

Open a restaurant in Berlin

A. Introduction

A.1. Description & discussion of the background

Berlin is the capital of Germany. In terms of residents, it is the second largest city in the European Union after London. Berlin is also one of the top 3 travel destinations in Europe. The person living in Berlin in June 2019 is 3,644,826. According to a population forecast for Berlin and the districts 2015 - 2030, further growth of 75,000 people can be expected from the end of 2020 to 2030. The growth of tourism and Berliners is motivating an investor to open a new restaurant in this city. The question now is: which borough will be suitable for this project. The purpose of my work is to find a suitable borough for a new restaurant in Berlin. Berlin is divided into 12 boroughs. My first idea is to visualize the borough with the most important residents and then I will also use a cluster method to locate the districts that can be attractive to the investor.

A.2. Data description

To consider the problem I use following sources:

- I found in wikipedia a table with boroughs of Berlin, the number of residents per borough, the surface of the boroughs and more information. I use this table to set up 2 data files. The first data file contains a table with the boroughs of Berlin and their number of residents. I will use this file to create a vertical bar chart to visualize the boroughs with the number of their residents. The second data file contains the boroughs of Berlin with their latitude and longitude. The second file will be used for the clustering.
- I used Google Map to get the center coordinates of each Borough.
- I will use Foursquare API to get the most common venues of given borough of Berlin.

Following data frame shows the boroughs of Berlin with their number of residents.

	Borough	Resident
0	Mitte	384.172
1	Frierichshain-Kreuzberg	289.762
2	Charlottenburg-Wilmersdorf	342.332
3	Spandau	243.977
4	Steglitz-Zehlendorf	308.697
5	Tempelhof-Schoeneberg	351.644
6	Neukoelln	329.691
7	Treptow-Koepernick	271.153
8	Marzahn-Hellersdorf	268.548
9	Lichtenberg	291.452
10	Reinichendorf	265.225
11	Pankow	407.765

Table 1

Following data frame shows the boroughs of Berlin with their latitude and longitude

	Borough	Latitude	Longitude
0	Mitte	52.531677	13.381777
1	Frierichshain-Kreuzberg	52.515816	13.454293
2	Charlottenburg-Wilmersdorf	52.500000	13.283333
3	Spandau	52.551100	13.199210
4	Steglitz-Zehlendorf	52.430884	13.192662
5	Tempelhof-Schoeneberg	52.472160	13.404954
6	Neukoelln	52.520008	13.566667
7	Treptow-Koepernick	52.450000	13.566667
8	Marzahn-Hellersdorf	52.536107	13.604973
9	Lichtenberg	52.534306	13.502326
10	Reinichendorf	52.566667	13.333333
11	Pankow	52.592879	13.431700

Table 2

Data Source: https://de.wikipedia.org/wiki/Verwaltungsgliederung_Berlins

B. Methodology

Following chart shows the data of the table 1.

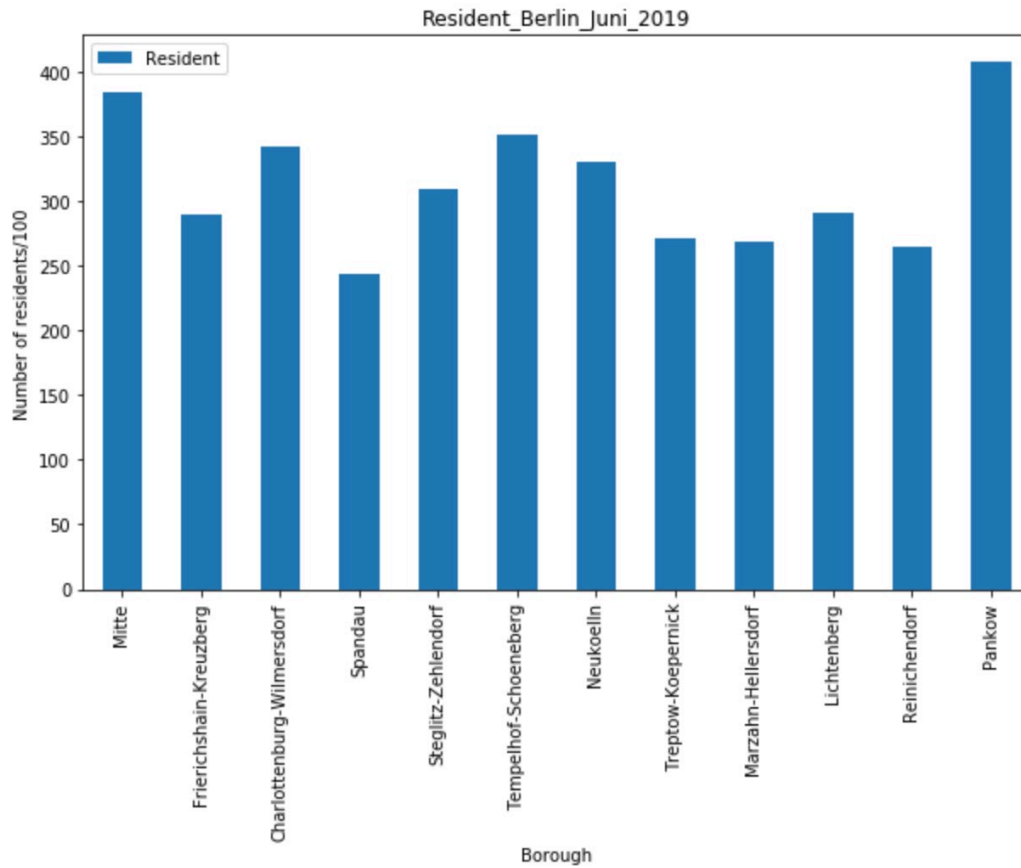


Figure 1

I use python folium library to visualize geographic details of Berlin and its boroughs and I created a map of Berlin with boroughs superimposed on top.

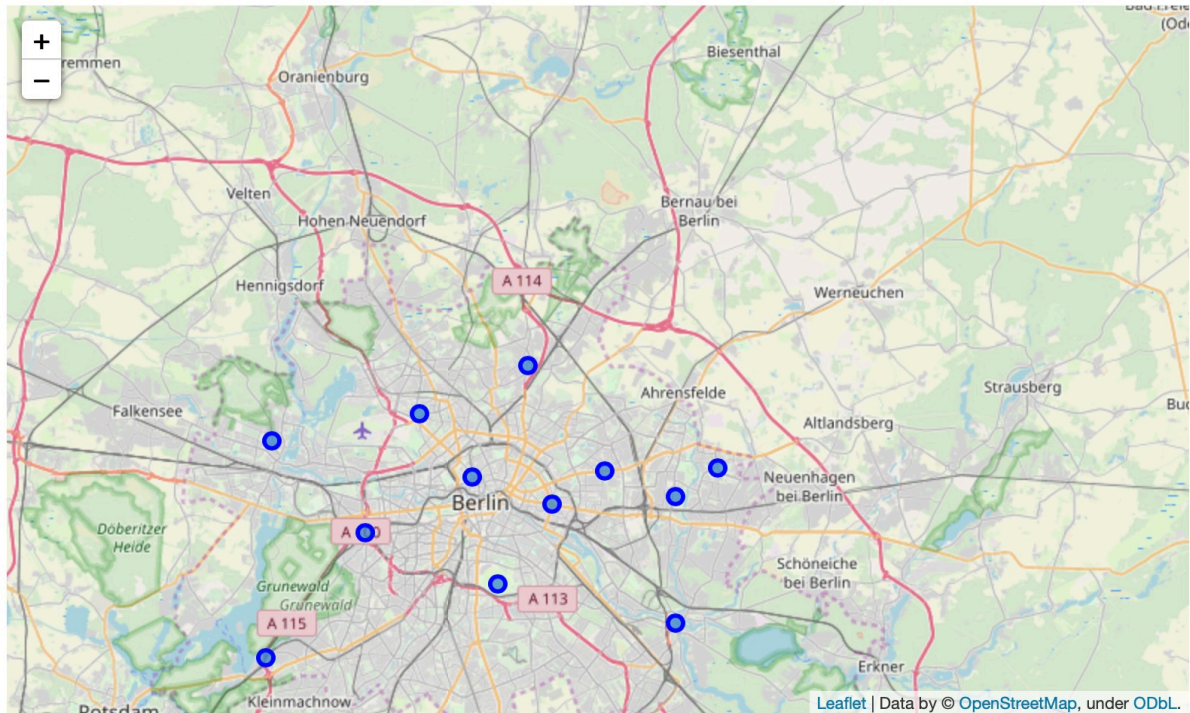


Figure 2

I use Foursquare API to explore the boroughs and segment them.

I try to get the top 100 venues that are in each Boroughs within a radius of 500 meters. Following table shows the head of the resulting data.

	Neighborhood	Neighborhood Latitude	Neighborhood Longitude	Venue	Venue Latitude	Venue Longitude	Venue Category
0	Mitte	52.531677	13.381777	19grams	52.533037	13.380054	Coffee Shop
1	Mitte	52.531677	13.381777	Hotel i31	52.531107	13.384270	Hotel
2	Mitte	52.531677	13.381777	Museum für Naturkunde	52.530271	13.379281	Science Museum
3	Mitte	52.531677	13.381777	+84	52.532639	13.379511	Vegetarian / Vegan Restaurant
4	Mitte	52.531677	13.381777	Titanic Chaussee Berlin	52.532215	13.381012	Hotel

Table 3

I analyse each neighborhood (borough), create a new dataframe and display the top 10 venues for each neighborhood. Following table shows the result for the first 6 boroughs.

	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
0	Charlottenburg-Wilmersdorf	Platform	Hotel	Park	Intersection	Bakery	Light Rail Station	Pet Store	Doner Restaurant
1	Friedrichshain-Kreuzberg	Pub	Café	Bakery	Coffee Shop	Vietnamese Restaurant	Pizza Place	Bar	Hotel
2	Lichtenberg	Tram Station	Hardware Store	Drugstore	Pharmacy	Furniture / Home Store	Supermarket	Fast Food Restaurant	Soccer Field
3	Marzahn-Hellersdorf	Supermarket	Indian Restaurant	Ice Cream Shop	Mexican Restaurant	Multiplex	Electronics Store	Drugstore	Plaza
4	Mitte	Coffee Shop	Hotel	Café	Gym / Fitness Center	Park	Italian Restaurant	Drugstore	Pub
5	Neukoelln	Board Shop	Bus Stop	Gym	Furniture / Home Store	Deli / Bodega	Doner Restaurant	Drugstore	Electro Store
6	Pankow	Hotel	Asian Restaurant	Tram Station	Supermarket	Hardware Store	Flower Shop	Dance Studio	Deli / Bodega

Table 4

I use k -means to cluster the boroughs into 4 clusters.
Following figure shows the map with the four clusters.

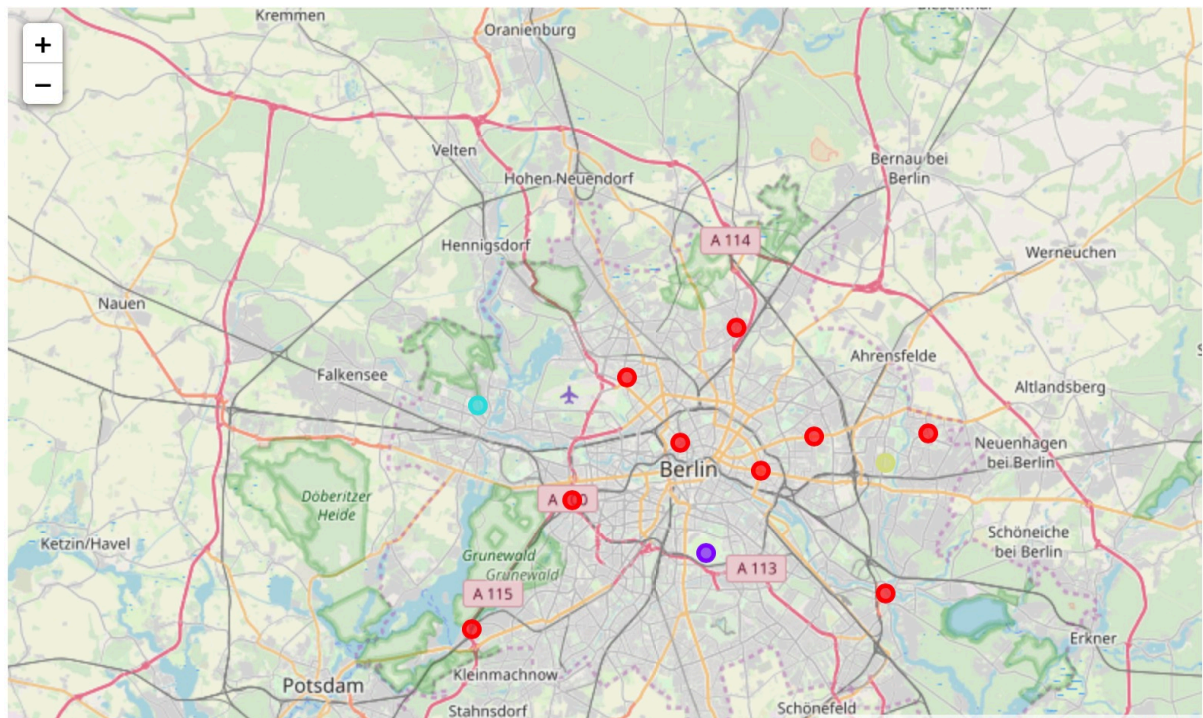


Figure 3

C. Results

Figure 1 shows that apart from the boroughs Mitte and Pankow, the distribution of number of residents by borough in the city of Berlin is almost equitable. The number of residents alone can not be considered as a only parameter to open a restaurant in this city.

After analysing the results obtain by clustering the boroughs of Berlin, I've got following results :

Cluster 0: Multiple Social Venue

	Latitude	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	52.531677	Coffee Shop	Hotel	Café	Gym / Fitness Center	Park	Italian Restaurant	Drugstore	Pub
1	52.515816	Pub	Café	Bakery	Coffee Shop	Vietnamese Restaurant	Pizza Place	Bar	Hotel
2	52.500000	Platform	Hotel	Park	Intersection	Bakery	Light Rail Station	Pet Store	Doner Restaurant
4	52.430884	Rest Area	Café	Fast Food Restaurant	Snack Place	Coffee Shop	Gas Station	Supermarket	Light Rail Station
7	52.450000	Park	Boat Rental	River	Tram Station	Light Rail Station	Boat or Ferry	Deli / Bodega	Doner Restaurant
8	52.536107	Supermarket	Indian Restaurant	Ice Cream Shop	Mexican Restaurant	Multiplex	Electronics Store	Drugstore	Plaza
9	52.534306	Tram Station	Hardware Store	Drugstore	Pharmacy	Furniture / Home Store	Supermarket	Fast Food Restaurant	Soccer Field
10	52.566667	Supermarket	Bakery	Indian Restaurant	Jewelry Store	Gas Station	Pet Store	Falafel Restaurant	Restaurant
11	52.592879	Hotel	Asian Restaurant	Tram Station	Supermarket	Hardware Store	Flower Shop	Dance Studio	Deli / Bodega

Table 5

Cluster 1: Park

	Latitude	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
5	52.47216	Park	Sporting Goods Shop	Wine Bar	Flower Shop	Dance Studio	Deli / Bodega	Doner Restaurant	Drugstore	Electronics Store	Ethiopian Restaurant

Table 6

Cluster 2: Supermarket

	Latitude	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	52.5511	Supermarket	Italian Restaurant	Bus Stop	Furniture / Home Store	Dance Studio	Deli / Bodega	Doner Restaurant	Drugstore	Electronics Store	Ethiopian Restaurant

Table 7

Cluster 3: Board shop

	Latitude	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
6	52.520008	Board Shop	Bus Stop	Gym	Furniture / Home Store	Deli / Bodega	Doner Restaurant	Drugstore	Electronics Store	Ethiopian Restaurant	Fala Restaurant

Table 8

D. Discussion

I will recommend boroughs in cluster 0 if the restaurant will offer something exclusive like vegan foods or a restaurant with a space for dogs or cats. Because in those areas there are enough restaurants and enough social venues. For the boroughs in cluster 1, 2 or 3, I will recommend fast food restaurants. A quick service restaurant near a park or a supermarket could be beneficial.

E. Conclusion

In my investigation to find a borough to open a new restaurant in Berlin, I start by visualizing the boroughs from Berlin with their number of residents. Then I use Foursquare API to find the most common venues in each borough. Use the K-means to cluster the boroughs. Restaurants can be opened in any borough in Berlin. Each borough is attractive. The type of restaurant to be opened is the more essential point to be considered for the choice of a borough.

F. Reference

Data Source: https://de.wikipedia.org/wiki/Verwaltungsgliederung_Berlins