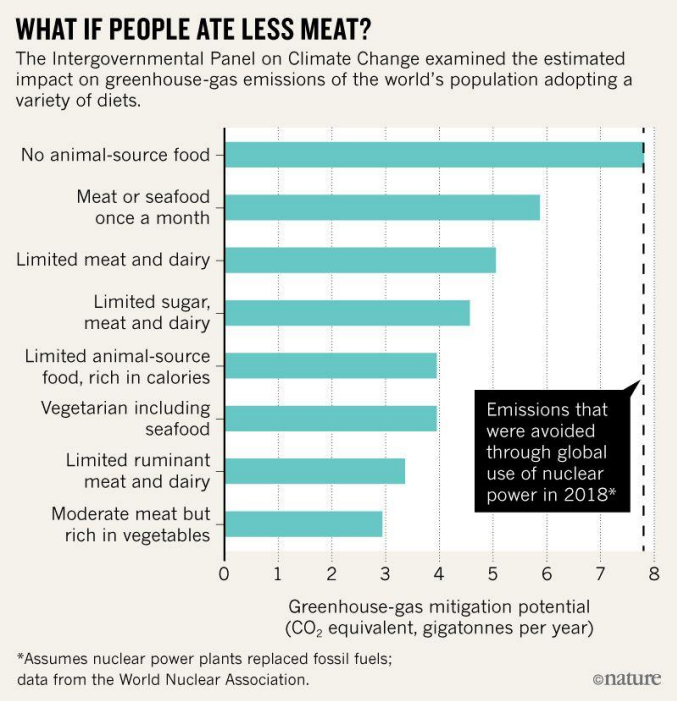
Introduction

To tackle climate change we need to change many aspects of our life and eating pattern is one of them. The following image (https://www.nature.com/articles/d41586-019-02409-7) highlights that a reduction in animal meat consumption and, in the long term, a reduction in animal products consumption is key in mitigating CO_2. One step to increase plant over animal products consumption is to increase the number of Vegetarian/Vegan restaurants, which will be the task in my project.



Data

In my project I will take New York locational data (https://ibm.box.com/shared/static/fbpw-bovar7lf8p5sgddm06cgipa2rxpe.json) and Toronto locational data (https://en.wikipedia.org/wiki/List_of_postal_codes_of_Canada:_M) to analyse the amount of restaurants in those two cities respectively. The data comes from the Foursquare locational database. I only take datasets labelled "Restaurant" or "Place" and calculate how many of them exist in each district of Toronto and New York. I also locate those places on the map, to highlight which places are saturated and which places are potential candidates for new restaurants.

Methodology

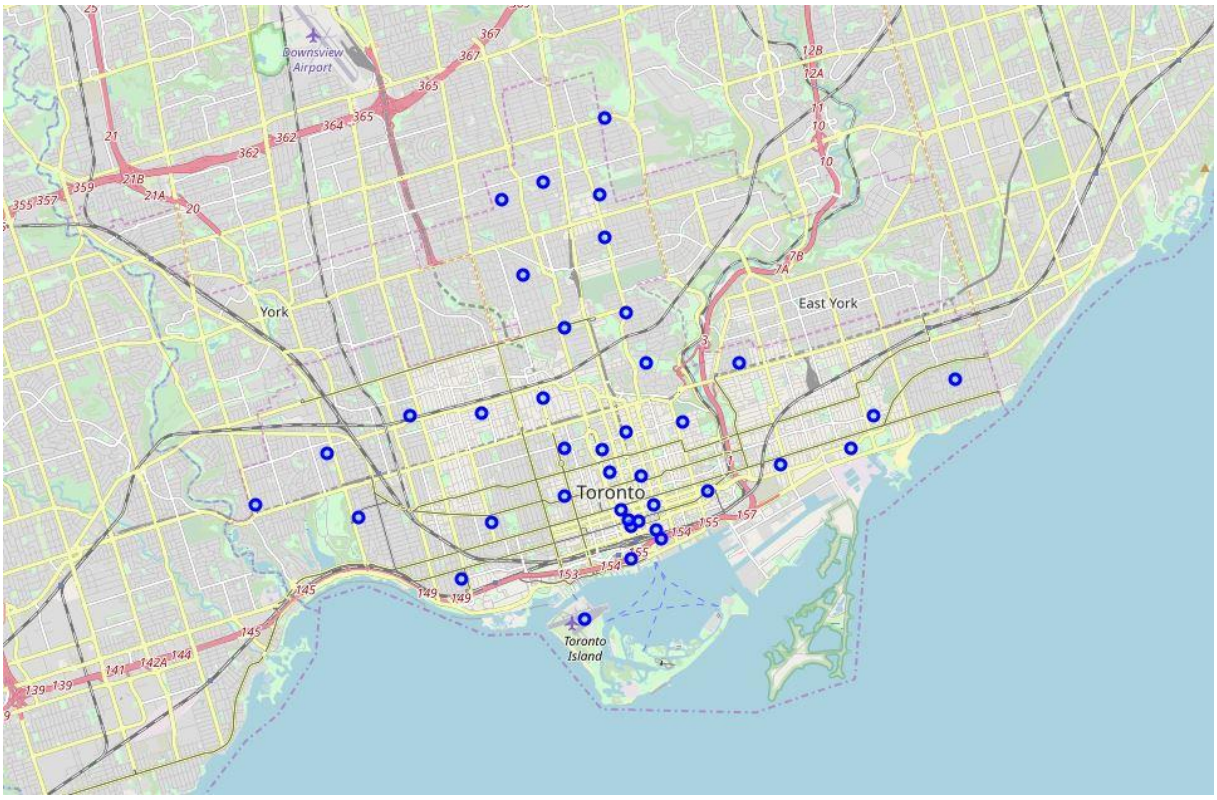
Methodology contains data extraction, dataframe manipulation and mapping of the respective places. The program is written in python and the most important libraries used are

- pandas
- folium
- json

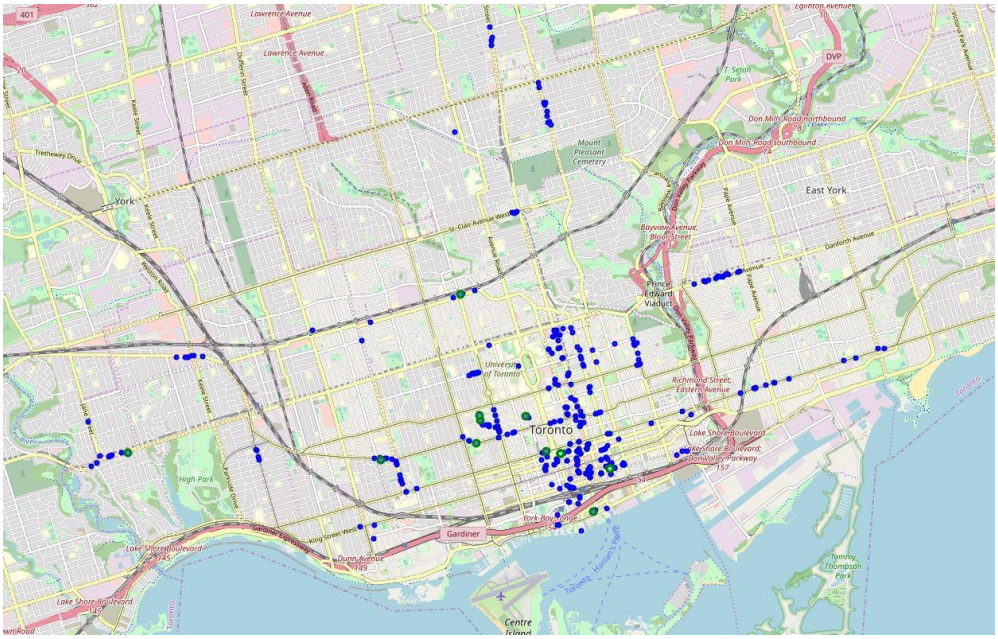
Of course I use many more packages, but only for minor operations.

Results

The first image shows the location of the districts of Toronto. The districts are separated into Neighbourhoods and each of then analysed afterwards.

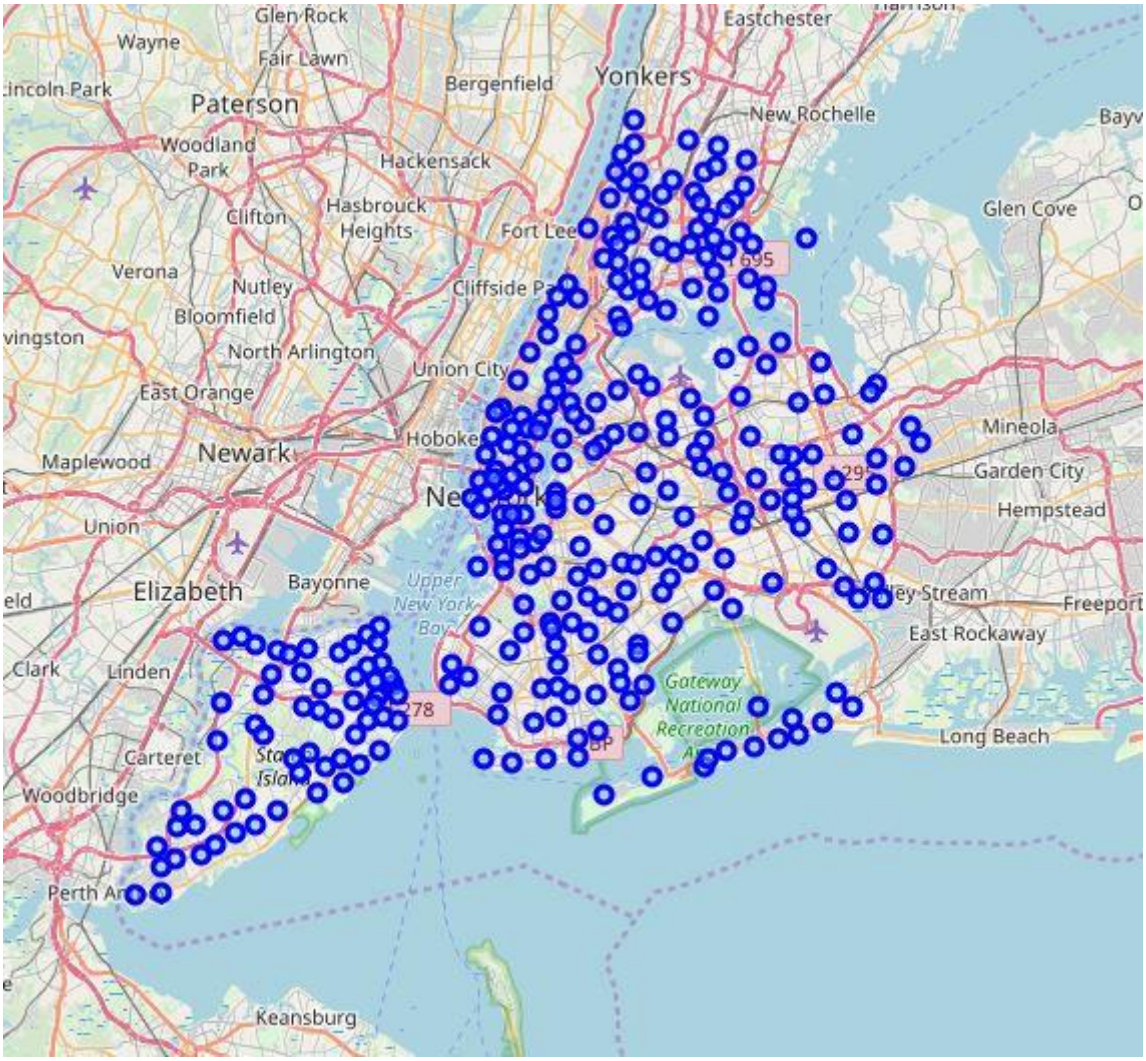


By using the folium package and Foursquare data one can produce the following map of Toronto, where the blue dots are restaurants in general and green dots vegetarian/vegan restaurants.

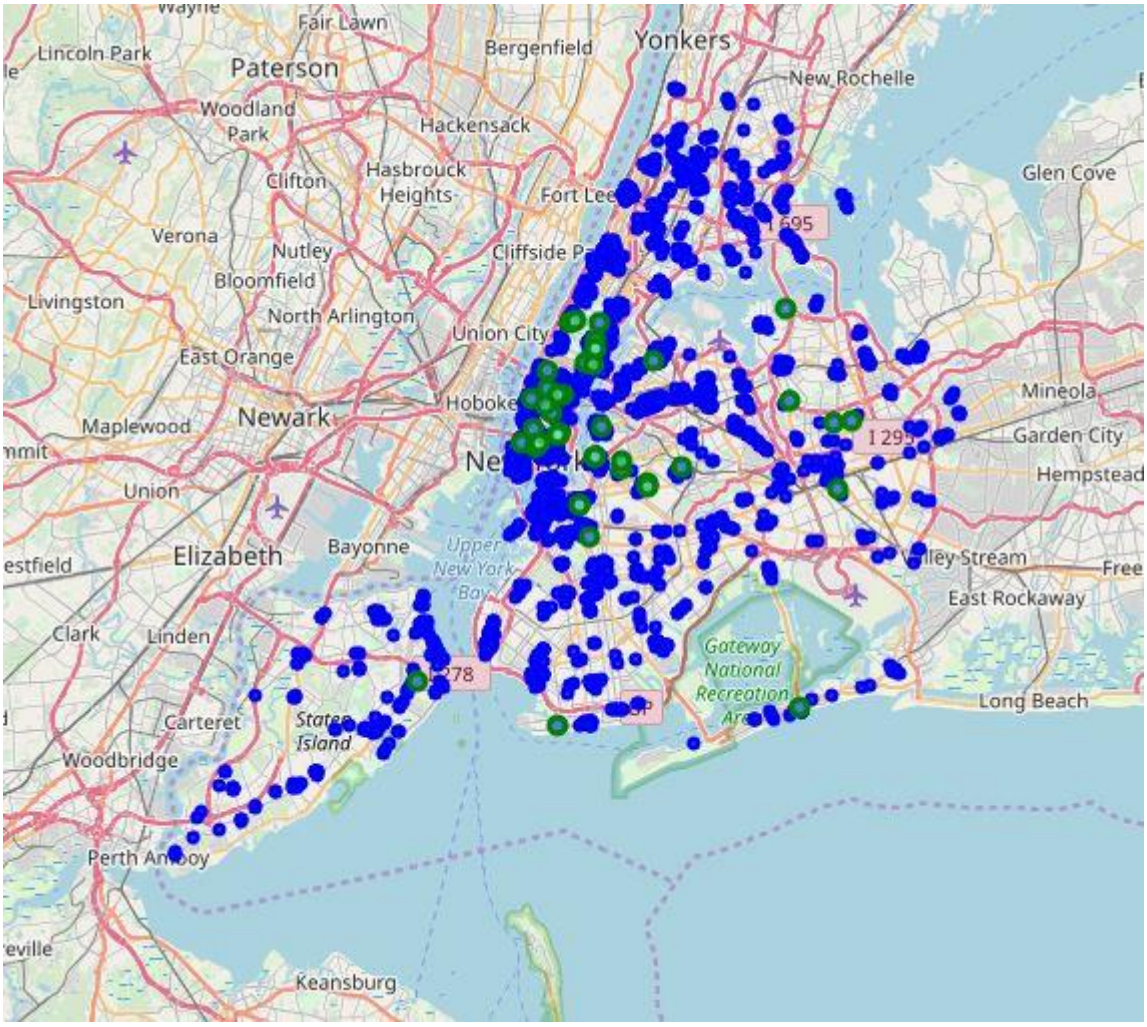


It can be see, that the restaurants are not spread out over the whole city area and if vegetarian/vegan restaurants exist, they are often concentrated in a small area.

Next is New York with its districts.



The same analysis as in the case of Toronto can be performed, were blue dots represent restaurants in general and green dots vegetarian/vegan restaurants. Manhattan seems to have a high restaurant density in general, but it is noteworthy how many vegetarian/vegan restaurants are in Manhattan. Staten Island has only 1 restaurant, Bronx not a single one and Queens and Brooklyn have just a few, so there much potential for more vegetarian/vegan restaurants.



Further important findings next to spatial analysis are:

- In Toronto in less than a third of the Neighbourhoods is a vegetarian/vegan restaurant!
- Toronto has 17 Vegetarian / Vegan restaurants out of 401 total restaurants, which makes up 4.24 %.
- New York has 43 Vegetarian / Vegan restaurants out of 2568 total restaurants, which makes up 1.67 %.
- Toronto has 0.03 Vegetarian/Vegan restaurants per km² and 6.49 per million inhabitan ts.
- New York has 0.07 Vegetarian/Vegan restaurants per km² and 16.41 per million inhab itants.

The data for the population and area of Toronto and New York respectively was taken from Wikipedia.

Discussion

It can be seen that in New York and Toronto we have big potential to open new vegetarian/vegan restaurants. It is important to highlight, that the hereby derived results can still be improved. This can be done by including fast food chains, special food places and grocery stores. Assigning the categories themselves to vegetarian/vegan and *not* vegetarian/vegan is not a black and white task as shown in this report, since there are numerous restaurants that serve the whole range of food. For a better analysis one can include the menu of the restaurants, which would increase the share of vegetarian/vegan restaurants.

Conclusion

To conclude, both cities have potential to increase their share in vegetarian/vegan restaurants. In Toronto those restaurants have to be more spread out. In the case of New York, if a stakeholder decides to open a new vegetarian/vegan restaurant, he should open it in all the districts but in Manhattan. There, the market seems to be saturated, compared to the rest of the city of New York.