

# Finding a location for a german/bavarian-style restaurant in Munich

Burkhardt Röper

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## Introduction

In Munich/Germany, bavarian-style restaurants are very popular. Worldwide known is the „Hofbräuhaus“, mostly frequented by tourists. Apart from the Hofbräuhaus there are many other bavarian-style restaurants in the city. The three main characteristics of bavarian-style are the food, the beer served and the interior of the space. Food is mainly based on porc dishes, e.g. the famous „Schweinebraten“ (roast porc). Beer always come from a bavarian brewery, mostly even from a local city brewery. The interior is in a traditional and rustic style.



The Hofbräuhaus in Munich (Left: Outside; Right: Interior)

The aim of this study is to find an appropriate neighborhood for a new bavarian restaurant. Appropriate in this context means: A neighborhood with preferable only a few bavarian restaurants – so that a new one could establish sucessfully. Munich is a growing city. Not long ago the population passed the 1.5 million threshold. It is expected to reach 1.8 million in 10 years, or so. So there should be opportunities for new restaurants of all styles. Munich, as being the capital of bavaria, bavarian style restaurants should be one of the best options.

For this analysis, only population data, neighborhoods and competitors in the vicinity were included. If this is sufficient, will be discussed in the „Conclusion“-Chapter.

# Data description

Different sources of data were used in this study (in parenthesis the source):

1. Available income in the 15 biggest cities in germany (German Statistical Agency)
2. List of munich neighborhoods and their population (citypopulation.de)
3. Population density of munich neighborhoods (Südbayerische Immobilien)
4. Munich restaurants (Foursquare.com)

Data from 1 and 3 was usable without any cleaning, as they were in form of ready to use charts.

Data from 2 needed to be crawled from a website, then cleaned and prepared for further use. This included generating the geolocation data with the help of open street map.

Data from 4 was obtained with the api-service from Foursquare.com

## Methodology

Data analysis of this study was done with the following tools:

- Programming language: Python, on a Jupyter Notebook
- Main Frameworks: Pandas, BeautifulSoup, Numpy, Scikit-Learn, Leaflet, Folium

The comparison of the available income of german cities was done to ensure that Munich is indeed the city in germany with the wealthiest inhabitants. Wealthy inhabitants are most willing to go out for lunch or dinner.

Munich is divided in boroughs and neighborhoods. Apart from the population density – for data on a neighborhood level was not available – neighborhoods were used for the analysis.

Citypopulation.de is a good source, but there is no api-service to get the data. So it had to be crawled from the website. This was done with the BeautifulSoup-Framework.

Some manual corrections and insertions had to be done. After putting the data to a Pandas-Dataframe and cleaning, geolocation-data was obtained from OpenStreetMap.

The results were visualized on a map.

With neighborhood-data ready, a restaurant-search per neighborhood on Foursquare was done. The results was prepared in different ways, e.g. most common restaurants per neighborhood.

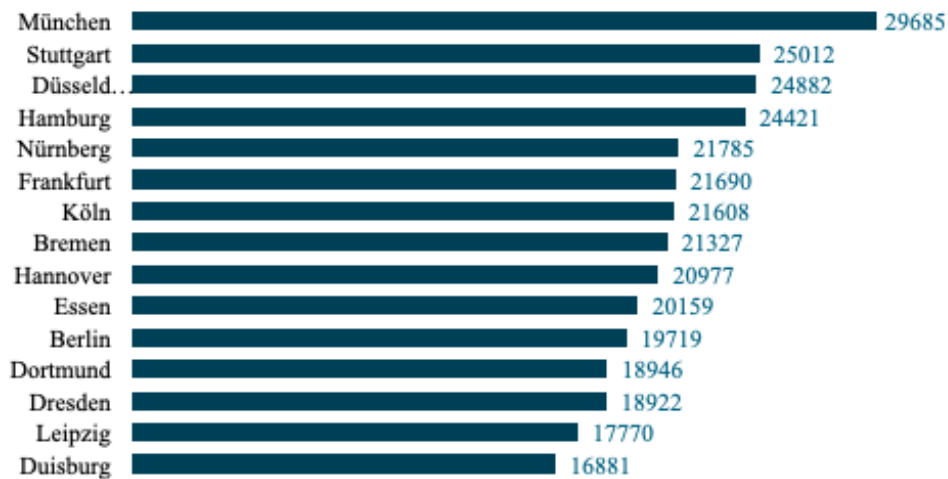
In the last step, a clustering-algorithm was applied (K-Means), to better identify which type of restaurant was the most common. The aim was to search for a cluster, where preferably no german/bavarian restaurant was in. For a better overview, the cluster-data was visualized on a map.

# Results

It is a well known fact, that Munich is the wealthiest city in Germany. Numbers from German Statistical Agency confirmed the assumption.

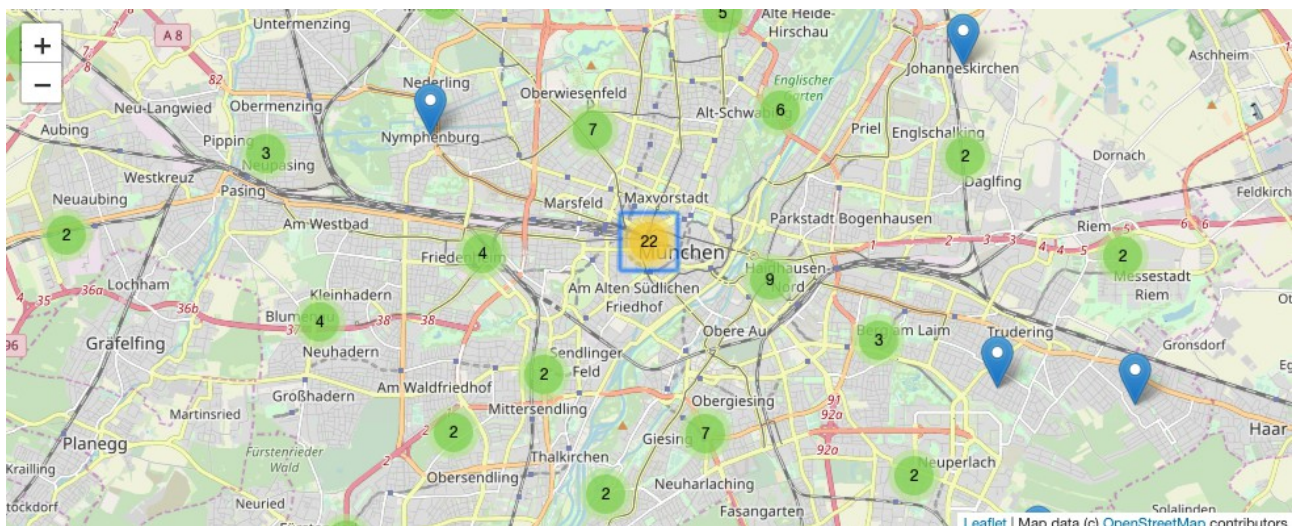
## Available income in the 15 biggest cities, 2016

Available income per resident, in Euro



Source: Statistische Ämter des Bundes und der Länder (Regionaldatenbank)

Munich is divided into 107 neighborhoods. One neighborhood was removed for being irrelevant. Unfortunately the neighborhoods Thalkirchen, Obersendling, Forstenried, Fürstenried and Solln were grouped into one borough at citypopulation.de. This grouping had to be undone manually. The population data for these neighborhoods were researched at Wikipedia as good as possible.



Neighborhoods in Munich (partially clustered by Leaflet)

Geolocation data for the neighborhoods were obtained flawlessly with OpenStreetMap.

	lat	lng	District	Population
0	48.196839	11.476602	Industriebezirk	15.264
1	48.195994	11.457013	Untermenzing-Allach	16.984
2	48.133670	11.571569	Angerviertel	3.663
3	48.147871	11.579682	Englischer Garten Süd	5.022
4	48.139563	11.580182	Graggenau	2.661

The query at Foursquare returned 2407 food locations, that were grouped into 93 unique categories.

```
print(munich_venues.shape)
munich_venues.head()

(2407, 7)

print('There are {} uniques categories.'.format(len(munich_venues['Venue Category'].unique())))

There are 93 uniques categories.
```

A list of neighborhoods and the frequency of the top 5 food locations was generated. A quick look at this list showed, that there are notable differences from neighborhood to neighborhood.

```
----Alte Heide - Hirschau----
                                venue  freq
0                                Café  0.50
1                Turkish Restaurant  0.25
2                                Bakery  0.25
3                Afghan Restaurant  0.00
4    Middle Eastern Restaurant  0.00

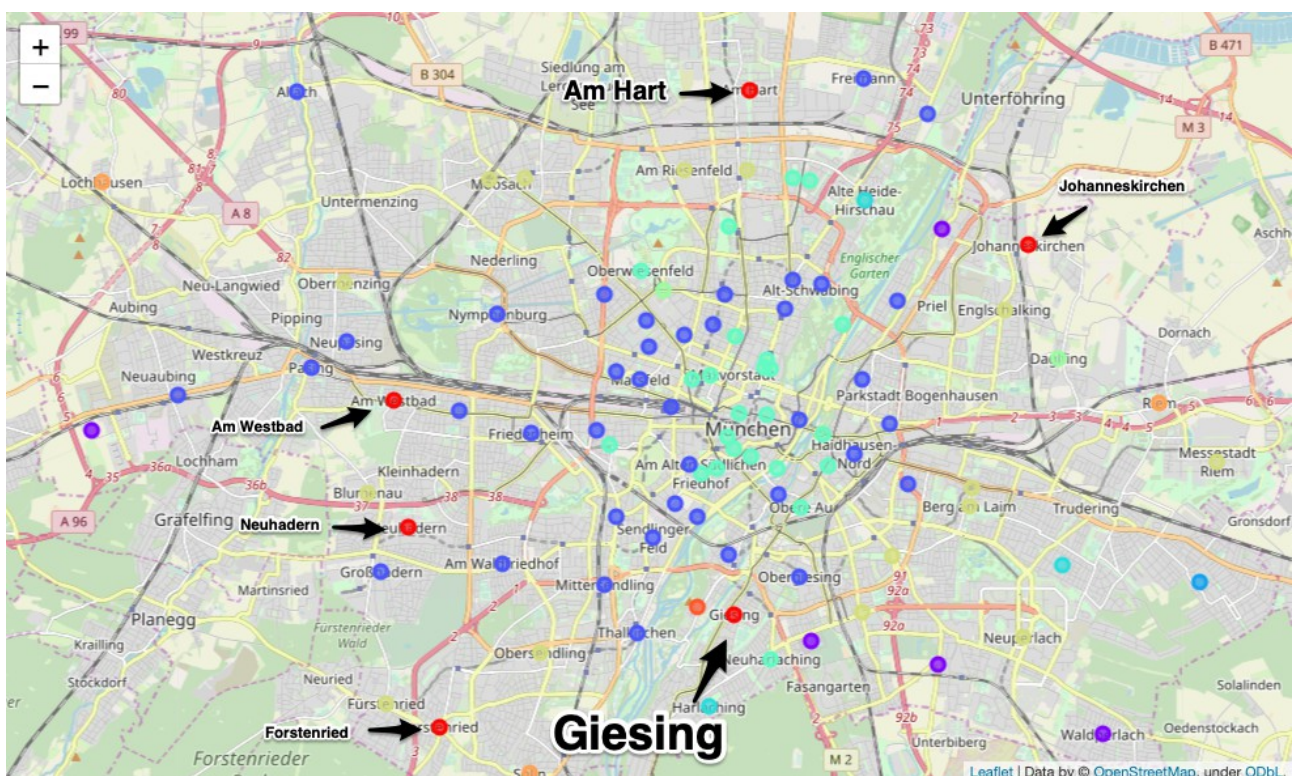
----Alte Kaserne----
                                venue  freq
0                                Bakery  0.15
1    Italian Restaurant  0.08
2                                Café  0.08
3    Fried Chicken Joint  0.08
4        Doner Restaurant  0.08
```



To better oversee the data, a list of the most common food locations („venues“) per neighborhood was generated.

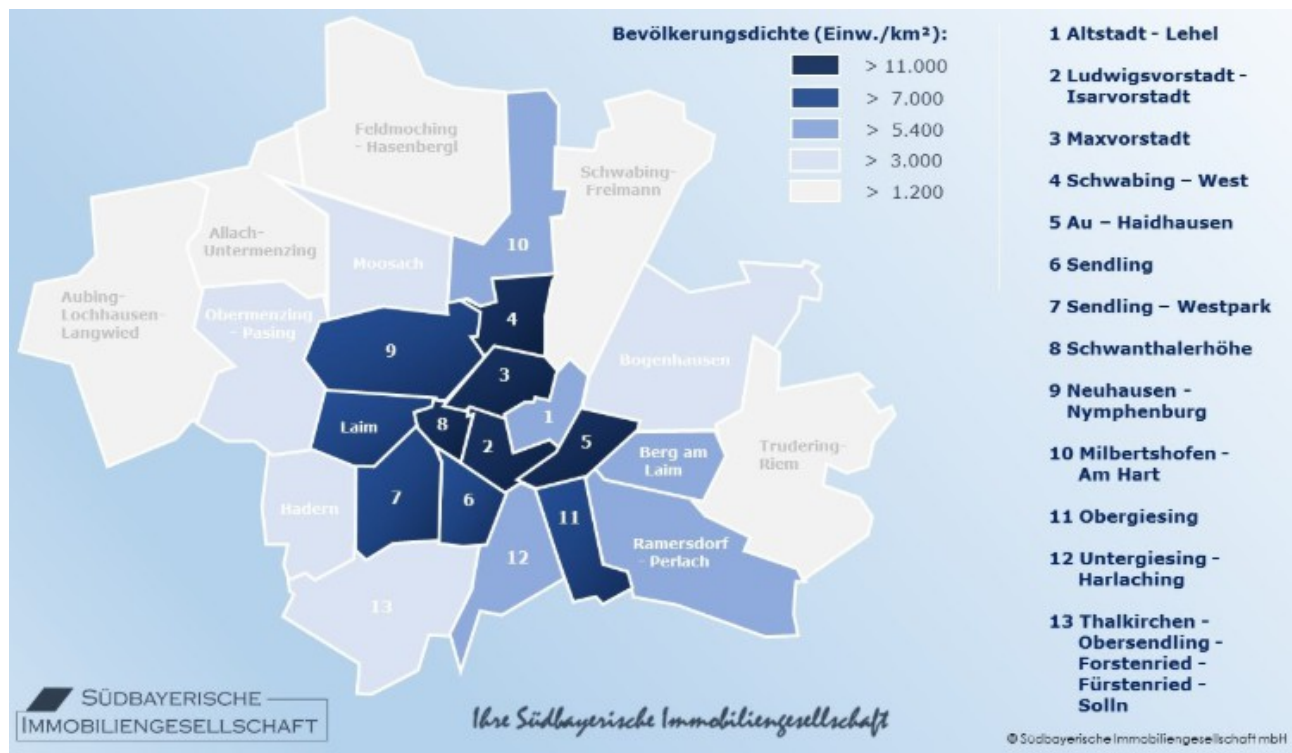
	Neighborhood	1st Most Common Venue	2nd Most Common Venue	3rd Most Common Venue	4th Most Common Venue	5th Most Common Venue	6th Most Common Venue	7th Most Common Venue	8th Most Common Venue	9th Most Common Venue	10th Most Common Venue
0	Alt Moosach	Bakery	Fast Food Restaurant	Burrito Place	German Restaurant	Trattoria/Osteria	Asian Restaurant	Pizza Place	Italian Restaurant	Food	Dim Sum Restaurant
1	Altbogenhausen	Italian Restaurant	Vietnamese Restaurant	Indian Restaurant	Japanese Restaurant	Bakery	Restaurant	Café	Xinjiang Restaurant	English Restaurant	Dim Sum Restaurant
2	Alte Heide - Hirschau	Café	Turkish Restaurant	Bakery	Xinjiang Restaurant	Ethiopian Restaurant	Deli / Bodega	Dim Sum Restaurant	Diner	Doner Restaurant	Donut Shop
3	Alte Kaserne	Bakery	Greek Restaurant	Fried Chicken Joint	Café	Middle Eastern Restaurant	Doner Restaurant	Italian Restaurant	Restaurant	Asian Restaurant	Indian Restaurant
4	Altperlach	German Restaurant	Pakistani Restaurant	Xinjiang Restaurant	Ethiopian Restaurant	Deli / Bodega	Dim Sum Restaurant	Diner	Doner Restaurant	Donut Shop	Dumpling Restaurant

Clustering resulted in 10 clusters, where cluster 0 was the most interesting. It had restaurants as first most common venue, but no German/Bavarian restaurant. No German/Bavarian restaurants as most common was also the case with cluster 3, 4, 5, 7 and 9. But these ones were somehow atypical, as the first most common values were mostly food locations, but not restaurants – e.g. bakery, cafe, etc. As expected, in the city-center there are Bavarian restaurants everywhere (blue points in the middle).



Clusters generated with K-Means: Red points are cluster 0

A comparison with the population and the population density showed, that from the list of neighborhoods at cluster 0, „Giesing“ is the one the biggest population and population density (in the chart below „Giesing“ is divided in „Obergiesing“ and „Untergiesing“).



Population density in Munich

Next on this ranking is „Am Hart“. Neuahadern has nearly as many inhabitants as „Am Hart“, but the population density is significantly lower.

## Discussion

Considering the available income, city population growth, tourism (among other factors), the opportunity for a new restaurant in general, a bavarian style in detail, seems to be a good option in Munich.

Obviously there are already bavarian restaurants in Munich. But the analysis here showed, that the density differs from neighborhood to neighborhood. Most of Munich is well provided with this kind of food location – especially in the city center.

But there are indeed 6 neighborhoods, where bavarian restaurants are not that common. Five from these six are in the outskirts of Munich. The one left, „Giesing“, is in between outskirts and city center – maybe an little advantage over the others. Apart from that, Giesing has a significantly higher population than the others, also the population density is higher.

Taking into account these observations, Giesing seems to be the best neighborhood for a new bavarian restaurant in Munich.

# Conclusion

So, is it really a good idea to open a bavarian restaurant in the neighborhood „Giesing“ in Munich? This analysis showed „Giesing“ as the best option – when regarding data like population, population density and other restaurants in the vicinity.

The question is, if these data is sufficient to make a decision. One of the biggest problem in Munich is the lack of available real estate. So, even if one choose „Giesing“ as the preferred neighborhood, the intent could be totally thwarted by the fact, that there is no location available. Even if so, rental prices are kind of exorbitant in Munich.

Maybe the second option, „Am Hart“, is a better option, assuming rental prices in the outskirts are lower.

Taking all this scores into account, one can conclude, that population data and competitors in the vicinity may not be sufficient for the final decision. A second analysis, including more data, would lead to a more precise result.