# BEST LOCATION FOR A NEW SUSHI RESTAURANT IN ISTANBUL

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# BEST LOCATION FOR A NEW SUSHI RESTAURANT IN ISTANBUL

## 1. INTRODUCTION

### 1.1. BACKGROUND

Istanbul is the largest city in Turkey, constituting the country's economic, cultural, and historical heart. Istanbul is a transcontinental city in Eurasia, with its commercial and historical center lying on the European side and about a third of its population living on the Asian side of Eurasia. With a population of 15.07 million as of December 31 2018, the city forms the largest urban agglomeration in Europe as well as the largest in the Middle East, and the sixth-largest city proper in the world. Istanbul's vast area of 2,063 square miles is coterminous with Istanbul Province, of which the city is the administrative capital.

Istanbul has a population density of 6,530 people per square mile and it has 39 districts in total.

Due to its historical significance and being in the intersection of three continents Istanbul is also known for great food. This makes Istanbul a desirable destination for tourist attraction and food related business opportunities.

### 1.2. PROBLEM

Istanbul already has a lot of restaurants. How should we decide the best location for another one?

In this project, I examined and tried to find the best location for opening a new sushi restaurant in Istanbul.

### 1.3. INTEREST

The results of this project can be helpful for investors, employees, suppliers, and food enthusiasts.

## 2. DATA ACQUISITION AND CLEANING

### 2.1. DATA SOURCES

Second-level Administrative Divisions, Turkey, 2015 from Spatial Data Repository of NYU [1]: A geojson file with the geometry objects of the districts of the cities of Turkey. The json file has the geometry shapes of all the districts. For this project, I will extract the rows for Istanbul and find the center points for each borough.

List of districts of Istanbul Wikipedia page [2]: Lists the districts of Istanbul as of 2018. I will scrape the populations of each borough from this page.

Foursquare API [3]: Will be used for finding the restaurants in each borough. I will send the category name as "Sushi Restaurant" and work with its results.

### 2.2. DATA ACQUISITION, PREPROCESSING AND CLEANING

After reading the geojson file into a dataframe by using 'GeoPandas' and taking a look of its head

| | id | id_0 | iso | name_0 | id_1 | name_1 | id_2 | name_2 | hasc_2 | ccn_2 | cca_2 | type_2 | engtype_2 | nl_name_2 | varname_2 | geometry |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 0 | nj696zj1674.1 | 235 | TUR | Turkey | 1 | Çanakkale | 1 | Çan | TR.CK.CA | 0 | None | District | District | None | None | (POLYGON ((26.98407936 39.86386108, 26.9731197... |
| 1 | nj696zj1674.2 | 235 | TUR | Turkey | 1 | Çanakkale | 2 | Ayvacık | TR.CK.AY | 0 | None | District | District | None | None | (POLYGON ((26.44069481 39.51625061, 26.4404163... |
| 2 | nj696zj1674.3 | 235 | TUR | Turkey | 1 | Çanakkale | 3 | Bayramiç | TR.CK.BA | 0 | None | District | District | None | None | (POLYGON ((26.4226017 39.69835663, 26.42402458... |
| 3 | nj696zj1674.4 | 235 | TUR | Turkey | 1 | Çanakkale | 4 | Biga | TR.CK.BI | 0 | None | District | District | None | None | (POLYGON ((27.57680511 40.31188583, 27.5807285... |
| 4 | nj696zj1674.5 | 235 | TUR | Turkey | 1 | Çanakkale | 5 | Bozcaada | TR.CK.BO | 0 | None | District | District | None | None | (POLYGON ((26.06097221 39.9406929, 26.06097221... |

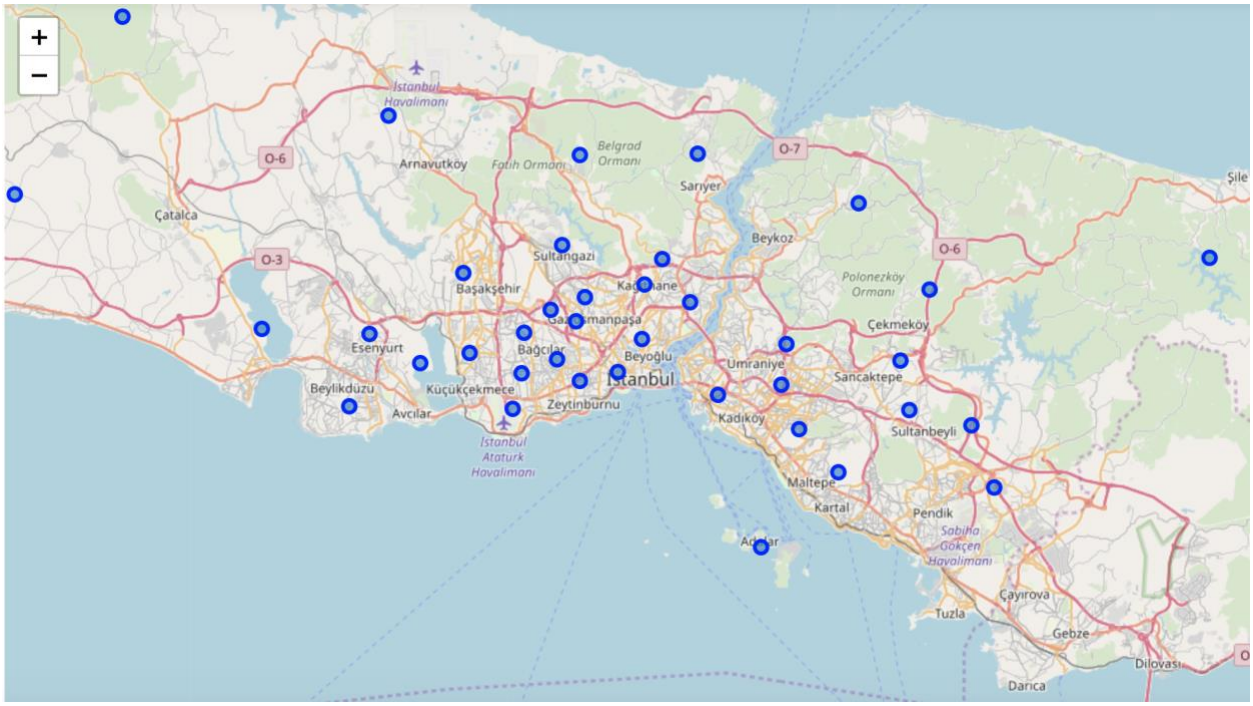
I filtered the relevant columns 'name_1', 'name_2', and 'geometry'. I then applied some filtering and formatting to the dataframe. The new look of the dataframe was as below:

| | Borough | geometry |
|---|---|---|
| 0 | Çatalca | (POLYGON ((28.54563522 41.38847351, 28.5436115... |
| 1 | Çekmekoy | (POLYGON ((29.17944717 41.02779007, 29.1788482... |
| 2 | Adalar | (POLYGON ((29.0518055 40.91485977, 29.0518055 ... |
| 3 | Ümraniye | (POLYGON ((29.17944717 41.02779007, 29.1770515... |
| 4 | Üsküdar | (POLYGON ((28.20846939 41.06986237, 28.2070827... |

I then found the centers of the boroughs and the latitude and longitude of each borough center

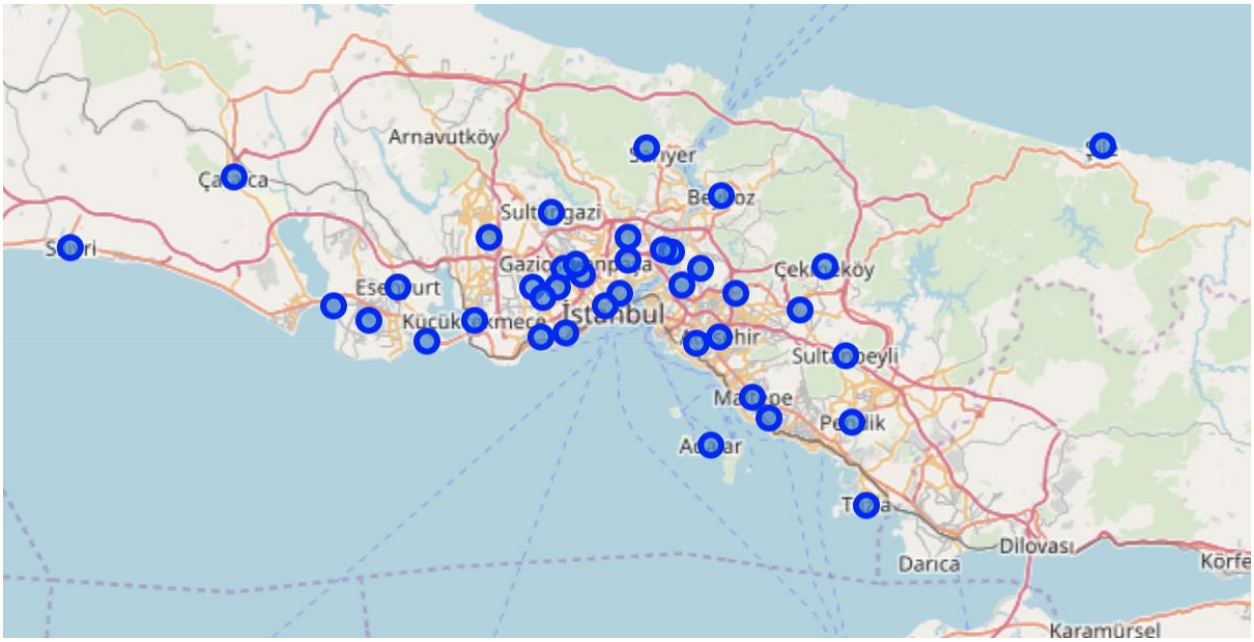
| | Borough | geometry | Center | Latitude | Longitude |
|---|---|---|---|---|---|
| 0 | Çatalca | (POLYGON ((28.54563522 41.38847351, 28.5436115... | POINT (28.40395065280459 41.3036808013895) | 41.303681 | 28.403951 |
| 1 | Çekmekoy | (POLYGON ((29.17944717 41.02779007, 29.1788482... | POINT (29.27865428644358 41.08152978930723) | 41.081530 | 29.278654 |
| 2 | Adalar | (POLYGON ((29.0518055 40.91485977, 29.0518055 ... | POINT (29.09589217657206 40.87084018625993) | 40.870840 | 29.095892 |
| 3 | Ümraniye | (POLYGON ((29.17944717 41.02779007, 29.1770515... | POINT (29.12329130594628 41.03728585521165) | 41.037286 | 29.123291 |
| 4 | Üsküdar | (POLYGON ((28.20846939 41.06986237, 28.2070827... | POINT (28.28742452864804 41.15882206752408) | 41.158822 | 28.287425 |

I used 'Folium' to depict the borough centers on the Istanbul map




This map was not promising as the centers calculated by using the centroids of the borough geometries were not actually on the spot.

I also noticed that 'Silivri' was labeled incorrectly as 'Uskudar' and the real 'Uskudar' was missing from the set. This indeed was the reason the number of boroughs were 38 in the first place rather than 39. After fixing this little issue, I used 'Geocoder' with a for loop for each borough and got better results this time.




This looked better. Then it was time to scrape the population data from Wikipedia page.

I used BeautifulSoup package to scrape the borough populations and converted it into a dataframe.

In order to merge location and population dataframes successfully, I first needed to equalize the borough names by converting all Turkish characters to English. I did this by using 'Unidecode' library.

After merging two dataframes the data looked as below

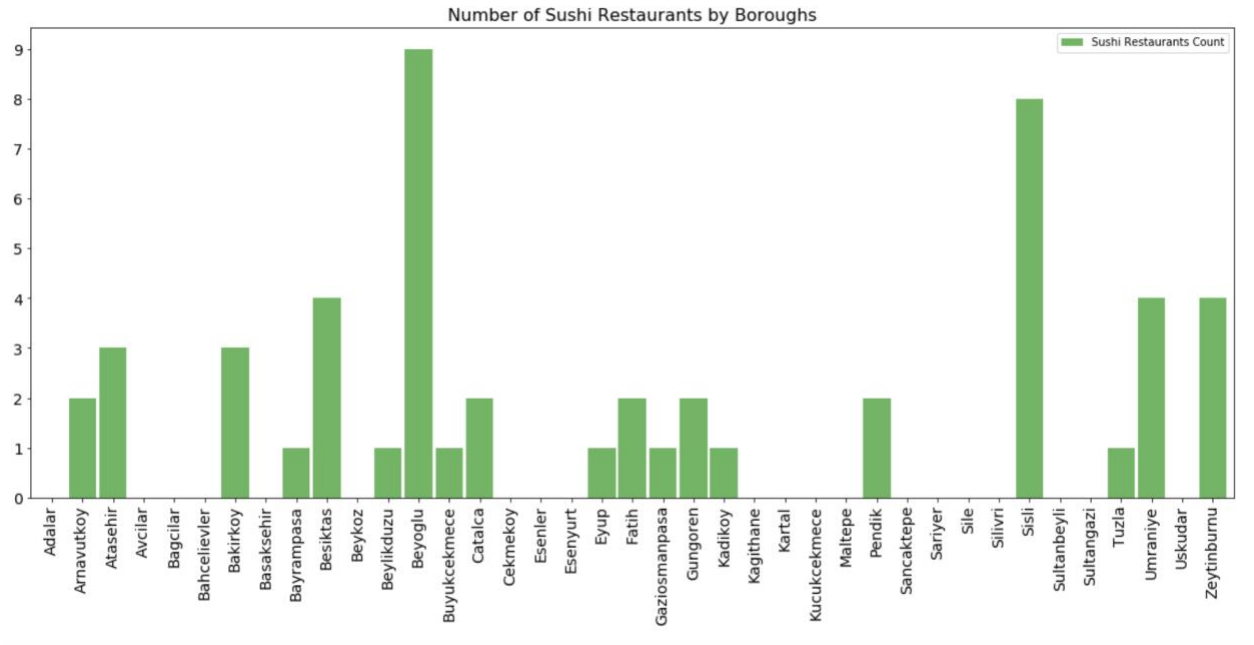
| | Borough | geometry | Center | Latitude | Longitude | Population |
|---|---|---|---|---|---|---|
| 0 | Adalar | (POLYGON ((29.0518055 40.91485977, 29.0518055 ... | POINT (29.09589217657206 40.87084018625993) | 40.875931 | 29.094742 | 16119 |
| 1 | Arnavutkoy | (POLYGON ((28.83302498 41.13262177, 28.8330497... | POINT (28.6924409915991 41.22317279934558) | 41.068394 | 29.041154 | 270549 |
| 2 | Atasehir | (POLYGON ((29.06557083 41.01100922, 29.0655708... | POINT (29.11740618068368 41.00336549589552) | 40.984749 | 29.106720 | 416318 |
| 3 | Avcilar | (POLYGON ((28.76737785 40.992836, 28.76796532 ... | POINT (28.72650253033136 41.02166473235334) | 40.980135 | 28.717547 | 435625 |
| 4 | Bagcilar | (POLYGON ((28.87145996 41.03858948, 28.8703727... | POINT (28.8384565827379 41.04588412344397) | 41.033899 | 28.857898 | 734369 |

For the sushi restaurants number in each borough I used the FourSquare api by setting the radius for each borough as 1000 meters.

Adding these counts to another column in the dataframe was the end of data preparation and the data was ready for exploratory analysis.

## 3. EXPLORATORY DATA ANALYSIS

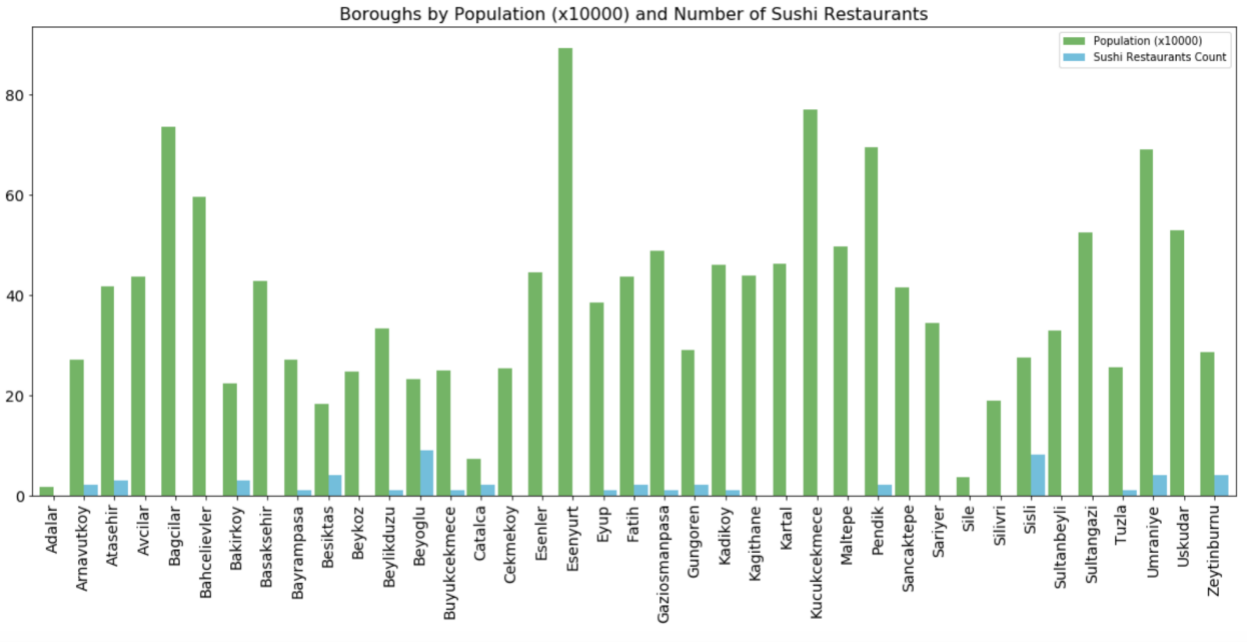
### 3.1. NUMBER OF SUSHI RESTAURANTS BY BOROUGHS




As seen in the bar chart, there are not many sushi restaurants in Istanbul. The borough with the most is Beyoglu with 9 which makes sense as Beyoglu is one of the dining centers in Istanbul. Out of 39 boroughs, 20 of them did not have a sushi restaurant at all.

## 3.2. POPULATION VS NUMBER OF SUSHI RESTAURANTS FOR EACH BOROUGH

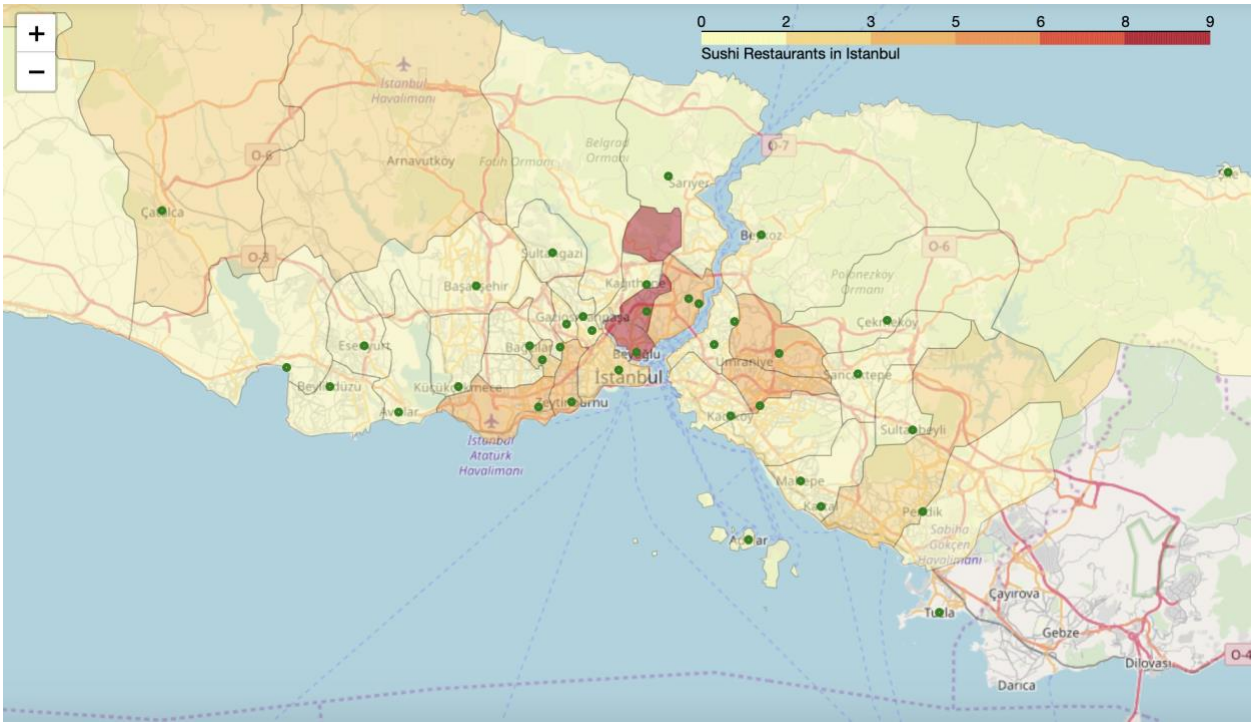
In order to see populations and numbers of sushi restaurants side by side I put the populations as 10,000s on the chart.




The bar chart showed that there are indeed very promising boroughs to open a sushi restaurant such as Esenyurt which had a population of 891,120 and no sushi restaurants.

## 3.3. SUSHI RESTAURANTS CHOROPLETH MAP OF BOROUGHS

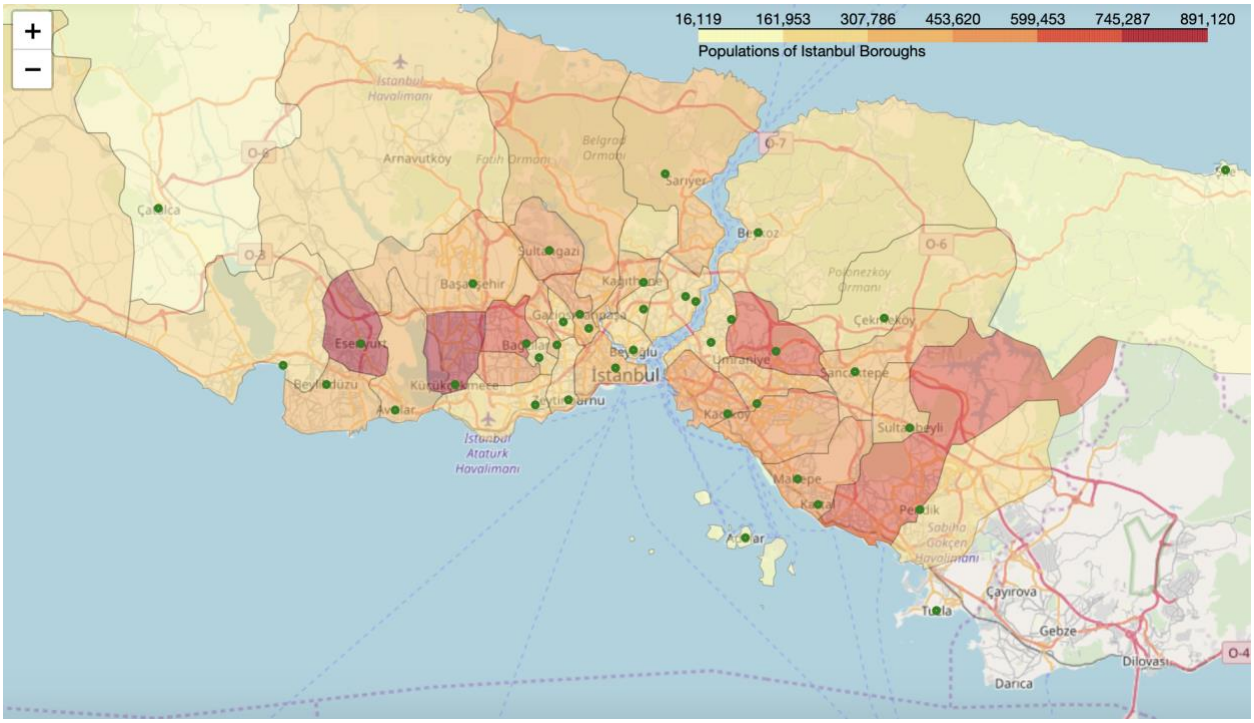
Let's have a look at the choropleth map of the sushi restaurants in Istanbul.




This map shows that the central Istanbul around Bosphorus has majority of the sushi restaurants.

## 3.4. CHOROPLETH MAP OF BOROUGH POPULATIONS

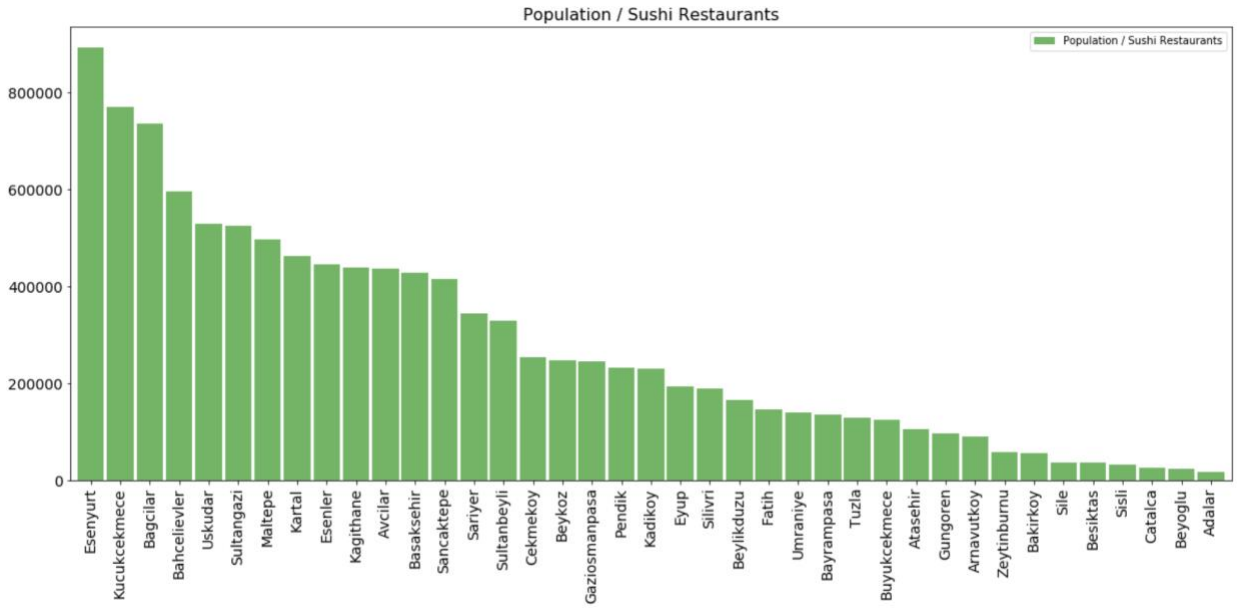
Let's have another look at the choropleth map of the borough populations in Istanbul.



This map shows that not all population lives in the Central Istanbul, there are boroughs which have great populations and were not red(ish) in the previous map.

### 3.5. POPULATION / SUSHI RESTAURANTS RATIO

Let's see how many people can our new sushi restaurant serve in each borough.




## 5. CONCLUSIONS

By using public geojson file obtained from Spatial Data Repository of NYU and the list from Wikipedia, I gathered the location and population of the boroughs of Istanbul. With the help from the Foursquare API, I got the numbers of sushi restaurants in each of these boroughs. Exploratory analysis of this data showed that

- Esenyurt, Kucukcekmece, and Bagcilar are some of the promising borough to open a sushi restaurant.
- Beyoglu is the best borough if you are interested in sushi restaurants.

## 6. DISCUSSIONS

- The ranking solely depends on population and number of restaurants in each borough.
- The accuracy of data depends on the data provided by FourSquare.

We could make a better analysis if we had the chance to procure additional data such as

- Preferences of food types of Turkish people, specifically corresponding sushi preference,
- Boroughs consideration mostly for visiting, pleasure, residential
- Modernity of people living in the boroughs

## 7. REFERENCES

1. Second-level Administrative Divisions, Turkey, 2015 from Spatial Data Repository of NYU
2. List of districts of Istanbul Wikipedia page
3. Foursquare API
4. Housing Sales Prices & Venues Data Analysis of Istanbul by Sercan Yıldız