

1.1 Background and Problem

The restaurant industry is highly competitive with a majority of restaurants closing before their first anniversary. In order to improve the odds of success, it would be helpful to know locations which would be advantageous.

While it may seem obvious that “people who go to restaurants tend to go to restaurants”, we can take advantage of this by co-locating with other restaurants. Patrons attending one restaurant will see the new offering and may consider the new restaurant for their next outing. This free advertising to people that frequent restaurants would be considered an advantage. Recognizing this has led to “restaurant districts” in many cities.

However, it would also be considered a disadvantage to open next to another restaurant of the same type. This increased competition would not only be unwelcome in the neighborhood but also would mitigate the curiosity factor we are anticipating with our new opening.

1.2 Interest

The solution to this problem would be of interest to anyone interested in opening an Ethiopian restaurant in Toronto. The process could also be generalized to other cities and/or other types of restaurants.

II. Data and Methodology

II.1 Acquisition

The data to be obtained would be the location of all restaurants in greater Toronto, defined by the neighborhoods found in https://en.wikipedia.org/wiki/List_of_postal_codes_of_Canada:_M. Our source for this list or restaurants will be through the use of the Foursquare API. Given that this API has an absolute limit of 50 venues per request, we will repeat the request for each neighborhood in the list above. This process was repeated with Foursquare requests for Ethiopian Restaurants specifically

II.2 Cleaning and Processing

The data from each of these calls to Foursquare then need to be combined into a single dataframe. Given that the calls are likely to include duplicate entries due to overlap, these duplicates will be eliminated. It was also found that some restaurants from outside the desired zone were reported by Foursquare. Those were eliminated by excluding entries with latitude or longitude outside the desired range as well as all entries from the United States.

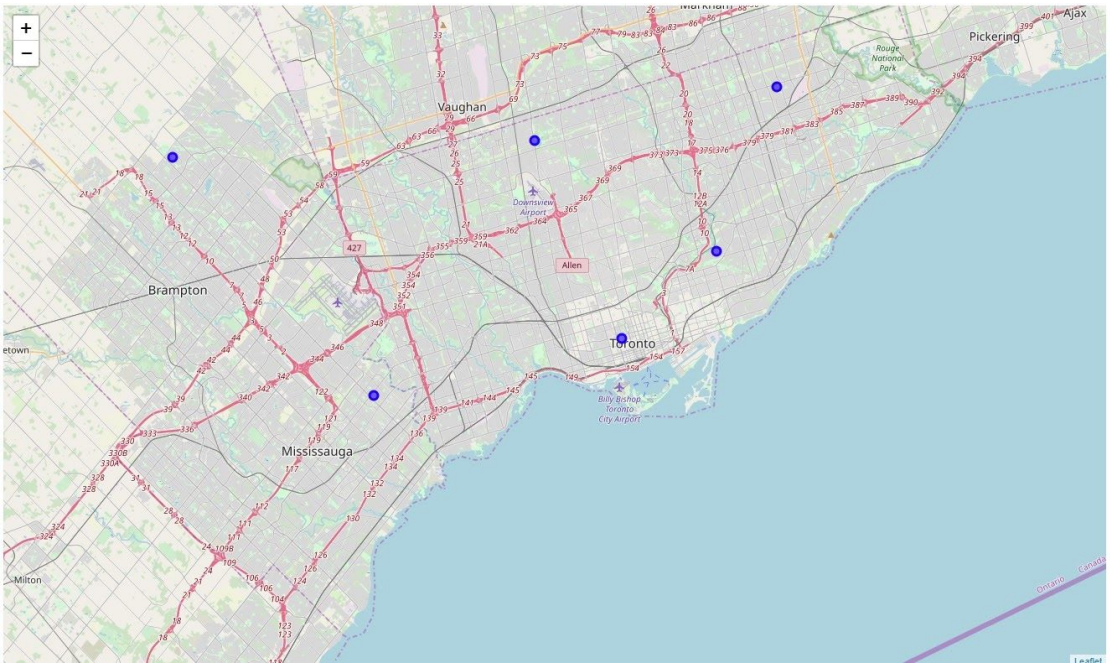
The same combining, cleaning, and processing was performed on the information obtained on the Ethiopian restaurants.

III. Results and Analysis

III.1 Clustering

Once the dataframe containing the restaurant (all) data was cleaned and processed as above, a description of the data was obtained. This showed mean and range values for longitude and latitude for the restaurants to be acceptable. The next step was to attempt to group the restaurants into clusters through K-Means clustering. K-Nearest Neighbor was considered but rejected as we were not trying to make predictions, rather to find the areas with the highest concentration of restaurants.

Below is a plot of the centroids for the K-Means clustering.



III.2 Distances to Restaurants

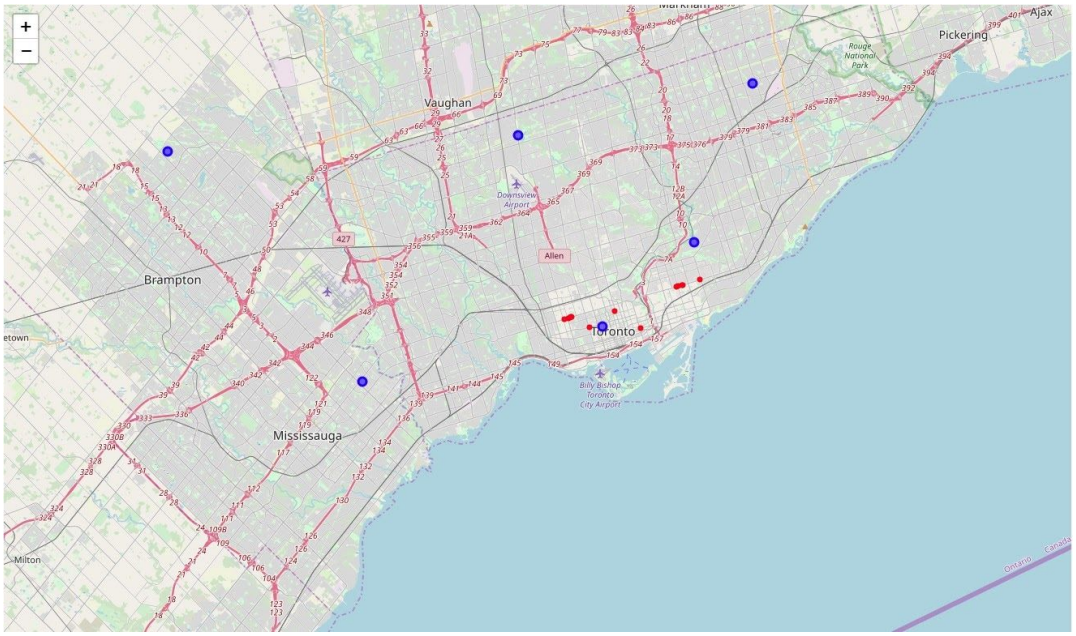
The next step in the analysis was to compare the distances between the centroids and the existing Ethiopian restaurants. The distance between each centroid and each of the known restaurants was calculated. The distances between each centroid and it's nearest Ethiopian restaurant is shown in the table below:

	lat	lng	dist
2	43.764236	-79.764357	29.374670602096646 km
3	43.623328	-79.599579	14.417703937180798 km
4	43.805587	-79.268834	13.813751817280755 km
0	43.774113	-79.467688	12.890256482271624 km

1 43.708641 -79.318823 2.593037042626966 km

5 43.656702 -79.395816 0.8882498230859057 km

As you can see, the farthest distance to an existing restaurant was 29km, while two potential sites are quite close to existing restaurants and may be subject to competition.
To better visualize this, we combine the potential sites with the existing restaurants on the map below



The map reveals that the majority of existing Ethiopian restaurants are near the shore in central Toronto. Rejecting the two sites closest to the other Ethiopian restaurants and rejecting the site at the edge of town as possibly being too remote, the recommendation is then to establish the new restaurant at one of the three other sites, namely:

1. Etobicoke, near the East Mall
2. North York, near the intersection of Finch Ave. and Yonge St.
3. Scarborough, near the Kennedy Commons

IV. Discussion and Conclusion

A large city such as Toronto will support many restaurants, but the restaurant business remains challenging. Locating a new restaurant where it can be helped by traffic to other restaurants but not hurt by competition by similar restaurants would be an advantage. In this study we located where a higher density of restaurants would be by obtaining a list of all food establishments and performing K-Means clustering. We then obtained a list of all competitors in this space and

evaluated the geographical relationships between the competitors and our proposed locations. From that we would pick the top three for further on-the-ground evaluation for the availability of space and rental costs. The three sites recommended include:

Etobicoke, near the East Mall
North York, near the intersection of Finch Ave. and Yonge St.
Scarborough, near the Kennedy Commons

Note that this process could be repeated for other types of restaurants and in other cities with relatively minor modifications.