

Introduction/Business Problem

If I'm going out near my house to eat at a restaurant, where should I go so that there will be many restaurants nearby to choose from? In other words, where can I go so that there are a lot of restaurants close by?

When I go out to try eating at a new restaurant, sometimes the restaurant will be closed or it doesn't look as expected from the outside. Thus, in order to not get hungry, I will need to quickly find a restaurant nearby to eat.

Now, if we start with a restaurant where there are no restaurants nearby, or the closest one is more than 20km away, it's not a very good restaurant to try out at the beginning because it's too risky if we decide to ditch that restaurant.

If we can find one of the restaurants where there are a lot of restaurants nearby, then it will be great and we don't need to travel that much.

Data

The data I will be using include the latitude and longitude of my home address (8 Hillcrest Ave) and the latitudes and longitudes of all the nearby restaurants.

Using these data, we can run the k-means clustering algorithm to find the clusters of restaurants near my home, then we can pick the centroid with the most restaurants in the cluster as the starting point to explore. This way we can minimize the travel time to the next restaurant if we decide not to eat at the previous restaurant, thus solving the problem.

To gather the data, we need to use Foursquare API to collect all the restaurants' latitude, longitude, name, and category name. We will also use GeoPy library to find the latitude and longitude of my home address.

Methodology

The exploratory data analysis happened with the help of Google Map, where I searched for "restaurant" near my home address. Based on the preliminary visualization, I decided to use the K-Means clustering algorithm. This is because of the natural corresponding relation from the "group of restaurants" concept with the "clusters" concept. They are basically the same.

With this in mind, and with the help of Google Map, I need to estimate the following:

- What is the maximum radius my final analysis should focus on
- Approximately how many restaurants are there in total
- Approximately how many clusters will there be based on the visual

Results

The result is that, running k-means algorithm on the 230 restaurants near my home, the algorithm yields 5 clusters with the following centers:

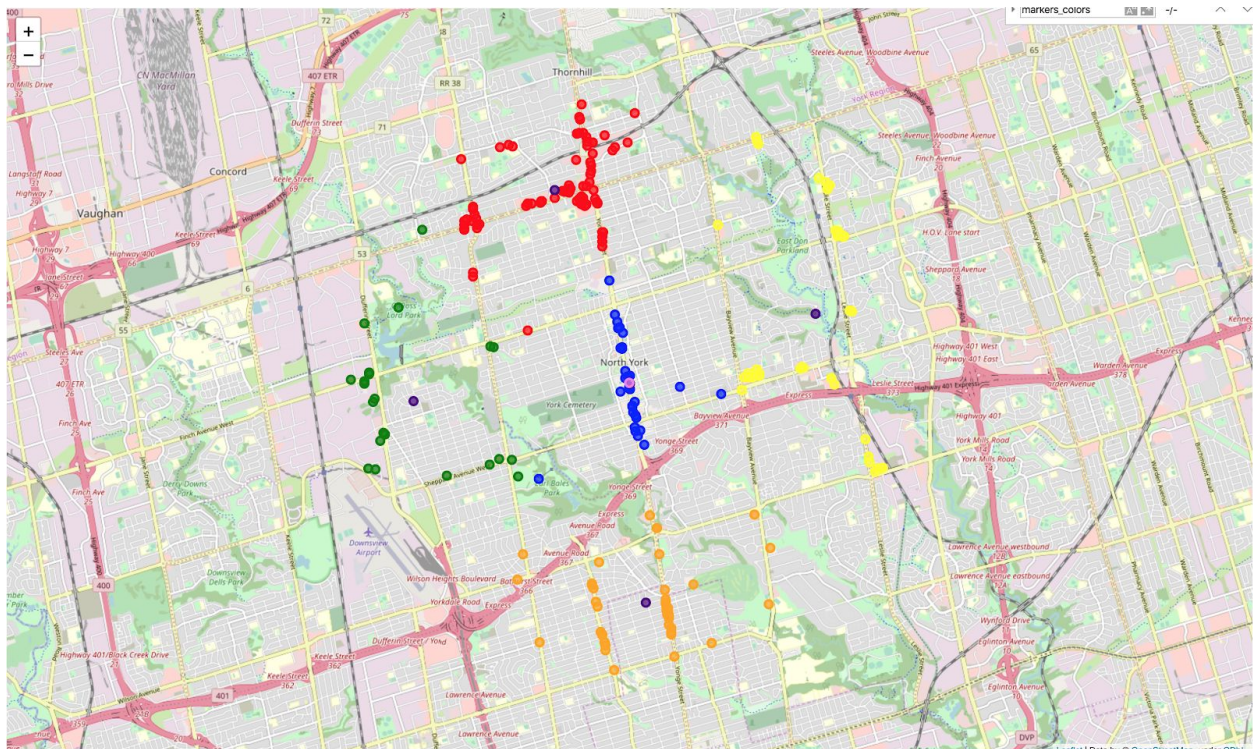
1. Hilda Avenue, Thornhill, Vaughan, York Region, Golden Horseshoe, Ontario, L4J 2L1, Canada
2. 84, Deloraine Avenue, Bedford Park, Eglinton—Lawrence, Old Toronto, Toronto, Golden Horseshoe, Ontario, M5M 3Y8, Canada
3. Newtonbrook Creek Park, Earlywood Court, Bayview Village, Don Valley North, North York, Toronto, Golden Horseshoe, Ontario, M2K 1W4, Canada
4. 9, Arlstan Drive, York Centre, North York, Toronto, Golden Horseshoe, Ontario, M3H 5K8, Canada
5. 8, Hillcrest Avenue, Lansing, North York, Willowdale, North York, Toronto, Golden Horseshoe, Ontario, M2N 6C6, Canada

The number of restaurants corresponding to these clusters is:

1. 86
2. 44
3. 46
4. 22
5. 32

Very interestingly, cluster 5 is my home address! And there are quite a bit of restaurants near me.

The clusters are visualized by the following:



To explain the colors:

- Red, orange, yellow, green, blue are the colors for the five clusters
- Indigo is the color for the centers of the five clusters
- Violet is the color of my home, which also happens to be one of the centers

Discussion

As seen on the map, it's quite interesting to see the restaurants near my home can be nicely clustered into five geographical clusters. In particular, cluster 5, which has 32 restaurants, has the same address as my home. Therefore, it's recommended that I start exploring restaurants from my home so I can try the 32 restaurants with minimal travel distance.

Conclusion

In conclusion, this report showcased the data and methodologies used to analyze the clusters of restaurants near my home, and gave a recommendation to start exploring restaurants from my home. This map could help me visualize and decide where to go for a restaurant and try new ones without risking to travel too far.