# DATA ANALYSIS REPORT

Venues of Freiburg im Breisgau

# INTRODUCTION

- I am working for an investment company and we would like to invest in the construction of a new hotel in Freiburg (Germany). At the moment we have no idea in which neighborhood we would like to build the hotel. The most important thing is that the hotel generates the highest possible profit. This means that it should be built in a district where the maximum demand for a hotel exists. It is assumed that the maximum demand for a hotel will be in the neighborhood where there are currently the fewest hotels. So the Question is:

**In which neighborhood in Freiburg should we build a Hotel to make the most profit?**

- To answer this question I web-scraped the names and coordinates of the different neighborhoods in Freiburg from Wikipedia. Then I made a query to "Four-square" in a radius of two kilometers to get all venues in the core of the different neighborhoods. I then grouped these venues into categories and sorted them by the percentage of all venues. At the end I could see in which districts the percentage of hotels is the highest and lowest and then make a recommendation.

# DATASET

- The **first** dataset will consist of the following variables:

  Neighborhood Name

  Neighborhood Latitude

  Neighborhood Longitude

- I web-scraped this Data to an excel file from: https://de.wikipedia.org/wiki/Stadtbezirke_von_Freiburg_im_Breisgau

# DATASET

- The **second** dataset will consist of the following variables:

  Venue Name

  Venue Category

  Venue Latitude

  Venue Longitude

- I did get this data by making an API-Request from “Foursquare” for a distance of 2000m far from the center of each neighborhood

# DATASET

- The **third** dataset will consist of the following variables:

  Neighborhood Name

  Venue Name

  Frequence

- I calculated the Frequence of the different categories from the dummy-dataset

# DATASET

- The **fourth** dataset will consist of the following variables:

  Neighborhood Name

  1st Most Common Venue

  2nd Most Common Venue

  3rd Most Common Venue

  …

- I merged the first and second dataset and made some modifications like grouping.

# METHODOLOGY

- First of all I created a map of Freiburg with Folium. I used the dataframe with the name, longitudes and latitudes of the different neighborhoods. I set them as markers in the map and checked if they are really in the center of the neighborhoods or if I made any mistakes getting the data.
- Next I made an API query to Foursquare to get the venues from the neighborhood "Altstadt". Using the output I could check if the venues are realistic. Then I did the API query for all neighborhoods.
- To get an overview of the venues I did a size check and a count command. This allowed me to explore how many venues and categories were queried by the API query. I checked the data for each neighborhood and if there were any abnormalities in the data.
- Since I was mainly interested in the number of hotels in each neighborhood the data was converted into dummy variables by category. Afterwards I looked at the average values for each category and each neighborhood. This gave me the percentage of hotels in each neighborhood.
- Finally, I made the data more manageable by dividing all the venues per neighborhood into the categories most common and inserting the 10 most venues into a dataframe. This step was taken out of pure interest and contains no further data to answer the question.

# RESULTS

- The results show the percentage of the ten most common venues in a neighborhood. In the following table, the percentage share of hotels was marked turquoise so that they can be identified and evaluated at a glance. Consequently, I have also created a bar chart to show the difference of the hotel shares.

# RESULTS

| Altstadt (100) | | Betzenhausen (100) | | Brühl (38) | | Ebnet (29) | |
|---|---|---|---|---|---|---|---|
| venue | % | venue | % | venue | % | venue | % |
| Café | 0.14 | Café | 0.13 | Hotel | 0.13 | Hotel | 0.17 |
| Hotel | 0.09 | Hotel | 0.11 | Supermarket | 0.08 | German Restaurant | 0.14 |
| German Restaurant | 0.06 | Supermarket | 0.05 | Big Box Store | 0.08 | Tram Station | 0.10 |
| Plaza | 0.06 | Restaurant | 0.03 | Furniture/Home Store | 0.08 | Supermarket | 0.07 |
| Restaurant | 0.03 | Italian Restaurant | 0.03 | German Restaurant | 0.08 | Bakery | 0.07 |
| Bar | 0.03 | Bar | 0.03 | Fast Food Restaurant | 0.05 | Campground | 0.07 |
| Italian Restaurant | 0.03 | German Restaurant | 0.03 | Tram Station | 0.05 | Sports Club | 0.03 |
| Indian Restaurant | 0.02 | Ice Cream Shop | 0.03 | Drugstore | 0.05 | Golf Course | 0.03 |
| Ice Shop | 0.02 | Furniture/Home Store | 0.03 | Bowling Alley | 0.03 | Gym | 0.03 |
| Mediterranean Restaurant | 0.02 | Plaza | 0.03 | Restaurant | 0.03 | Drugstore | 0.03 |

# RESULTS

| Günterstal (47) | | Haslach (100) | | Herdern (100) | | Hochdorf (8) | |
|---|---|---|---|---|---|---|---|
| venue | % | venue | % | venue | % | venue | % |
| German Restaurant | 0.21 | Café | 0.14 | Café | 0.13 | Gym | 0.12 |
| Supermarket | 0.09 | Hotel | 0.07 | Hotel | 0.09 | Lake | 0.12 |
| Bakery | 0.06 | Plaza | 0.06 | German Restaurant | 0.08 | Intersection | 0.12 |
| Hotel | 0.06 | German Restaurant | 0.05 | Plaza | 0.06 | German Restaurant | 0.12 |
| Drugstore | 0.06 | Italian Restaurant | 0.04 | Restaurant | 0.03 | Café | 0.12 |
| Middle | 0.04 | Park | 0.03 | Italian Restaurant | 0.03 | Liquor Store | 0.12 |
| Café | 0.04 | Tapas Restaurant | 0.03 | Indian Restaurant | 0.02 | Rest Area | 0.12 |
| Farm | 0.02 | Restaurant | 0.03 | Ice Cream Shop | 0.02 | Train Station | 0.12 |
| Spanish Restaurant | 0.02 | Ice Cream Shop | 0.02 | Middle Eastern Restaurant | 0.02 | Japanese Restaurant | 0.00 |
| Coffee Shop | 0.02 | Mediterranean Restaurant | 0.02 | Falafel | 0.02 | Italian Restaurant | 0.00 |

# RESULTS

| Kappel (15) | | Landwasser (47) | | Lehen (52) | | Littenweiler (34) | |
|---|---|---|---|---|---|---|---|
| venue | % | venue | % | venue | % | venue | % |
| German Restaurant | 0.20 | Hotel | 0.15 | Hotel | 0.12 | German Restaurant | 0.15 |
| Bakery | 0.13 | Supermarket | 0.09 | Supermarket | 0.10 | Hotel | 0.15 |
| Soccer Field | 0.07 | Furniture/Home Store | 0.06 | Tram Station | 0.08 | Tram Station | 0.09 |
| Café | 0.07 | Fast Food Restausrant | 0.04 | Furniture | 0.06 | Campground | 0.06 |
| Supermarket | 0.07 | Beer Garden | 0.04 | Café | 0.04 | Café | 0.06 |
| Pool | 0.07 | Restaurant | 0.04 | Beer Garden | 0.04 | Supermarket | 0.06 |
| Tram Station | 0.07 | Train Station | 0.04 | Train Station | 0.04 | Bakery | 0.06 |
| Italian Restaurant | 0.07 | Park | 0.04 | Gym/Fitness Center | 0.04 | Gym/Fitness Center | 0.03 |
| Hotel | 0.07 | Café | 0.04 | Restaurant | 0.04 | Drugstore | 0.03 |
| Soccer Stadium | 0.07 | Zoo | 0.02 | Park | 0.04 | Sports Club | 0.03 |

# RESULTS

| Mooswald (100) | | Mundenhof (19) | | Munzingen (11) | | Neuburg (100) | |
|---|---|---|---|---|---|---|---|
| venue | % | venue | % | venue | % | venue | % |
| Café | 0.16 | Hotel | 0.21 | Hotel | 0.36 | Café | 0.14 |
| Hotel | 0.10 | Supermarket | 0.16 | Fast Food Restaurant | 0.18 | Hotel | 0.08 |
| German Restaurant | 0.05 | Café | 0.11 | Gas Station | 0.18 | German Restaurant | 0.08 |
| Plaza | 0.04 | Beer Garden | 0.11 | Coffee Shop | 0.09 | Plaza | 0.06 |
| Bar | 0.03 | Asian Restaurant | 0.05 | German Restaurant | 0.09 | Restaurant | 0.03 |
| Park | 0.03 | Train Station | 0.05 | Intersection | 0.09 | Italian Restaurant | 0.03 |
| Supermarket | 0.03 | Snack Place | 0.05 | Lake | 0.00 | Indian Restaurant | 0.02 |
| Italian Restaurant | 0.03 | Restaurant | 0.05 | Kebab Restaurant | 0.00 | Ice Cream Shop | 0.02 |
| Indian Restaurant | 0.02 | Park | 0.05 | Pub | 0.00 | Middle Eastern Restaurant | 0.02 |
| Deli/Bodega | 0.02 | Liquor Store | 0.05 | Pool | 0.00 | Falafel Restaurant | 0.02 |

# RESULTS

| Oberau (100) | | Opfingen (5) | | Rieselfeld (27) | | St. Georgen (28) | |
|---|---|---|---|---|---|---|---|
| venue | % | venue | % | venue | % | venue | % |
| Café | 0.15 | Restaurant | 0.20 | Hotel | 0.22 | Hotel | 0.18 |
| German Restaurant | 0.09 | Hotel | 0.20 | Supermarket | 0.11 | Supermarket | 0.11 |
| Hotel | 0.07 | Lake | 0.20 | Italian Restaurant | 0.07 | Bakery | 0.11 |
| Plaza | 0.06 | Gas Station | 0.20 | Gym/Fitness Center | 0.07 | Italian Restaurant | 0.07 |
| Restaurant | 0.03 | German Restaurant | 0.20 | Park | 0.07 | Gym/Fitness Center | 0.07 |
| Bar | 0.03 | Miscellaneous Shop | 0.00 | Zoo | 0.04 | German Restaurant | 0.07 |
| Italian Restaurant | 0.03 | Pool | 0.00 | Intersection | 0.04 | Kebab Restaurant | 0.04 |
| Ice Cream Shop | 0.02 | Plaza | 0.00 | Bakery | 0.04 | Liquor Store | 0.04 |
| Middle Eastern Restaurant | 0.02 | Pizza Place | 0.00 | Ice Cream Shop | 0.04 | Mediterranean Restaurant | 0.04 |
| Falafel Restaurant | 0.02 | Park | 0.00 | Hot Spring | 0.04 | Hot Spring | 0.04 |

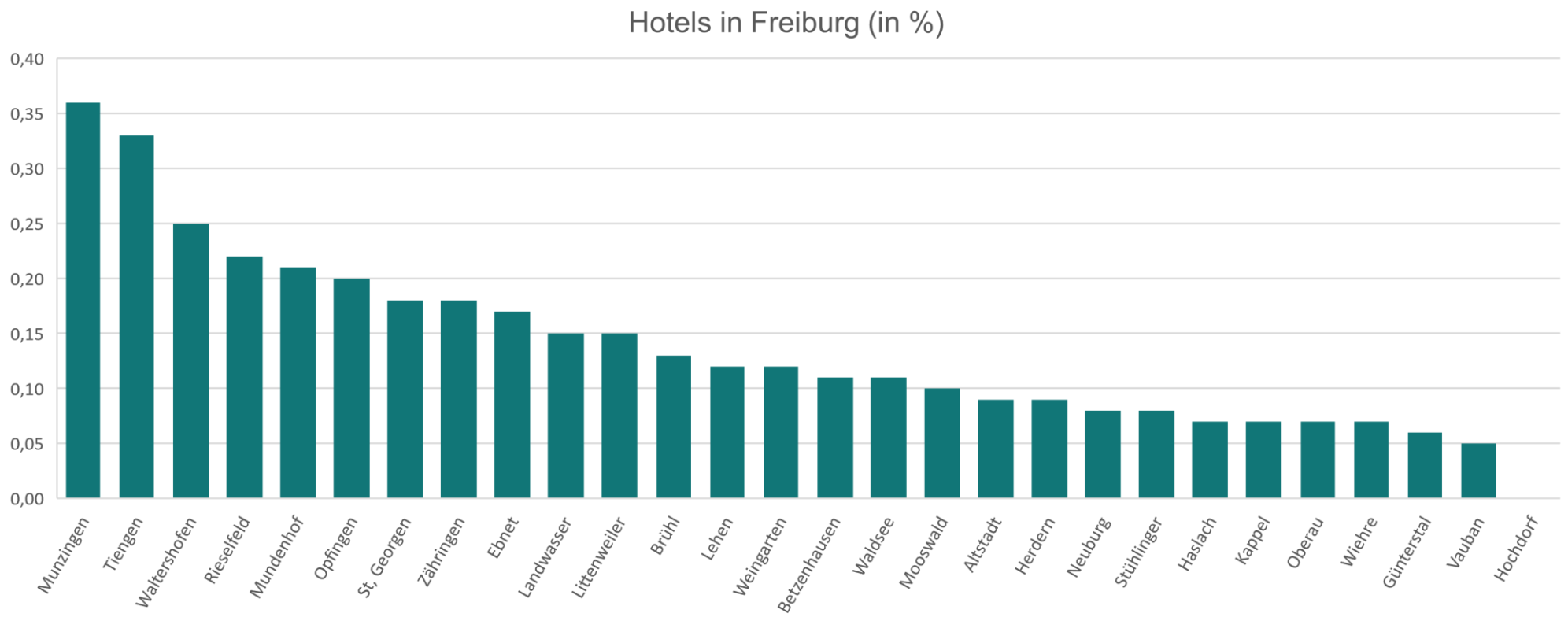
# RESULTS

| Stühlinger (100) | | Tiengen (9) | | Vauban (99) | | Waldsee (64) | |
|---|---|---|---|---|---|---|---|
| venue | % | venue | % | venue | % | venue | % |
| Café | 0.14 | Hotel | 0.33 | Café | 0.15 | Hotel | 0.11 |
| Hotel | 0.08 | Fast Food Restaurant | 0.22 | German Restaurant | 0.09 | German Restaurant | 0.09 |
| German Restaurant | 0.06 | Gas Staion | 0.11 | Hotel | 0.05 | Plaza | 0.08 |
| Plaza | 0.06 | Coffee Shop | 0.11 | Italian Restaurant | 0.04 | Café | 0.06 |
| Italian Restaurant | 0.04 | German Restaurant | 0.11 | Plaza | 0.04 | Bakery | 0.03 |
| Restaurant | 0.03 | Restaurant | 0.11 | Drugstore | 0.03 | Restaurant | 0.03 |
| Indian Restaurant | 0.02 | Lake | 0.00 | Supermarket | 0.03 | Beer Garden | 0.03 |
| Ice Cream Shop | 0.02 | Kebab Restaurant | 0.00 | Tapas Restaurant | 0.03 | Wine Bar | 0.03 |
| Middle Eastern Restaurant | 0.02 | Pub | 0.00 | Bakery | 0.03 | Brewery | 0.03 |
| Falafel Restaurant | 0.02 | Pool | 0.00 | Bar | 0.03 | Historic Site | 0.03 |

# RESULTS

| Waltershofen (4) | | Weingarten (100) | | Wiehre (100) | | Zähringen (40) | |
|---|---|---|---|---|---|---|---|
| venue | % | venue | % | venue | % | venue | % |
| Insurance Office | 0.25 | Café | 0.15 | Café | 0.14 | Hotel | 0.18 |
| Hotel | 0.25 | Hotel | 0.12 | German Restaurant | 0.08 | German Restaurant | 0.08 |
| Lake | 0.25 | Supermarket | 0.06 | Hotel | 0.07 | Furniture/Home Store | 0.08 |
| German Restaurant | 0.25 | German Restaurant | 0.05 | Plaza | 0.06 | Big Box Store | 0.08 |
| Middle Eastern Restaurant | 0.00 | Italian Restaurant | 0.04 | Italian Restaurant | 0.04 | Café | 0.05 |
| Pool | 0.00 | Bar | 0.03 | Restaurant | 0.03 | Supermarket | 0.05 |
| Plaza | 0.00 | Tapas Restaurant | 0.03 | Bar | 0.03 | Fast Food Restaurant | 0.05 |
| Pizza Place | 0.00 | Drugstore | 0.03 | Indian Restaurant | 0.02 | Tram Station | 0.05 |
| Park | 0.00 | Gym/Fitness Center | 0.03 | Ice Cream Shop | 0.02 | Train Station | 0.02 |
| Mountain | 0.00 | Indian Restaurant | 0.02 | Mediterranean Restaurant | 0.02 | Toy/Game Store | 0.02 |

# RESULTS


Hotels in Freiburg (in %)
0,40
0,35
0,30
0,25
0,20
0,15
0,10
0,05
0,00
Munzingen
Tiengen
Waltershofen
Rieselfeld
Mundenhof
Opfingen
St, Georgen
Zähringen
Ebnet
Landwasser
Littenweiler
Brühl
Lehen
Weingarten
Betzenhausen
Waldsee
Mooswald
Altstadt
Herdern
Neuburg
Stühlinger
Haslach
Kappel
Oberau
Wiehre
Günterstal
Vauban
Hochdorf

# DISCUSSION AND CONCLUSION

- Based on the data, the most sensible thing would be to build a hotel in the “Hoch-dorf” district, since according to the data, there is not a single hotel within a radius of two kilometers. On the contrary, it would be best to avoid building a hotel in “Munzingen”, where 36% of hotels are located.
- The result can only be interpreted under strong limitations, as only the percentage of hotels in all venues of a district is an insufficient indicator. On the one hand only eight venues were found in “Hochdorf”. This could indicate that the Foursquare da-tabase is incomplete or that Foursquare in Germany or especially in rural areas like “Hochdorf” is not reliable enough. After some research I found out that there are ho-tels in “Hochdorf” but they are not listed in Foursquare.
- There are of course several other factors that are important. For example the number of inhabitants of the city districts, the proximity to the city centre or interesting nature areas, the popularity of the city district for tourists etc.
- In retrospect, I realized that it is not really useful to calculate the percentage of hotels in all venues. It would make more sense to include all hotels in each city district and then calculate a ratio with the number of inhabitants.