Capstone Project — What is the best location for a new Asian restaurant in Toronto

INTRODUCTION

A description of the problem and a discussion of the background

Business Problem: We want to find the best location for an Asian restaurant in Toronto. The best location is where there are many potential customers and there should not be another Asian restaurant close-by. We cannot get a direct handle on the number of customers, because they are not necessarily the residence of a certain neighborhood, but can also be people who are in the neighborhood for work, shopping, or cite-seeing. So, we will get a handle on the number of potential customers by looking at the total number of restaurants in a certain neighborhood and pick a location where Asian restaurants are underrepresented.

Note: This was the initial idea, but Foursquare only allows to search for coordinates and a circle around it. We will therefore generate a grid and sample the city by this grid and not by neighborhoods. Also, we are guided to some extent by the Coursera example.

Who could be interested in this analysis?

Any business that wants to open a restaurant in Toronto and needs to pick a location.

A description of the data and how it will be used to solve the problem.

We will try to get all restaurants in Toronto and create a model of all non-asian restaurants. We do the same for Asian restaurants. Our metric for the decision will be the neighborhood with the lowest ratio of "Asia restaurants" vs "Total number of restaurants".

METHODOLOGY

In a first attempt we tried to call Foursquare and get the number of restaurants per neighborhood, which is not easily possible and very inaccurate. This idea was dropped and we created a grid of the city instead, consisting of circles. The boundary for our search grid is the outline of Toronto which we approximate by four points. Figures 1 and 2 illustrate the process.

In contrast to the example on Coursera, we will use a minimally overlapping grid such that there is no uncovered space. We have also taken the borders of Toronto from google maps and approximated it by four corner points.

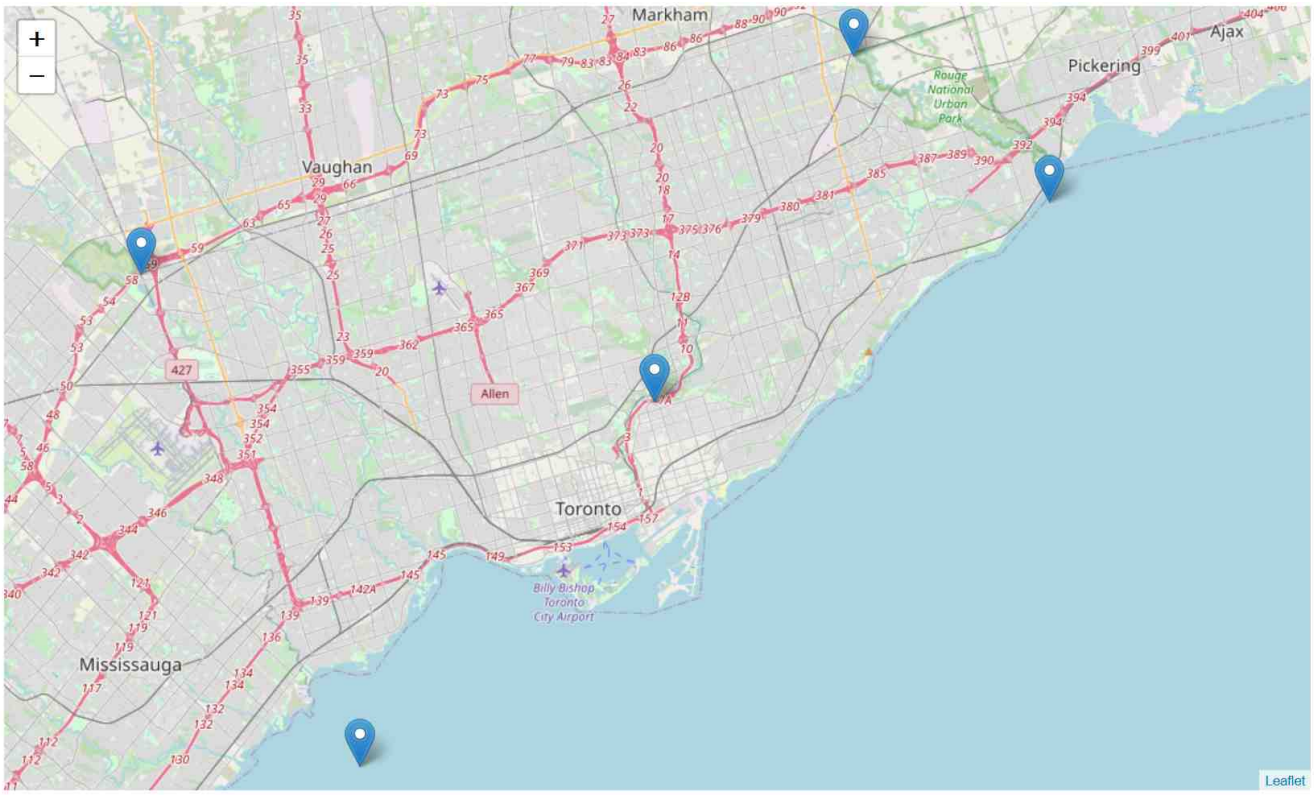


Figure 1: A map of Toronto, where the four corner points and the center of the map are marked.

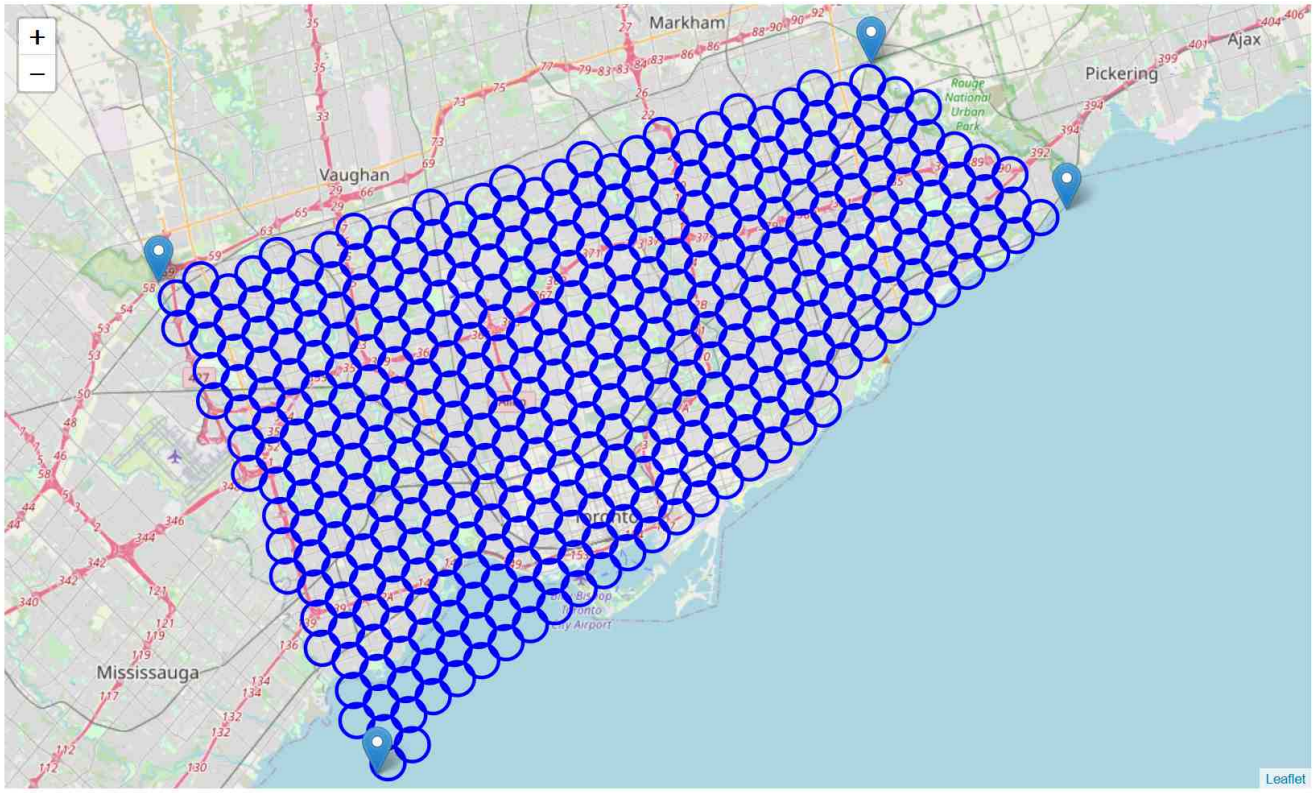


Figure 2: The search grid bound by the four corner points to be used with Foursquare.

We called Foursquare for every circle of the generated grid. The distances between two circles is 2 km. This leads to a radius of around 866 m for a minimally overlapping grid. (Disclaimer: We will do some aspects similarly to the report linked as example on the Coursera website.) The best grid for this can be found in nature. Graphene for example has such a grid: hexagonal closest packed. (https://en.wikipedia.org/wiki/Graphene).

The result of each call to Foursquare API is a list of restaurants and their location. This is illustrated in Figure 3. We find that there are 2563 restaurants and 94 Asian restaurants, so Asian restaurants make up almost 4% of all restaurants.

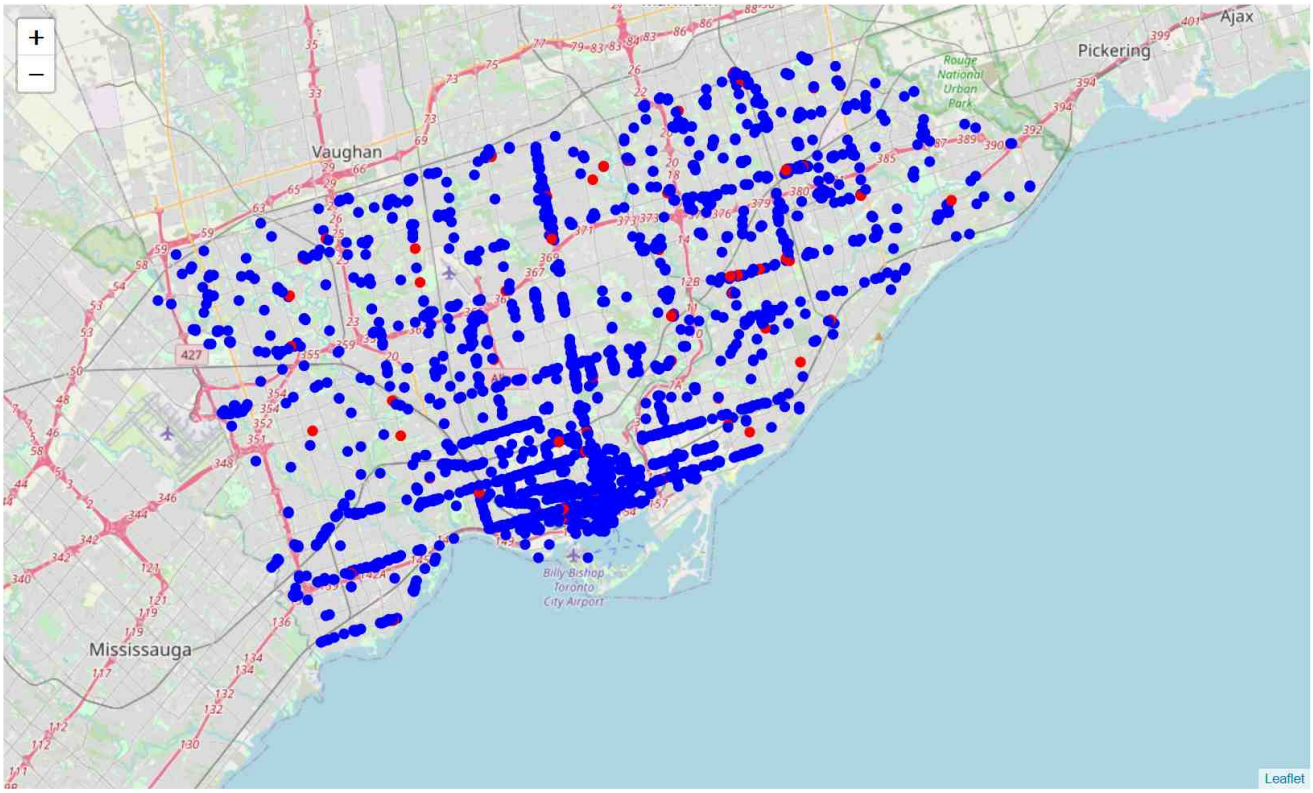
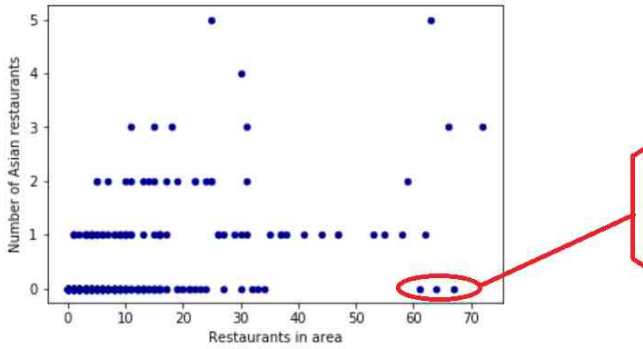


Figure 3: The blue point are non-asian restaurants and the red points are the asian restaurants.

RESULTS

Having obtained this data, we can do our analysis. We calculate the number of restaurants and Asian restaurants for each grid circle. We then plot both parameters against each other in Figure 4. There might have been no clear outlier group and only one cluster, but we were lucky and there are three extreme cases, where the number of restaurants is more than sixty and there is not a single Asian restaurant. You can see there locations in Figure 5 marked by yellow circles.



	Latitude	Longitude	Restaurants in area	Number of Asian restaurants
155	43.663323	-79.375069	64	0
173	43.705620	-79.396526	61	0
199	43.665953	-79.420470	67	0

Figure 4: A plot of the two parameters, number of restaurants vs. number of asian restaurants for each search circle. The marked group of outliers are our best locations for the new asian restaurant.

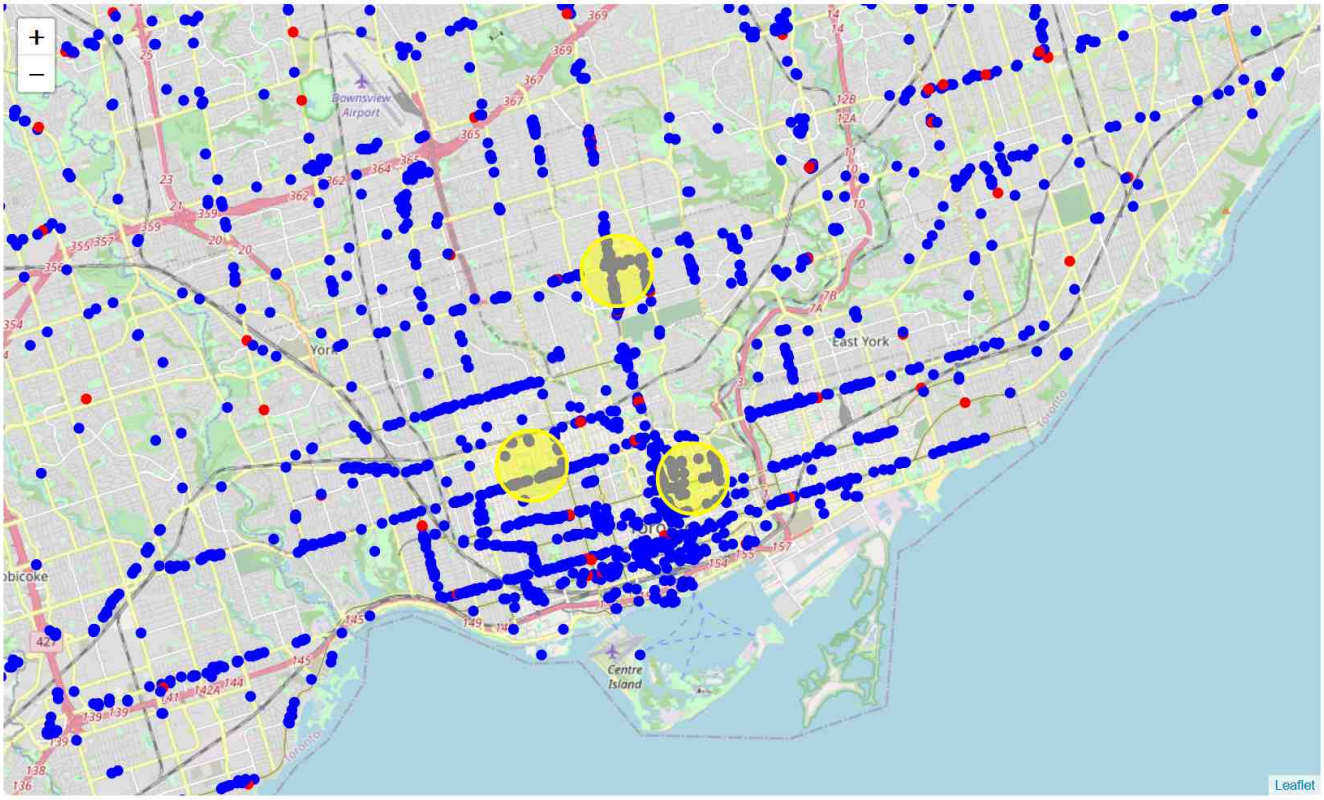


Figure 5: This is our final result, the yellow circles show the best locations with the highest number of restaurants but no asian restaurants.

DISCUSSION

This is certainly only the crudest way of obtaining a location for an Asian restaurant. If there would not have been any clear outliers, we could have created a density map, like in the Coursera example. Furthermore, we could have checked, what type of Asian restaurants there are in the neighborhood and make a more refined analysis.

But, three locations is pretty good and there are other things to be considered for opening a restaurant. For example is there an available space to rent? What type of restaurant fits best in the neighborhood. Is there a reason why there is no Asian restaurant?

CONCLUSION

By this easy analysis, where we compare the number of restaurants to the number of Asian restaurants in a certain area, we were able to make a recommendation for a location for a new restaurant. We assumed here, that the number of restaurants is a good indicator for the number of available customers and also assumed that these customers would be attracted to our restaurant, because there is no other Asian restaurant in the vicinity.