textbfResearch Clustering about Queens in New York City

1 Introduction

In the example shown before, we discover the clustering neighbourhood for Manhattan,New York. Then I'm curious about the other districts in New York city. As we all know, Manhattan has the largest population of New York. Is other districts similar to the situation of Manhattan?
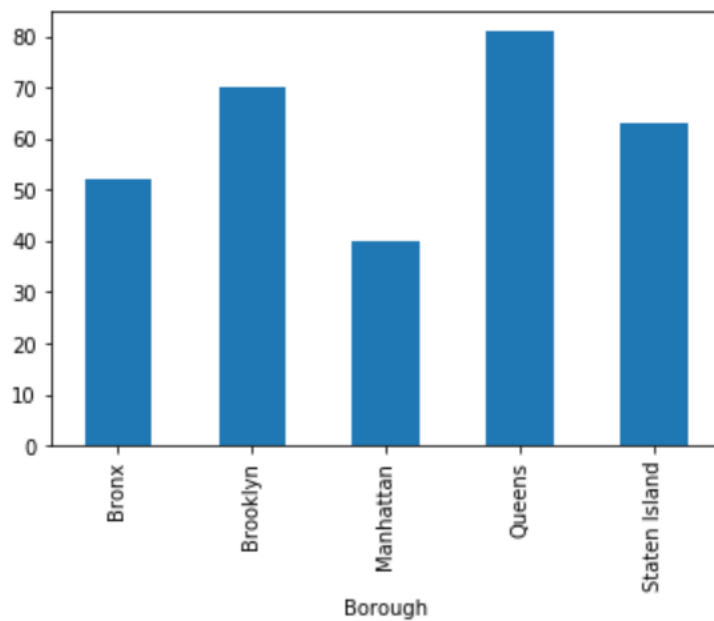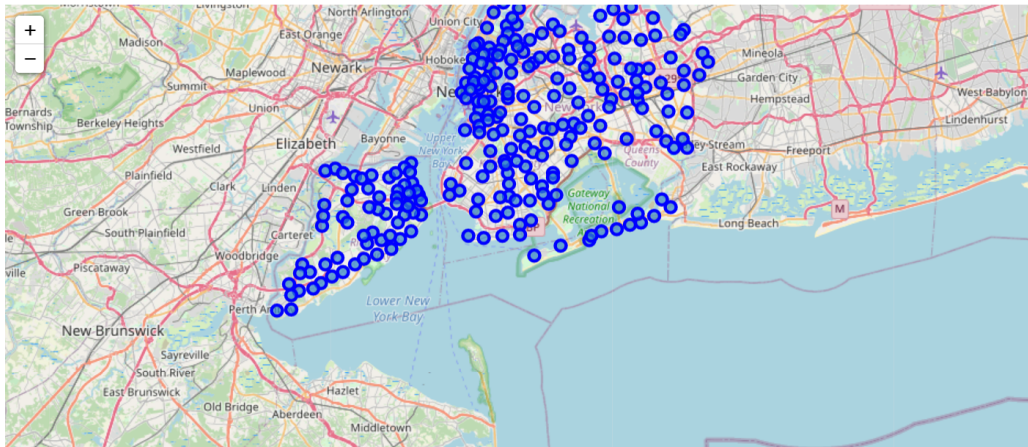
2 Data Description

The data is from Coursera, which has 5 boroughs and 306 neighborhoods of New York. We get each neighborhood's latitude and longitude, then we can confirm its location in the map.
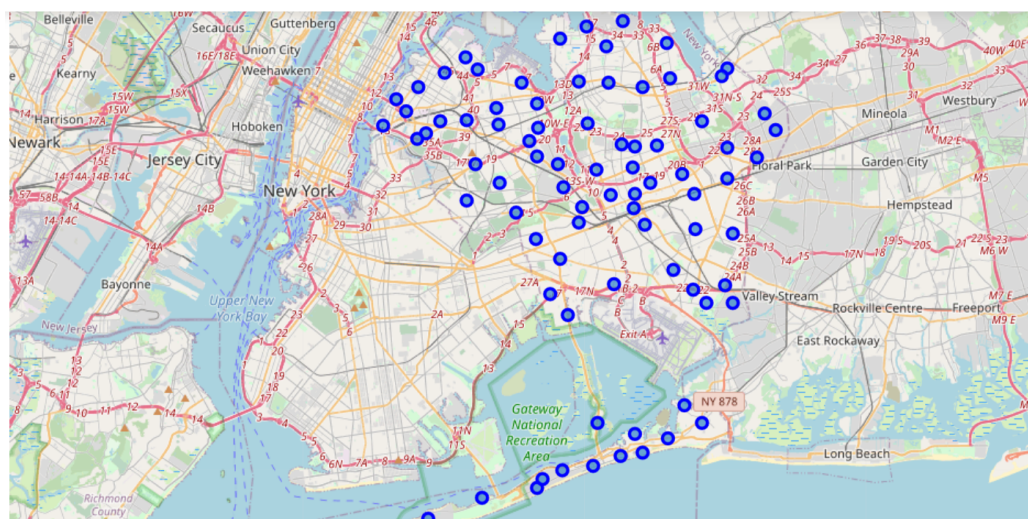
	Latitude	Longitude
count	306.000000	306.000000
mean	40.701362	-73.946254
std	0.097498	0.121202
min	40.505334	-74.246569
25%	40.617778	-74.000062
50%	40.702969	-73.932009
75%	40.766645	-73.857525
max	40.908543	-73.708847

After using the **geolocator** package in python, we can draw the map with many points on. And we can see that Manhattan has the largest density of neighbourhoods visually. Then I grouped the neighbourhoods according to the districts, and figured out the bar plot.The Queens has the maximum number of neighbourhoods among the five districts.

As I will research the neighbourhoods distribution of Queens in detail, I separated the data of Queens from the data of New York city. There're 81 neighbourhoods in the Queens.
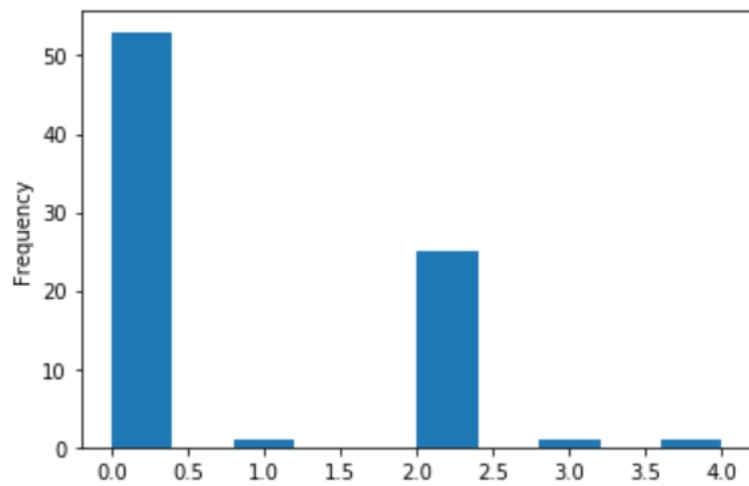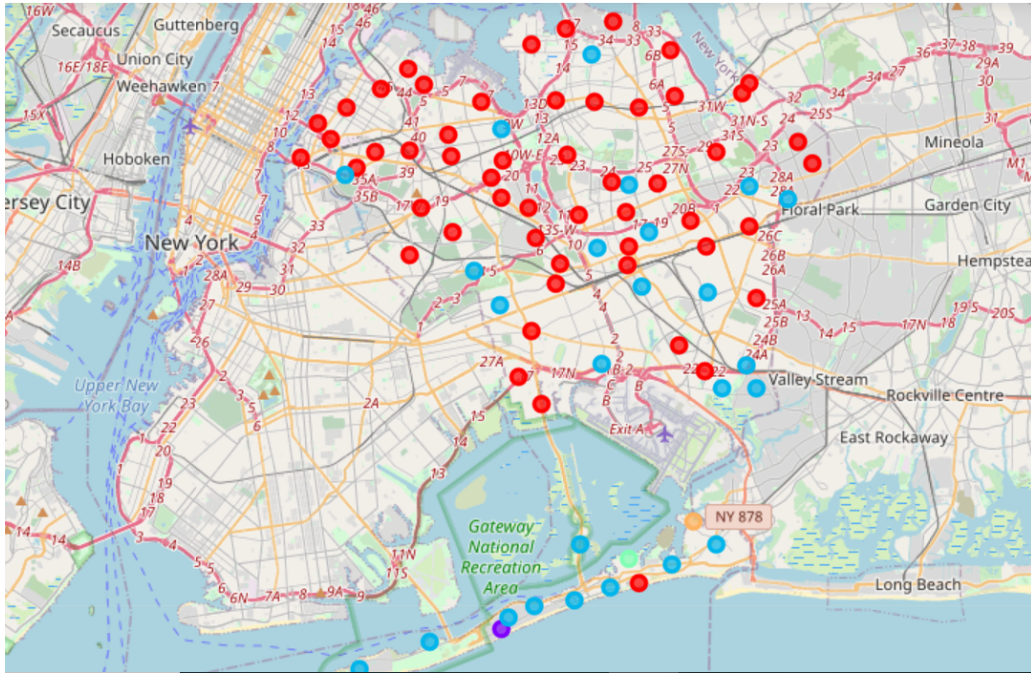
3 Data Analysis

Now let's explore what types of stores are available in each neighborhood. Using the information in Foursquare API,we find that there're 2101 venues in total. According to the category method in Foursquare,such as shop,restaurant,gym,etc, we can get there're 270 unique categories in Queens.

	Neighborhood	Neighborhood Latitude	Neighborhood Longitude	Venue	Venue Latitude	Venue Longitude	Venue Category
0	Astoria	40.768509	-73.915654	Favela Grill	40.767348	-73.917897	Brazilian Restaurant
1	Astoria	40.768509	-73.915654	Orange Blossom	40.769856	-73.917012	Gourmet Shop
2	Astoria	40.768509	-73.915654	Titan Foods Inc.	40.769198	-73.919253	Gourmet Shop
3	Astoria	40.768509	-73.915654	Off The Hook	40.767200	-73.918104	Seafood Restaurant
4	Astoria	40.768509	-73.915654	CrossFit Queens	40.769404	-73.918977	Gym

Since different neighborhood has different venue core, for example, there may not be many supermarket in the neighbourhood nearby airport, we list the top 10 common venues of each neighbourhood. Then we can classify these neighbourhoods through their most common venues.

	Neighborhood	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	Arverne	Surf Spot	Sandwich Place	Metro Station	Beach	French Restaurant	Coffee Shop	BBQ Joint	Donut Shop	Café	Burrito Place
1	Astoria	Bar	Middle Eastern Restaurant	Seafood Restaurant	Café	Greek Restaurant	Hookah Bar	Bakery	Deli / Bodega	Mediterranean Restaurant	Indian Restaurant
2	Astoria Heights	Plaza	Bus Station	Burger Joint	Bakery	Supermarket	Italian Restaurant	Bowling Alley	Pizza Place	Playground	Hostel
3	Auburndale	Hookah Bar	Discount Store	Mobile Phone Shop	Mattress Store	Fast Food Restaurant	Supermarket	Sushi Restaurant	Noodle House	Toy / Game Store	Italian Restaurant
4	Bay Terrace	Clothing Store	Women's Store	Shoe Store	American Restaurant	Kids Store	Bank	Mobile Phone Shop	Donut Shop	Cosmetics Shop	Coffee Shop

I decided to separate them into 5 clusters using KNN method, and points different cluster in different color in the map. The dots in red and blue color take up a large area in the map. In the bar plot, we can figure out that the red dots represent cluster 0 and the blue dots represent cluster 2.

In order to discover the feature of cluster 0 and cluster 2. I calculate the exact neighborhoods and their venues in these two clusters. In the following scripts, we can see that, there're many bars,restaurants and shops in cluster 0; as well as, there're many farms, beaches in cluster 2.

	Neighborhood	1	2	3	4	5	6	7	8	9	10
0	Astoria	Bar	Middle Eastern Restaurant	Seafood Restaurant	Café	Greek Restaurant	Hookah Bar	Bakery	Deli / Bodega	Mediterranean Restaurant	Indian Restaurant
1	Woodside	Grocery Store	Thai Restaurant	Filipino Restaurant	Bakery	Latin American Restaurant	American Restaurant	Pizza Place	Donut Shop	Bar	Pub
2	Jackson Heights	Latin American Restaurant	Peruvian Restaurant	South American Restaurant	Bakery	Mobile Phone Shop	Thai Restaurant	Spanish Restaurant	Empanada Restaurant	Diner	Mexican Restaurant
3	Elmhurst	Thai Restaurant	Mexican Restaurant	Bubble Tea Shop	Chinese Restaurant	Vietnamese Restaurant	Colombian Restaurant	Salon / Barbershop	Seafood Restaurant	Fast Food Restaurant	Snack Place
4	Howard Beach	Pharmacy	Italian Restaurant	Bank	Fast Food Restaurant	Deli / Bodega	Sandwich Place	Donut Shop	Tapas Restaurant	Jewelry Store	Seafood Restaurant
5	Corona	Mexican Restaurant	Chinese Restaurant	Supermarket	Bakery	Pizza Place	Deli / Bodega	Park	Restaurant	Donut Shop	Sandwich Place
6	Forest Hills	Gym / Fitness Center	Gym	Yoga Studio	Pizza Place	Park	Convenience Store	Liquor Store	Thai Restaurant	Pharmacy	Video Game Store

	Neighborhood	1	2	3	4	5	6	7	8	9	10
41	Far Rockaway	Deli / Bodega	Pizza Place	Chinese Restaurant	Supermarket	Bus Station	Grocery Store	Pet Store	Diner	Comfort Food Restaurant	Other Great Outdoors
42	Broad Channel	Sporting Goods Shop	Dive Bar	Other Nightlife	Deli / Bodega	Pizza Place	Event Space	Falafel Restaurant	Farm	Farmers Market	Fast Food Restaurant
43	Breezy Point	Beach	Monument / Landmark	Trail	Bus Stop	Fast Food Restaurant	Event Space	Falafel Restaurant	Farm	Farmers Market	Women's Store
47	Edgemere	Metro Station	Cosmetics Shop	Bus Station	Ice Cream Shop	Gift Shop	Farm	Park	Deli / Bodega	Pizza Place	Scenic Lookout
49	Rockaway Beach	Beach	Ice Cream Shop	Latin American Restaurant	Seafood Restaurant	BBQ Joint	Fast Food Restaurant	Arepa Restaurant	Fried Chicken Joint	Board Shop	Bar
54	Jamaica Estates	Dog Run	Bus Station	Women's Store	Field	Event Space	Falafel Restaurant	Farm	Farmers Market	Fast Food Restaurant	Filipino Restaurant
59	Laurelton	Caribbean Restaurant	Train Station	Park	Cosmetics Shop	Fish Market	Fish & Chips Shop	Filipino Restaurant	Field	Fast Food Restaurant	Eastern European Restaurant
61	Belle Harbor	Beach	Spa	Deli / Bodega	Boutique	Pub	Restaurant	Bakery	Bagel Shop	Donut Shop	Chinese Restaurant
62	Rockaway Park	Beach	Pizza Place	Bank	Pharmacy	Deli / Bodega	Diner	Donut Shop	Sandwich Place	Seafood Restaurant	Smoke Shop
64	Brookville	Recording Studio	Deli / Bodega	Women's Store	Field	Empanada Restaurant	Event Space	Falafel Restaurant	Farm	Farmers Market	Fast Food Restaurant

4 Conclusion

In our research, the area in the Queens can generally divided into 2 parts. The first one is in the center of district, which has many shops, restaurants and other facilities for eating and entertainment. The other part distributes by the sea mostly, which has the most number of farms, beaches and big markets.

However, the distribution in Manhattan is more commercial. There're kinds of restaurants from different countries all over the world. For examples, many neighbourhoods have Italian restaurants in common. Since there's a chinatown in Manhattan, there're also many Chinese restaurants. As for the natural scenery, there're only some parks in some neighbourhoods for relax.