



BATTLE OF NEIGHBORHOODS



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Introduction

In previous projects we have seen and analyzed the Neighborhoods in cities such as Toronto and New York. This time, and as I live in Chicago, the main goal is to determine which neighborhoods have which type of food in Chicago. In addition, we will group them by clusters to see which of them are similar.

Imagine you want to run a new brand restaurant and you are trying to figure it out which is the best place to do it. In order to do it in the best way you will try to collect some information about the neighborhoods such as number of restaurants, type of food and their location. Thanks to this project you will have this information and in addition it will be clustered, then, once you find a suitable neighborhood for your restaurant you will be able to find others with similar conditions inside the cluster.

But this project is not only good for restaurants, it is also for costumers. In fact they will look for one kind of food to eat, and they will be able to know which neighborhood would be the best to find it.

Data

The data used for this project is in the next link: https://en.wikipedia.org/wiki/List_of_neighborhoods_in_Chicago, where a table like this is provided:

	Neighborhood	Community area
0	Albany Park	Albany Park
1	Altgeld Gardens	Riverdale
2	Andersonville	Edgewater
3	Archer Heights	Archer Heights
4	Armour Square	Armour Square

However, to make it easier we will change the name of the Community area column by Borough, as we did in previous projects. In addition, the table will be sorted by boroughs in order to know if there are many neighborhood in just one borough:

	Neighborhood	Borough
0	Albany Park	Albany Park
1	Mayfair	Albany Park
2	North Mayfair	Albany Park
3	Ravenswood Manor	Albany Park
4	Archer Heights	Archer Heights

As we can see, each bough may have many neighborhoods so we will group them together:

	Neighborhood	Borough
0	Albany Park, Mayfair, North Mayfair, Ravenswo...	Albany Park
1	Archer Heights	Archer Heights
2	Armour Square, Chinatown, Wentworth Gardens	Armour Square
3	Wrightwood, Scottsdale, Crestline, Beverly Vie...	Ashburn
4	Auburn Gresham, Gresham	Auburn Gresham

Now we have a dataframe with 78 rows and two columns, but before using foursquare we need the Latitudes and Longitudes. We use geolocator, and we get the following data:

	Neighborhood	Borough	Latitude	Longitude
0	Albany Park, Mayfair, North Mayfair, Ravenswo...	Albany Park	41.9719	-87.7162
1	Archer Heights	Archer Heights	41.8114	-87.7262
2	Armour Square, Chinatown, Wentworth Gardens	Armour Square	41.84	-87.6331
3	Wrightwood, Scottsdale, Crestline, Beverly Vie...	Ashburn	41.7475	-87.7112
4	Auburn Gresham, Gresham	Auburn Gresham	41.7505	-87.6643

Now we can use Foursquare to get venues. In this project we will only focus in restaurants, the we use query = 'restaurant' and we process the data to get the following table:

	Neighborhood	Borough	Latitude	Longitude	Cluster Labels	1st Most Common Venue	2nd Most Common Venue	3rd Most Common Venue	4th Most Common Venue	5th Most Common Venue	6th Most Common Venue	7th Most Common Venue	8th Most Common Venue
0	Albany Park, Mayfair, North Mayfair, Ravenswo...	Albany Park	41.9719	-87.7162	4	Mexican Restaurant	Sandwich Place	Korean Restaurant	Latin American Restaurant	Pizza Place	Chinese Restaurant	Fast Food Restaurant	Diner
1	Archer Heights	Archer Heights	41.8114	-87.7262	4	Mexican Restaurant	Wings Joint	Seafood Restaurant	Hot Dog Joint	Italian Restaurant	Pizza Place	Chinese Restaurant	Sandwich Place
2	Armour Square, Chinatown, Wentworth Gardens	Armour Square	41.84	-87.6331	0	Chinese Restaurant	Asian Restaurant	Bakery	Italian Restaurant	American Restaurant	Hot Dog Joint	Indian Restaurant	Breakfast Spot
3	Wrightwood, Scottsdale, Crestline, Beverly Vie...	Ashburn	41.7475	-87.7112	3	Food	BBQ Joint	Pizza Place	Italian Restaurant	Wings Joint	Eastern European Restaurant	Czech Restaurant	Deli / Bodega
4	Auburn Gresham, Gresham	Auburn Gresham	41.7505	-87.6643	2	Fast Food Restaurant	American Restaurant	Greek Restaurant	BBQ Joint	Dim Sum Restaurant	Wings Joint	Falafel Restaurant	Deli / Bodega

This table is the one that we will use to cluster and to map the neighborhoods. It provides position of the borough, its neighborhoods, its cluster, and the most common restaurants in them. This table have enough information to help people to take a decision however, clustering and mapping and its analysis would provide them with better tools.

All the pictures here belongs to the first five rows of the data frame.

Methodology

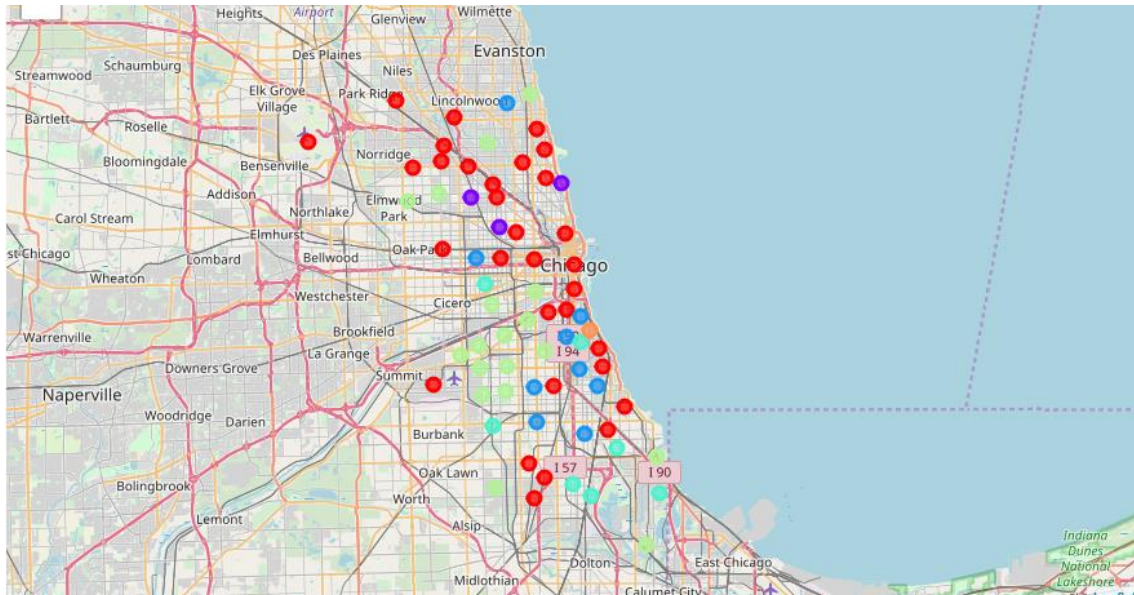
In this project we have decided to use clustering in order to facilitate to the final user to find similar boroughs with similar characteristics. To get that, the data had to be preprocessed as we have already explained in the previous point.

The Foursquare API was a really useful to get all the restaurants and to determine to which borough it belonged. Once we had all the data, we just had to group it and get the frequency of each type of restaurant in each borough and finally use the k-means with 6 clusters to gather them, this way the final user will be able to find al the suitable locations easier.

Results

The results we had are the following:

1. A map: Here we can easily see the location of each neighborhood and its cluster.



2. The data of each cluster:

a. Cluster 0: Pizza, Fast food, Bakery, Sandwich, Chinese and Italian.

	Borough	1st Most Common Venue	2nd Most Common Venue	3rd Most Common Venue	4th Most Common Venue	5th Most Common Venue	6th Most Common Venue	7th Most Common Venue	8th Most Common Venue	9th Most Common Venue	10th Most Common Venue
2	Armour Square	Chinese Restaurant	Asian Restaurant	Bakery	Italian Restaurant	American Restaurant	Hot Dog Joint	Indian Restaurant	Breakfast Spot	Sandwich Place	Café
5	Austin	Wings Joint	Italian Restaurant	Japanese Restaurant	Donut Shop	Ethiopian Restaurant	Czech Restaurant	Deli / Bodega	Dim Sum Restaurant	Diner	Eastern European Restaurant
6	Avalon Park	Food	Fast Food Restaurant	Burger Joint	Breakfast Spot	Pizza Place	Sandwich Place	Fish & Chips Shop	Diner	Cajun / Creole Restaurant	Donut Shop
7	Avondale	Food Truck	Sandwich Place	Chinese Restaurant	Bakery	Fast Food Restaurant	Diner	Donut Shop	Korean Restaurant	Restaurant	Hot Dog Joint
9	Beverly	Pizza Place	Chinese Restaurant	Italian Restaurant	Bakery	Burger Joint	Wings Joint	Ethiopian Restaurant	Deli / Bodega	Dim Sum Restaurant	Diner

b. Cluster 1: Food Truck, Latin American restaurant, Czech, Deli and Dim Sum

	Borough	1st Most Common Venue	2nd Most Common Venue	3rd Most Common Venue	4th Most Common Venue	5th Most Common Venue	6th Most Common Venue	7th Most Common Venue	8th Most Common Venue	9th Most Common Venue	10th Most Common Venue
31	Hermosa	Latin American Restaurant	Mexican Restaurant	Food Truck	Food	Diner	Czech Restaurant	Deli / Bodega	Dim Sum Restaurant	Donut Shop	Eastern European Restaurant
32	Humboldt Park	Food Truck	Café	Latin American Restaurant	Wings Joint	Ethiopian Restaurant	Czech Restaurant	Deli / Bodega	Dim Sum Restaurant	Diner	Donut Shop
39	Lincoln Park	Food Truck	Wings Joint	Ethiopian Restaurant	Cuban Restaurant	Czech Restaurant	Deli / Bodega	Dim Sum Restaurant	Diner	Donut Shop	Eastern European Restaurant

c. Cluster 2:Fast food, Fried Chicken, Sandwich, Wings Joint, Dim Sum

	Borough	1st Most Common Venue	2nd Most Common Venue	3rd Most Common Venue	4th Most Common Venue	5th Most Common Venue	6th Most Common Venue	7th Most Common Venue	8th Most Common Venue	9th Most Common Venue	10th Most Common Venue
4	Auburn Gresham	Fast Food Restaurant	American Restaurant	Greek Restaurant	BBQ Joint	Dim Sum Restaurant	Wings Joint	Falafel Restaurant	Deli / Bodega	Diner	Donut Shop
14	Chatham	Fast Food Restaurant	Donut Shop	Wings Joint	Ethiopian Restaurant	Cuban Restaurant	Czech Restaurant	Deli / Bodega	Dim Sum Restaurant	Diner	Eastern European Restaurant
17	Douglas	Fast Food Restaurant	Sandwich Place	Wings Joint	Seafood Restaurant	Asian Restaurant	Chinese Restaurant	Donut Shop	Food	Pizza Place	African Restaurant
25	Fuller Park	Fast Food Restaurant	Sandwich Place	Chinese Restaurant	Wings Joint	Eastern European Restaurant	Czech Restaurant	Deli / Bodega	Dim Sum Restaurant	Diner	Donut Shop
69	Washington Park	Fast Food Restaurant	Fried Chicken Joint	Ethiopian Restaurant	Cuban Restaurant	Czech Restaurant	Deli / Bodega	Dim Sum Restaurant	Diner	Donut Shop	Eastern European Restaurant
71	West Englewood	Fast Food Restaurant	American Restaurant	Wings Joint	French Restaurant	Food Truck	Food Court	Food	Fish & Chips Shop	Filipino Restaurant	Creperie
72	West Garfield Park	Fast Food Restaurant	Fried Chicken Joint	Pizza Place	Sandwich Place	Food	Taco Place	Middle Eastern Restaurant	Donut Shop	Czech Restaurant	Deli / Bodega

d. Cluster 3: Food, Ethiopian restaurant Cuban, Czech, Eastern restaurant.

	Borough	1st Most Common Venue	2nd Most Common Venue	3rd Most Common Venue	4th Most Common Venue	5th Most Common Venue	6th Most Common Venue	7th Most Common Venue	8th Most Common Venue	9th Most Common Venue	10th Most Common Venue
3	Ashburn	Food	BBQ Joint	Pizza Place	Italian Restaurant	Wings Joint	Eastern European Restaurant	Czech Restaurant	Deli / Bodega	Dim Sum Restaurant	Diner
13	Calumet Heights	Food	Deli / Bodega	Wings Joint	Ethiopian Restaurant	Cuban Restaurant	Czech Restaurant	Dim Sum Restaurant	Diner	Donut Shop	Eastern European Restaurant
20	East Side	Food	Wings Joint	Ethiopian Restaurant	Cuban Restaurant	Czech Restaurant	Deli / Bodega	Dim Sum Restaurant	Diner	Donut Shop	Eastern European Restaurant
28	Grand Boulevard	Food	Breakfast Spot	Pizza Place	Restaurant	Food Court	Fish & Chips Shop	Filipino Restaurant	Fast Food Restaurant	Falafel Restaurant	Ethiopian Restaurant
52	North Lawndale	Food	Fried Chicken Joint	Ethiopian Restaurant	Cuban Restaurant	Czech Restaurant	Deli / Bodega	Dim Sum Restaurant	Diner	Donut Shop	Eastern European Restaurant

e. Cluster 4: Mexican, pizza, Chinese, fast food.

	Borough	1st Most Common Venue	2nd Most Common Venue	3rd Most Common Venue	4th Most Common Venue	5th Most Common Venue	6th Most Common Venue	7th Most Common Venue	8th Most Common Venue	9th Most Common Venue	10th Most Common Venue
0	Albany Park	Mexican Restaurant	Sandwich Place	Korean Restaurant	Latin American Restaurant	Pizza Place	Chinese Restaurant	Fast Food Restaurant	Diner	Donut Shop	Deli / Bodega
1	Archer Heights	Mexican Restaurant	Wings Joint	Seafood Restaurant	Hot Dog Joint	Italian Restaurant	Pizza Place	Chinese Restaurant	Sandwich Place	Restaurant	Bakery
8	Belmont Cragin	Mexican Restaurant	Restaurant	Burger Joint	American Restaurant	BBQ Joint	Bakery	Middle Eastern Restaurant	Chinese Restaurant	Ethiopian Restaurant	Dim Sum Restaurant
11	Brighton Park	Mexican Restaurant	Pizza Place	Taco Place	Sandwich Place	Café	Burger Joint	Breakfast Spot	Food	Falafel Restaurant	Fast Food Restaurant
15	Chicago Lawn	Mexican Restaurant	Pizza Place	Fast Food Restaurant	American Restaurant	Fish & Chips Shop	Wings Joint	Czech Restaurant	Deli / Bodega	Dim Sum Restaurant	Diner

f. Cluster 5: Irish pub, wings.

	Borough	1st Most Common Venue	2nd Most Common Venue	3rd Most Common Venue	4th Most Common Venue	5th Most Common Venue	6th Most Common Venue	7th Most Common Venue	8th Most Common Venue	9th Most Common Venue	10th Most Common Venue
56	Oakland	Irish Pub	Wings Joint	Falafel Restaurant	Czech Restaurant	Deli / Bodega	Dim Sum Restaurant	Diner	Donut Shop	Eastern European Restaurant	Ethiopian Restaurant

Discussion

For example, if you want to go with your family to a Mexico restaurant, you'll may go to one of the boroughs of cluster 4, as you will have more possible options to choose. May be the cluster 5 is a good place to have a beer with your friends or you may want some fried chicken, the choose between all the neighborhoods in cluster 2.

On the other hand, if you want to open a new fast food restaurant, you may choose cluster 3, and between all the neighborhoods that it has, you can go to the map and choose that is near the loop, near your house if you want more commodity, or may be near a location that you may think is strategic.

Conclusion

In this project we have achieved the main goal of providing enough information to people to be able to choose where they may start a new restaurant or where we should go to eat.

The tools provided are the neighborhood and their locations, the restaurants they have and the most common between them. In addition clustering helps to gather them and that way be able to choose the best borough for you.