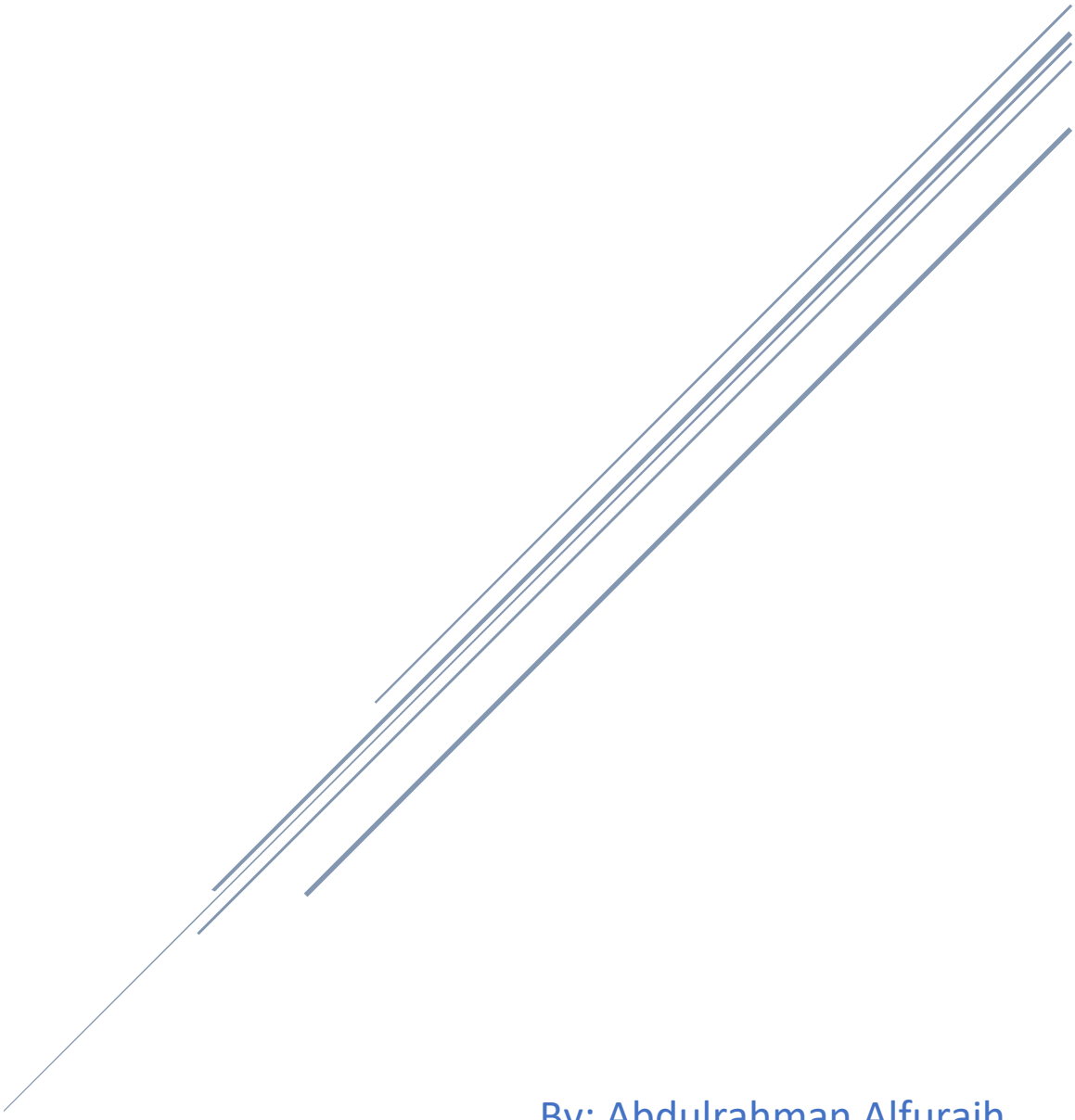
BATTLE OF NEIGHBORHOODS

Laundries in Munich



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1. Introduction / Business Problem

Munich is the capital and most populous city of Bavaria with a population of 1,558,395 inhabitants as of July 31, 2020, it is the third-largest city in Germany, after Berlin and Hamburg, and thus the largest which does not constitute its own state, as well as the 11th-largest city in the European Union. It is well known that Munich is a great destination for tourists due to the variety of activities, lakes, parks and beer gardens to museums, historical sites and massive stores, there is something for everyone who visits Munich.

Based on what is mentioned above, it is obvious that there will be lots of hotels, hostels, and Inns. Some of these places are providing laundry services and some of them do not. Four stars or five starts hotels are providing laundry services but the costs are extremely high. Therefore, as part of this project we will analyze the areas around the hotels in Munich to find out the good places where to open or provide a laundry or dry-cleaning services.

2. Data

In this section of the report, we will describe the data that has been used to find the solution for the mentioned problem in the previous section.

First, we know that Munich is divided into multiple boroughs. Therefore, we started to collect the information regarding the boroughs. We were able to find the related information in this page. The following table is showing the needed information:

Note: The following number of inhabitants refer to principal residences as of the 31 December 2006

Name	Area in km²	Inhabitant Count	Inhabitants per km²
Allach-Untermenzing	15.45	27,730	1,795
Altstadt-Lehel	3.16	18,876	5,973
Aubing-Lochhausen-Langwied	34.06	37,857	1,111
Au-Haidhausen	4.22	54,382	12,887

Berg am Laim	6.31	39,009	6,182
Bogenhausen	23.71	75,657	3,191
Feldmoching-Hasenbergl	28.71	54,245	1,889
Hadern	9.23	44,993	4,875
Laim	5.29	50,082	9,457
Ludwigsvorstadt-Isarvorstadt	4.39	45,736	10,418
Maxvorstadt	4.29	46,058	10,736
Milbertshofen-Am Hart	13.37	66,992	5,011
Moosach	11.09	47,754	4,306
Neuhausen-Nymphenburg	12.92	84,604	6,548
Obergiesing	5.71	47,007	8,232
Pasing-Obermenzing	16.50	63,763	3,864
Ramersdorf-Perlach	19.90	102,689	5,160
Schwabing-Freimann	25.67	62,430	2,432
Schwabing-West	4.37	59,553	13,628
Schwanthalerhöhe	2.07	26,103	12,610
Sendling	3.94	37,146	9,428
Sendling-Westpark	7.81	50,903	6,518

Thalkirchen-Obersendling -Forstenried-Fürstenried-Solln	17.75	80,701	4,547
Trudering-Riem	22.45	53,915	2,401
Untergiesing-Harlaching	8.06	48,075	5,965

In addition to the above table, we used the Foursquare API to fetch the hotels in each borough. The following is an example of the fetched list of hotels in one of the boroughs:

Borough	Borough Latitude	Borough Longitude	Hotel	Hotel Latitude	Hotel Longitude	Hotel Category
Allach-Untermenzing	48.195157	11.462973	Boutique Hotel Amalienburg	48.164081	11.487630	Hotel
Allach-Untermenzing	48.195157	11.462973	Harry's Home Hotels	48.179374	11.505741	Hotel
Allach-Untermenzing	48.195157	11.462973	Westside Hotel	48.201045	11.458564	Hotel

Also, by using Foursquare APIs, we fetched the list of laundries around each hotel. The following is an example:

Hotel	Hotel Latitude	Hotel Longitude	Laundry	Laundry Latitude	Laundry Longitude	Laundry Category
Cortiina Hotel	48.136804	11.579450	Stark Reinigung	48.137173	11.580919	Dry Cleaner
Hotel Vier Jahreszeiten Kempinski	48.138918	11.581775	Stark Reinigung	48.137173	11.580919	Dry Cleaner

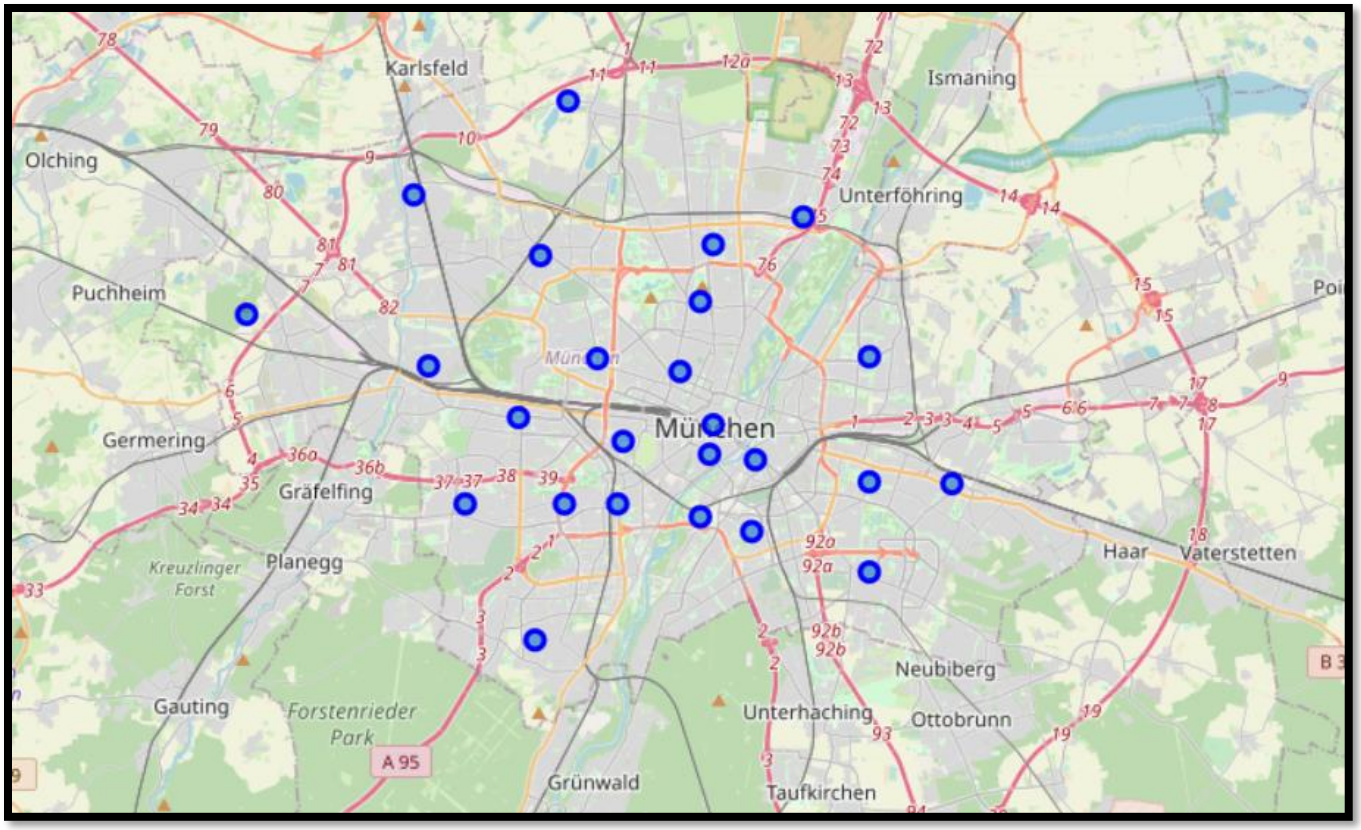
3. Methodology

In this section of the report, we will explain in detail the steps we took in our analysis:

In the first step, we used this page to fetch the information related to Munich boroughs. The following is a sample data:

Name	Area in km²	Inhabitant Count	Inhabitants per km²
Allach-Untermenzing	15.45	27,730	1,795
Altstadt-Lehel	3.16	18,876	5,973

Then, we have plotted the hotel in a map using the Folium library:



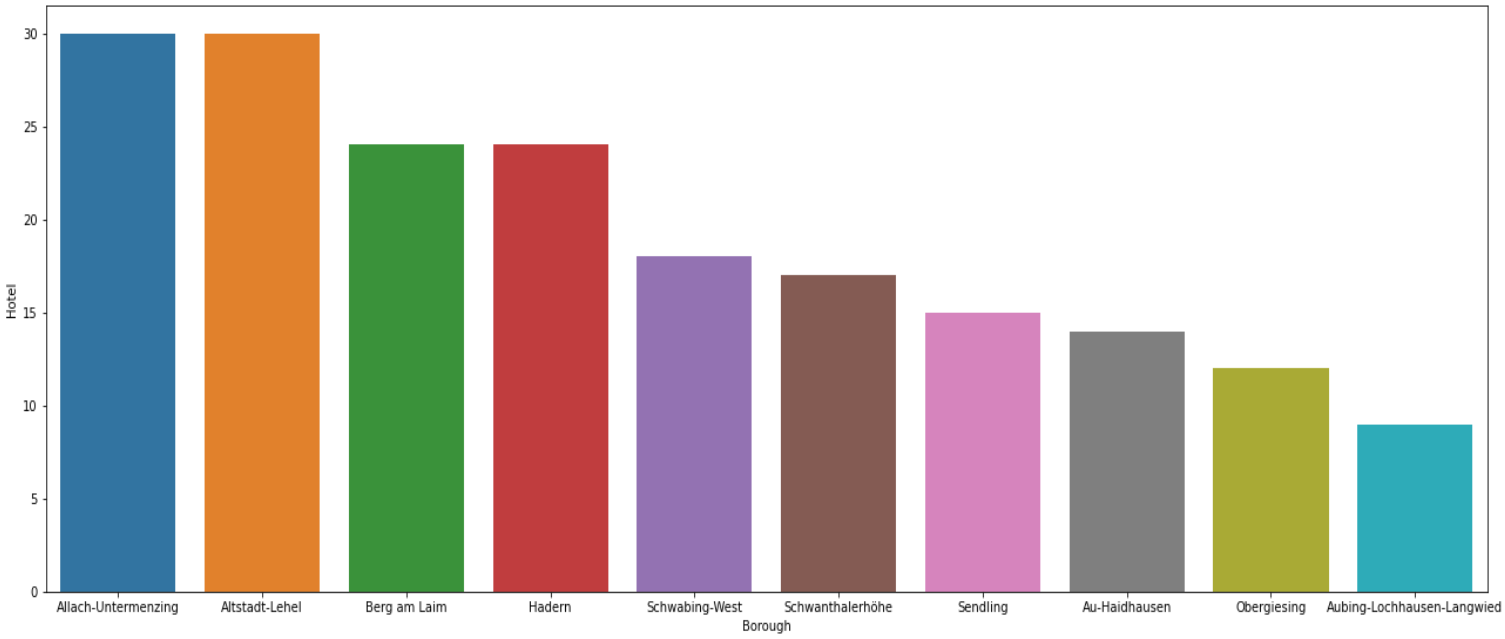
After that, we used the geopy library get the coordinates of the borough. The following is a sample data after retrieving the coordinates:

Borough	Area_Size	Inhabitant_Count	Area_Size_Meter	Latitude	Longitude
Allach-Untermenzing	15.45	27730	15450.0	48.195157	11.462973
Altstadt-Lehel	3.16	18876	3160.0	48.137828	11.574582
Aubing-Lochhausen-Langwied	34.06	37857	34060.0	48.165059	11.400221

In the next step, we used Foursquare API to fetch all the hotel in each borough within a radius of Area_Size_Meter/2. The following is a sample data:

Borough	Borough Latitude	Borough Longitude	Hotel	Hotel Latitude	Hotel Longitude	Hotel Category
Allach-Untermenzing	48.195157	11.462973	Boutique Hotel Amalienburg	48.164081	11.487630	Hotel
Allach-Untermenzing	48.195157	11.462973	Harry's Home Hotels	48.179374	11.505741	Hotel
Allach-Untermenzing	48.195157	11.462973	Westside Hotel	48.201045	11.458564	Hotel

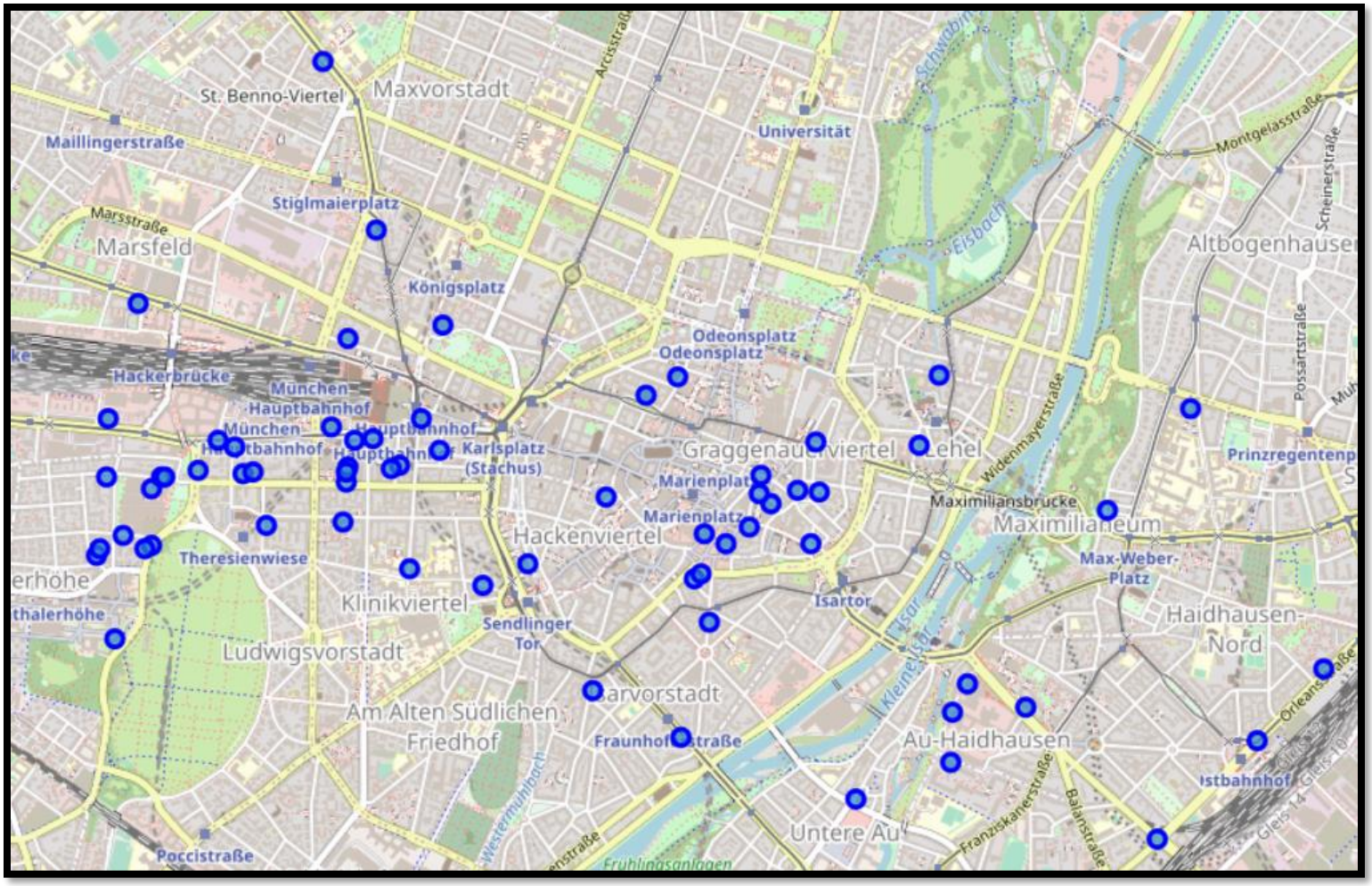
Then, we created a bar plot to show to see what the top 10 boroughs are based on the number of hotels:



We minimized our scope to be on the hotels in the following boroughs due that nature of the area and the closeness to the city center:

- Altstadt-Lehel
- Ludwigsvorstadt-Isarvorstadt
- Au-Haidhausen
- Maxvorstadt
- Schwanthalerhöhe

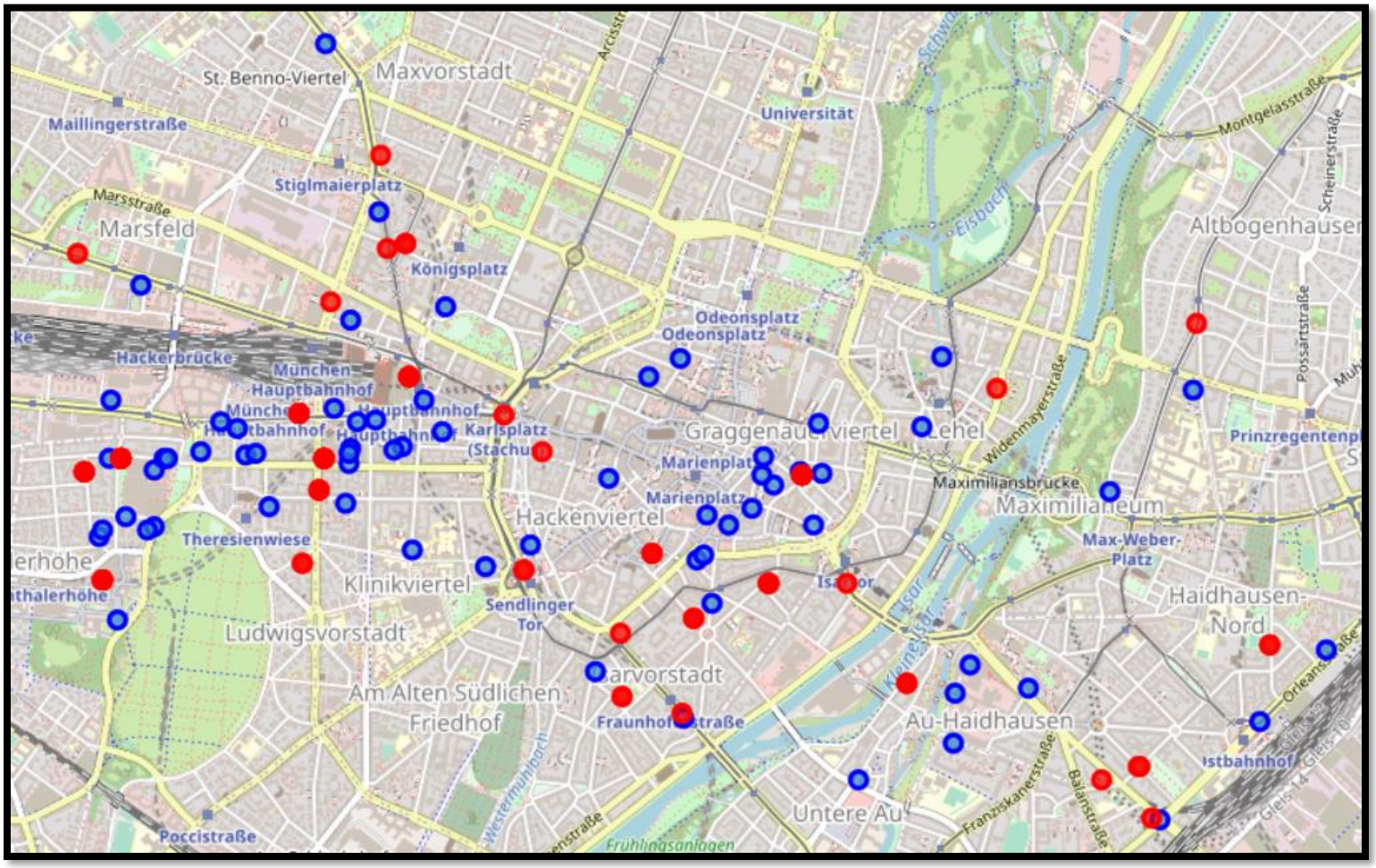
In the following steps, we plotted the hotels on a map to have a look at how the hotels are located within each other's:



Next, we checked each hotel and used Foursquare APIs to find the laundries around them. The following is a sample data:

Hotel	Hotel Latitude	Hotel Longitude	Laundry	Laundry Latitude	Laundry Longitude	Laundry Category
Cortiina Hotel	48.136804	11.579450	Stark Reinigung	48.137173	11.580919	Dry Cleaner
Hotel Vier Jahreszeiten Kempinski	48.138918	11.581775	Stark Reinigung	48.137173	11.580919	Dry Cleaner

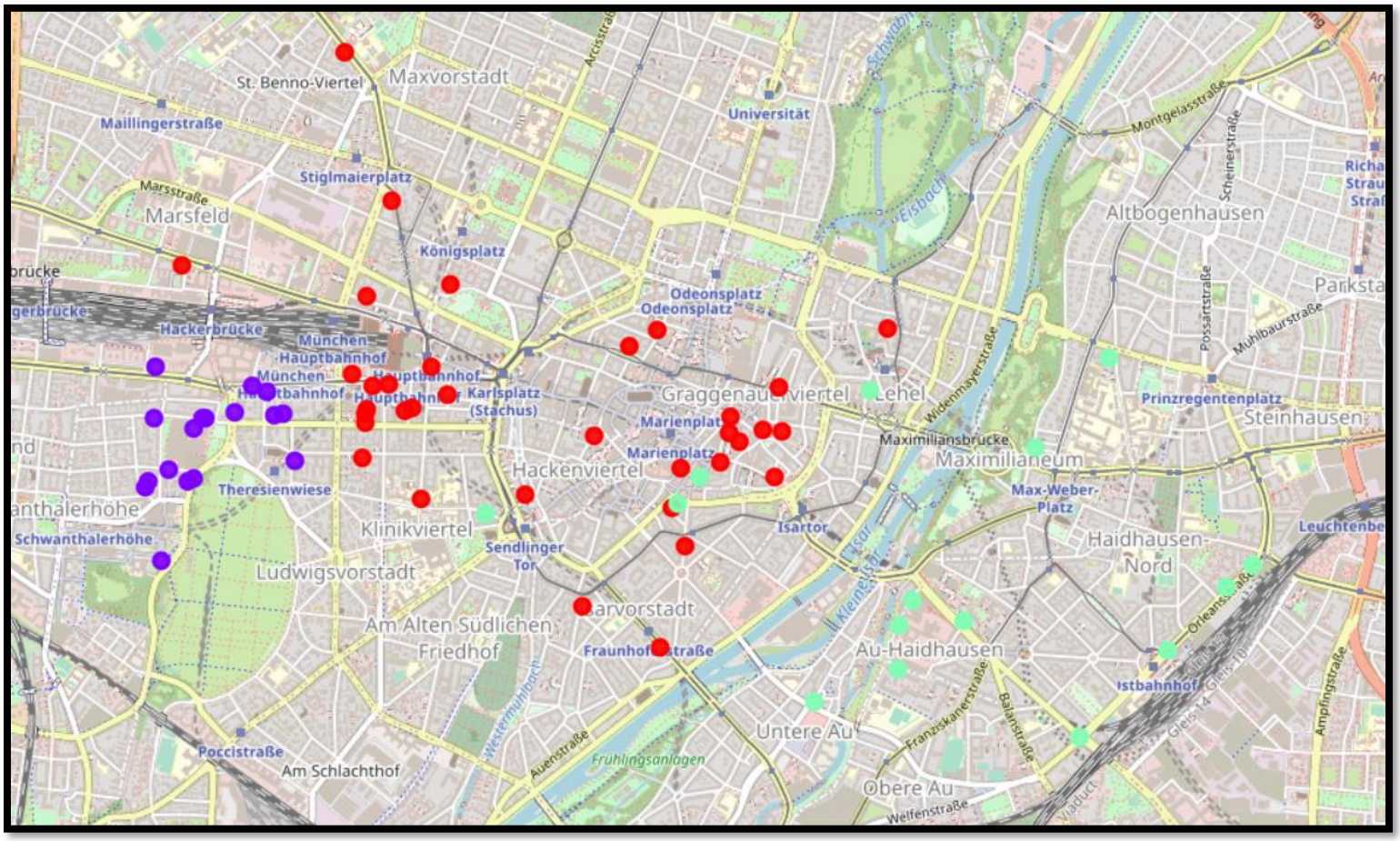
Then we have plotted the laundries around the hotels in the map for a better visualization (Hotels in blues and laundries in red):



Then, we have added the number of hotels next to each hotel and we modified our dataset. The following is a sample data:

Borough	Borough Latitude	Borough Longitude	Hotel	Hotel Latitude	Hotel Longitude	Laundry
Altstadt-Lehel	48.137828	11.574582	Hotel Bayerischer Hof	48.140529	11.572938	0.0
Altstadt-Lehel	48.137828	11.574582	Cortiina Hotel	48.136804	11.579450	1.0

In the next steps, we used KMeans clustering to cluster the hotels based on the given data. We have divided our data into 3 clusters, the following is a map showing the hotels with theirs clusters represented by different colors (cluster 0 in red, cluster1 in purple and cluster 2 in turquoise):



4. Discussion

As we can see from the above analysis, hotels in cluster zero have an average of 1.75 laundries around them. Hotels in cluster 1 have an average of 2.11 laundries around them while hotels in cluster 2 have an average of 1.2 laundries around them.

We can see that almost all the hotels in cluster 1 are in the Schwanthalerhöhe borough. In addition to the higher average of the number of laundries around the hotels, it is not in the central area of the city. Therefore, Schwanthalerhöhe borough will not be recommended to open a laundry or provide a dry-cleaning services in.

Most of the hotel in cluster 1 are in Altstadt-Lehel borough while few of them are in Maxvorstadt borough. Altstadt-Lehel borough are in the central area of the city and around many attractions in Munich. It is attracting a lot of the tourists and it will be a great area to open a laundry around one the hotel knowing that the average number of the laundries around the hotels are 1.75. I believe that more analysis on that area should be done to know the chance of success.

For Hotels in cluster 2, most of the hotels are in Au-Haidhausen borough. It is near the Altstadt-Lehel so we are assuming that people who are looking for cheaper hotels in a considerably good area. It is a good are for opening a laundry knowing that the average number of laundries around the hotels is 1.2. We should look for an area that have multiple hotels near each other to target a greater number of tourists.

5. Conclusion

In this report, we have explained the problem we were trying to solve. Also, we have explained all the steps and the assumption we made during the analysis. After that we have explained how we segmented our data based on the available features.

After the analysis and segmentation, the highest recommended borough to open a laundry in is Altstadt-Lehel due to the high number of hotels and nature of the area which attracts a high number of tourists. The next recommended area will be in Au-Haidhausen borough. It has a fewer number of laundries and it is relatively close to the central area of Altstadt-Lehel.

Few things should be considered upon opening the laundry:

- More analysis should be done in the area where a laundry will be open to decide the right spot.
- Prices should be competitive to the laundries in the same area.
- Provide an express service to attract more customers who are in a hurry.