Finding the best place to open a restaurant – Bronx

- Business problem

In the field of gastronomy, there is great competition today. Therefore, before opening a gastronomic facility, it is good to know the location well, that is, to know the competition in the area well. If there are already a lot of restaurants of a certain type in a location, it is not profitable to open another one in that place. Also, if the investor is not sure what type of gastronomic facility he wants to open, it is desirable to know which types already exist and in which locations.

This project will answer the above questions, when it comes to the borough of Bronx in NY.

- Data

The database from the site https://geo.nyu.edu/catalog/nyu_2451_34572 will be used in this paper. with all boroughs and their neighborhoods of NY, from which only the borough of Bronx will be extracted. Then, an analysis of existing restaurants and fast food will be performed in all neighborhoods. This will determine which part has the least competition and which type of restaurant is in question. Foursquare location data will also be used for this purpose.

- Methodology

Data on all New York neighborhoods are downloaded from the given site in the form of a json file. All relevant data is in the function key, which is basically a list of quarters. Therefore, it is necessary to define a new variable that includes this data. The next step is to transform the data into a pandas dataframe and loop through the data and fill the dataframe one row at a time. Geopy library is used, to get the latitude and longitude values of New York City, with the help of user_agent. From this dataframe, a new Bronx dataframe is created. The Foursquare API was then used to explore the neighborhoods in Bronx and segment them. This is how we got dataframe of venues in radius from 500, for each Neighborhood, with longitudes and latitudes. Here is an overview of the first five items:

	Neighborhood	Neighborhood Latitude	Neighborhood Longitude	Venue	Venue Latitude	Venue Longitude	Venue Category
0	Wakefield	40.894705	-73.847201	Lollipops Gelato	40.894123	-73.845892	Dessert Shop
1	Wakefield	40.894705	-73.847201	Rite Aid	40.896649	-73.844846	Pharmacy
2	Wakefield	40.894705	-73.847201	Walgreens	40.896528	-73.844700	Pharmacy
3	Wakefield	40.894705	-73.847201	Carvel Ice Cream	40.890487	-73.848568	Ice Cream Shop
4	Wakefield	40.894705	-73.847201	Shell	40.894187	-73.845862	Gas Station

There are 171 uniques categories.

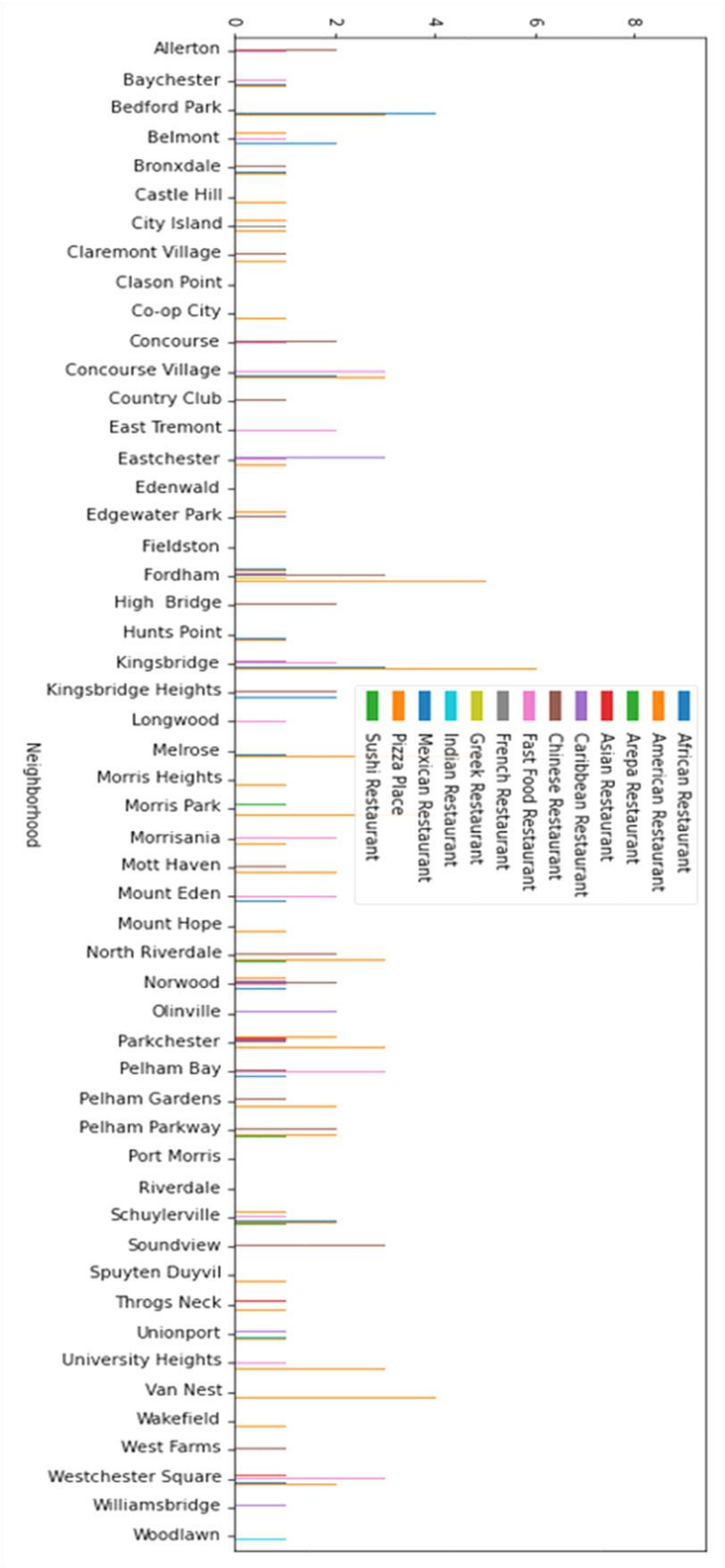
Then, it was determined how many total facilities there are from each category, where it can already be seen that gastronomic facilities, and especially fast food, are very common. Here is the top 5 venues:

Venue Category	
Pizza Place	101
Deli / Bodega	56
Donut Shop	44
Pharmacy	42
Italian Restaurant	41

Then, only restaurant categories will be extracted from all categories, and it will be calculated how many of each restaurants there are in each neighborhood. The following table is obtained:

Neighborhood	African Restaurant	American Restaurant	Arepa Restaurant	Asian Restaurant	Caribbean Restaurant	Chinese Restaurant	Fast Food Restaurant	French Restaurant	Greek Restaurant	Indian Restaurant	Mexican Restaurant	Pizza Place	Sushi Restaurant
Allerton	0	0	0	0	0	2	1	0	0	0	0	4	0
Baychester	0	0	0	0	0	0	1	0	0	0	1	1	0
Bedford Park	0	0	0	0	0	3	0	0	0	0	4	3	0
Belmont	0	1	0	0	0	0	1	0	0	0	2	9	0
Bronxdale	0	0	0	0	0	1	0	0	0	0	1	1	0
Castle Hill	0	0	0	0	0	0	0	0	0	0	0	1	0
City Island	0	1	0	0	0	0	0	1	0	0	0	1	0
Claremont Village	0	0	0	0	1	1	0	0	0	0	0	1	0
Clason Point	0	0	0	0	0	0	0	0	0	0	0	0	0
Co-op City	0	0	0	0	0	0	1	0	0	0	0	1	0
Concourse	0	0	0	0	1	2	1	0	0	0	0	1	0

Here is just an overview of a few neighborhoods, and there are a total of 52 neighborhoods. To get a rough picture of which neighborhoods are without restaurants we will make one visualization with a bar plot



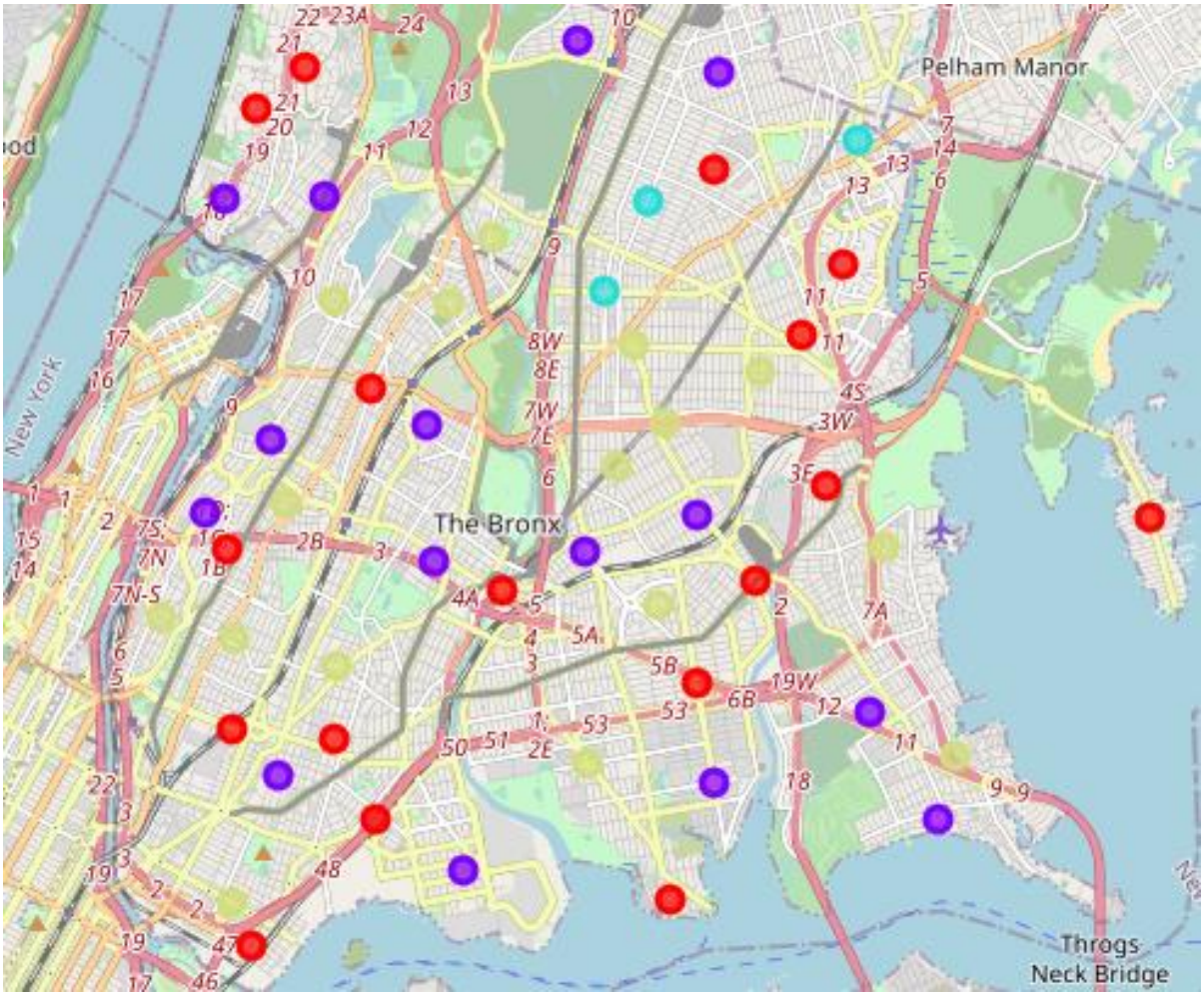
So there are neighborhoods that are very suitable for opening a restaurant, because there is currently no competition in them, they are: Clason Point, Edenwald, Fieldston, Port Morris, Riverdale.

Given a lot of data, not much can be read from the picture above, so the next step is simplification, so that the neighborhoods will be divided into clusters in relation to the representation of the types of restaurants in them. This will provide a clearer insight into which areas and what would be good to open.

For the purpose of clustering, a dataframe was made with the top 3 venues for each neighborhood, here is an overview of the first 5 items:

	Borough	Neighborhood	Latitude	Longitude	Cluster Labels	1st Most Common Venue	2nd Most Common Venue	3rd Most Common Venue
0	Bronx	Wakefield	40.894705	-73.847201	1	Pizza Place	Sushi Restaurant	Mexican Restaurant
1	Bronx	Co-op City	40.874294	-73.829939	0	Pizza Place	Fast Food Restaurant	Sushi Restaurant
2	Bronx	Eastchester	40.887556	-73.827806	2	Caribbean Restaurant	Pizza Place	Fast Food Restaurant
3	Bronx	Fieldston	40.895437	-73.905643	0	Sushi Restaurant	Pizza Place	Mexican Restaurant
4	Bronx	Riverdale	40.890834	-73.912585	0	Sushi Restaurant	Pizza Place	Mexican Restaurant

All objects are divided into 4 clusters, which can be seen on the map below. For this map is used visualization library Folium.


Pelham Manor
The Bronx
Throgs
Neck Bridge

- Results section

The red dots on the map represent the neighborhoods in the first cluster and these are the next neighborhoods, where it is not advisable to open Pizza Place, Sushi Restaurant or Fast Food Restaurant.

Neighborhood	1st Most Common Venue	2nd Most Common Venue	3rd Most Common Venue
Co-op City	Pizza Place	Fast Food Restaurant	Sushi Restaurant
Fieldston	Sushi Restaurant	Pizza Place	Mexican Restaurant
Riverdale	Sushi Restaurant	Pizza Place	Mexican Restaurant
Baychester	Pizza Place	Mexican Restaurant	Fast Food Restaurant
City Island	Pizza Place	French Restaurant	American Restaurant
Fordham	Pizza Place	Fast Food Restaurant	Chinese Restaurant
West Farms	Pizza Place	Chinese Restaurant	Sushi Restaurant
Port Morris	Sushi Restaurant	Pizza Place	Mexican Restaurant
Longwood	Fast Food Restaurant	Sushi Restaurant	Pizza Place
Morrisania	Fast Food Restaurant	Pizza Place	Chinese Restaurant
Clason Point	Sushi Restaurant	Pizza Place	Mexican Restaurant
Westchester Square	Fast Food Restaurant	Pizza Place	Mexican Restaurant
Pelham Bay	Fast Food Restaurant	Mexican Restaurant	Chinese Restaurant
Unionport	Pizza Place	Indian Restaurant	Fast Food Restaurant
Edenwald	Sushi Restaurant	Pizza Place	Mexican Restaurant
Concourse Village	Pizza Place	Fast Food Restaurant	Mexican Restaurant
Mount Eden	Pizza Place	Fast Food Restaurant	Mexican Restaurant

The blue dots on the map represent the neighborhoods in the second cluster and these are the next neighborhoods, where it is not advisable to open Pizza Place, Sushi Restaurant or Mexican Restaurant.

Neighborhood	1st Most Common Venue	2nd Most Common Venue	3rd Most Common Venue
Wakefield	Pizza Place	Sushi Restaurant	Mexican Restaurant
Kingsbridge	Pizza Place	Mexican Restaurant	Fast Food Restaurant
Woodlawn	Pizza Place	Indian Restaurant	Sushi Restaurant
University Heights	Pizza Place	Fast Food Restaurant	African Restaurant
Morris Heights	Pizza Place	Sushi Restaurant	Mexican Restaurant
East Tremont	Pizza Place	Fast Food Restaurant	Sushi Restaurant
Melrose	Pizza Place	Mexican Restaurant	Sushi Restaurant
Hunts Point	Pizza Place	Mexican Restaurant	Sushi Restaurant
Throgs Neck	Pizza Place	Asian Restaurant	American Restaurant
Van Nest	Pizza Place	Sushi Restaurant	Mexican Restaurant
Morris Park	Pizza Place	Arepa Restaurant	Sushi Restaurant
Belmont	Pizza Place	Mexican Restaurant	Fast Food Restaurant
Spuyten Duyvil	Pizza Place	Sushi Restaurant	Mexican Restaurant
Schuylerville	Pizza Place	Mexican Restaurant	Sushi Restaurant

The turquoise dots on the map represent the neighborhoods in the third cluster and these are the next neighborhoods, where it is not advisable to open Caribbean Restaurant or Sushi Restaurant.

Neighborhood	1st Most Common Venue	2nd Most Common Venue	3rd Most Common Venue
Eastchester	Caribbean Restaurant	Pizza Place	Fast Food Restaurant
Williamsbridge	Caribbean Restaurant	Sushi Restaurant	Pizza Place
Olinville	Caribbean Restaurant	Sushi Restaurant	Pizza Place

The green dots on the map represent the neighborhoods in the 4th cluster and these are the next neighborhoods, where it is not advisable to open Pizza Place, Chinese Restaurant or Mexican Restaurant.

Neighborhood	1st Most Common Venue	2nd Most Common Venue	3rd Most Common Venue
Norwood	Pizza Place	Chinese Restaurant	Mexican Restaurant
Pelham Parkway	Pizza Place	Chinese Restaurant	Sushi Restaurant
Bedford Park	Mexican Restaurant	Pizza Place	Chinese Restaurant
High Bridge	Pizza Place	Chinese Restaurant	Asian Restaurant
Mott Haven	Pizza Place	Chinese Restaurant	Sushi Restaurant
Soundview	Chinese Restaurant	Pizza Place	Sushi Restaurant
Country Club	Chinese Restaurant	Sushi Restaurant	Pizza Place
Parkchester	Pizza Place	American Restaurant	Mexican Restaurant
North Riverdale	Pizza Place	Chinese Restaurant	Sushi Restaurant
Edgewater Park	Pizza Place	Chinese Restaurant	Asian Restaurant
Pelham Gardens	Pizza Place	Chinese Restaurant	American Restaurant
Concourse	Chinese Restaurant	Pizza Place	Fast Food Restaurant
Claremont Village	Pizza Place	Chinese Restaurant	Caribbean Restaurant
Mount Hope	Pizza Place	Chinese Restaurant	Sushi Restaurant
Bronxdale	Pizza Place	Mexican Restaurant	Chinese Restaurant
Allerton	Pizza Place	Chinese Restaurant	Fast Food Restaurant
Kingsbridge Heights	Pizza Place	Mexican Restaurant	Chinese Restaurant

- Discussion section

Opening a gastronomic facility in the Bronx in terms of competition would be good in the neighborhoods: Clason Point, Edenwald, Fieldston, Port Morris, Riverdale, since there are no restaurants or fast food there. As for the other neighborhoods, you should pay attention to the four tables above and in each neighborhood avoid type of restaurants that appear in the first most common venue and if possible the second and third common venue.

- Conclusion section

This research recommends opening a gastronomy facility in the neighborhoods: Clason Point, Edenwald, Fieldston, Port Morris or Riverdale in Bronx, New York.