

Moving to Basel City, Switzerland

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1. Introduction

A person is about to move to Basel City, Switzerland, and needs to make a decision which neighbourhood to choose for his future residence.

Basel is a small European city with population just under 200,000 people. There are only 19 neighbourhoods and plenty of public transport available. The daily commute to work within the city is not an issue. However, due to current COVID-19 and home-office situation, restrictions to movement may apply. One would like to make sure that the essential amenities (such as, for example, supermarkets and parks) are within the convenient reach. Thus, the individual would like to know what sort of venues are available in different areas, how similar to one another those areas are, and make his decisions based on that information.

We will use data science to collect and analyze available information about Basel neighbourhoods (also known as quartiers) to generate several clusters based on their similarities. To do that we will use K-Means clustering algorithm. This should allow the individual to make an informed decision about his future move.

2. Data acquisition

To solve the task at hand we require the postal codes and the names of Basel quartiers. The data is published online on

<https://www.plz-suche.org/basel-ch7874>

We scrape this information using BeautifulSoup tool in Python.

	Postal Code	Quartiere
1	4001-4051	Altstadt Grossbasel
2	4058	Altstadt Kleinbasel
3	4051-4056	Am Ring
4	4054	Bachletten
5	4052	Breite
6	4059	Bruderholz
7	4058	Clara
8	4054	Gotthelf
9	4053	Gundeldingen
10	4058	Hirzbrunnen
11	4055	Iselin
12	4057	Kleinhüningen
13	4057	Klybeck
14	4057	Matthäus
15	4058	Rosental
16	4052	Sankt Alban
17	4056	Sankt Johann
18	4051	Vorstädte
19	4058	Wettstein

There are 19 quartieres in Basel City.

Figure 1. Basel quartieres and their postal codes.

There are 19 neighbourhoods and their postal codes are not unique. Therefore, it is more sensible to collect geospatial data based on the neighbourhoods' names. We are able to do by using GeoPy library in Python.

	Postal Code	Quartiere	Latitude	Longitude
0	4001-4051	Altstadt Grossbasel	47.556427	7.588259
1	4058	Altstadt Kleinbasel	47.560700	7.593382
2	4051-4056	Am Ring	47.558774	7.577477
3	4054	Bachletten	47.548566	7.571726
4	4052	Breite	47.551809	7.617853
5	4059	Bruderholz	47.530799	7.591624
6	4058	Clara	47.564085	7.596629
7	4054	Gotthelf	47.555819	7.570952
8	4053	Gundeldingen	47.543219	7.591485
9	4058	Hirzbrunnen	47.568873	7.615470
10	4055	Iselin	47.562196	7.565999
11	4057	Kleinhüningen	47.583376	7.597574
12	4057	Klybeck	47.576798	7.590149
13	4057	Matthäus	47.567439	7.591540
14	4058	Rosental	47.567708	7.601491
15	4052	Sankt Alban	47.549565	7.605052
16	4056	Sankt Johann	47.569086	7.575934
17	4051	Vorstädte	47.552646	7.588804
18	4058	Wettstein	47.560508	7.604795

Figure 2. Geospatial data for each quartiere in Basel.

The latitude and longitude information is required to be used in Foursquare API to gather the venue data for all quartiers. To visualize the data we use `folium` library in Python.

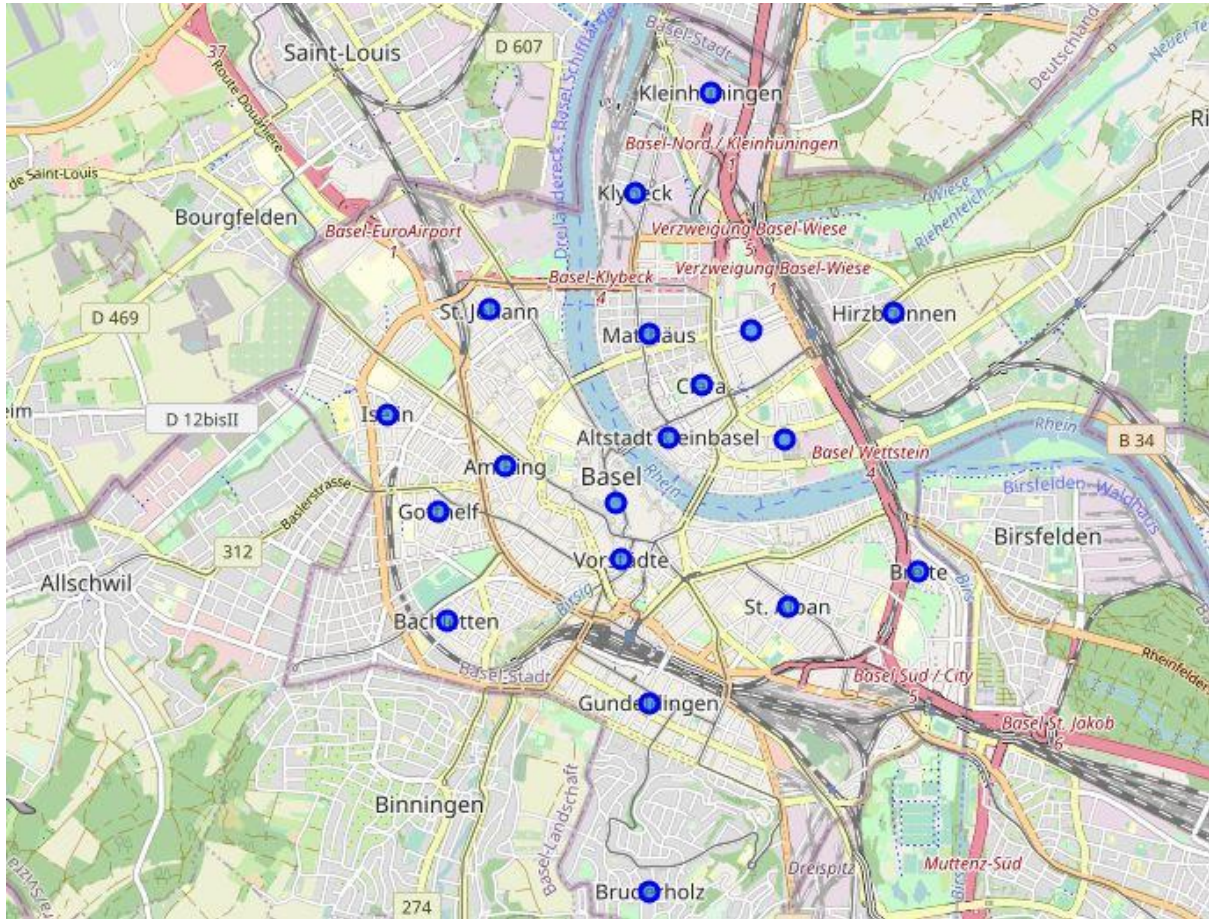


Figure 3. The map of Basel, Switzerland, with its quartiers superimposed on top.

3. Methodology

First of all, we use Foursquare API to collect information about all venues in the radius of 500 meters from each quartiere's latitude and longitude.

Quartiere	Number of venues
Altstadt Grossbasel	69
Altstadt Kleinbasel	73
Am Ring	21
Bachletten	6
Breite	11
Bruderholz	8
Clara	62
Gotthelf	17
Gundeldingen	44
Hirzbrunnen	6
Iselin	6
Kleinhüningen	12
Klybeck	8
Matthäus	28
Rosental	34
Sankt Alban	7
Sankt Johann	17
Vorstädte	100
Wettstein	24

Figure 4. The number of venues in each quartiere.

There are 553 venues of 116 unique categories. We can also print out the top venues for each quartiere.


```

-----Altstadt Grossbasel-----
---Number of venues: 69.
      Type of venue  Frequency
0           Bar      0.09
1           Café      0.07
2  Swiss Restaurant  0.06
3           Hotel      0.06
4           Plaza      0.06

-----Altstadt Kleinbasel-----
---Number of venues: 73.
      Type of venue  Frequency
0           Hotel      0.12
1           Bar      0.08
2  Italian Restaurant  0.07
3           Restaurant  0.05
4  Swiss Restaurant  0.05

-----Am Ring-----
---Number of venues: 21.
      Type of venue  Frequency
0  Italian Restaurant  0.14
1           Tram Station  0.10
2           Hotel      0.10
3  Gym / Fitness Center  0.05
4           Historic Site  0.05

```

Figure 5. Example of Top-5 venues output for each quartiere.

In order to use K-Means clustering algorithm we group out data by quartiere and transform categorical values into numerical ones using one hot encoding. K-Means algorithm assigns each neighbourhood to a cluster based on venue similarities.

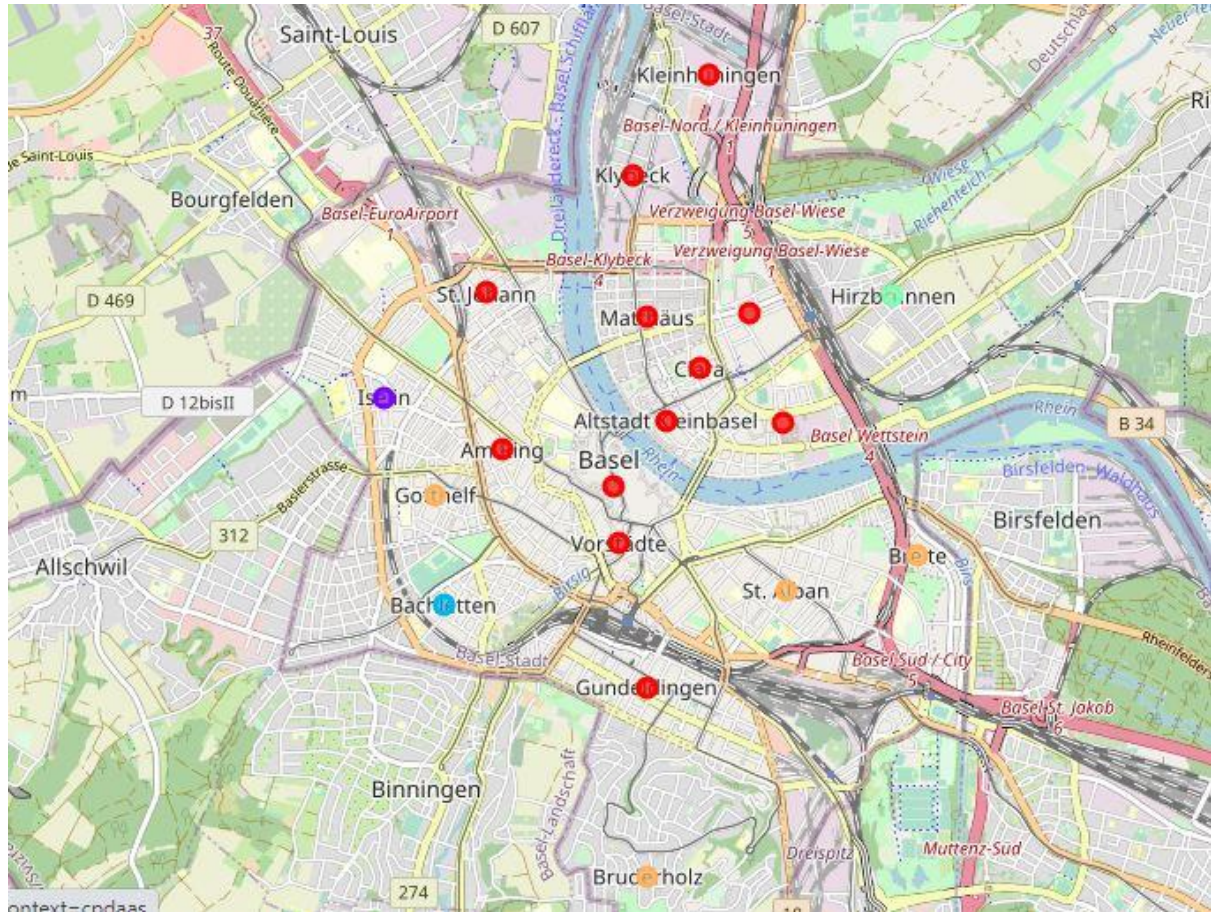


Figure 6. Basel quartiers grouped into clusters.

4. Results

In order to get a better understanding of the results, we can also print each cluster individually. Many neighbourhoods contain small number of venues (<10), so a closer look is essential. The most common type of neighbourhood in Basel is clearly in red. It contains high number of venues: multiple shops, restaurants and entertainment places. Blue and purple clusters do not appear to have any accessible supermarkets, while brown clusters have both shops, parks, and plenty of available public transport connections.

5. Discussion

Based on the obtained analysis, the individual can make an informed decision on where in Basel would be the best place to reside. Personally, I am drawn to the brown sector, as I appreciate the convenience of local shops and options for relaxing evening walks.

6. Conclusion

The quartiers of Basel are clustered and the map with the clustered superimposed on top is provided. All calculation and detailed analysis can be accessed via [GitHub/Jupyter Notebook](#).