



# Where should I live in Zurich?

## Project Report

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## Abstract

This data science project is submitted in partial fulfillment for the IBM Data Science Professional Certificate. The goal of this project is to identify the five most attractive urban living areas for young people in Zurich. To do so, publicly available census data on neighbourhood level was combined with Foursquare data to run a machine learning clustering algorithm that identified the most attractive neighbourhoods. My findings suggest that young people who want to live in an urban neighbourhood in Zurich should find an apartment in (1) Höngg, (2) Seebach, (3) Wipkingen, (4) Hard or (5) Oerlikon.

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## 1. Introduction

This Section discusses the problem, the background and the relevance for specific target audience groups.

### 1.1 Background

Zurich is the largest Swiss city and Switzerland's financial and economic capital. The city is located at the northwestern tip of Lake Zurich and as of January 2020, the municipality had 434'335 inhabitants. The consulting firm Mercer has ranked Zurich as the city with the highest living standard for several subsequent years (Mercer, 2007; Mercer, 2008). According to Mercer, Zurich has particularly high scores in the categories work, housing, leisure, education and safety.

Despite the high overall living standard, there are differences between the 34 neighbourhoods in Zurich. In urban downtown neighbourhoods you will usually find many bars and restaurants, whereas neighbourhoods in the outskirts of Zurich have less to offer. On the other hand, are they downtown neighbourhoods often noisier and more busy than neighbourhoods in the outskirts. Hence, there is somehow a tradeoff between enjoying the benefits of living downtown and enjoying the silence of outskirt neighbourhoods.

### 1.2. Problem Definition

This project aims to rank the top 5 urban neighbourhoods for young people in Zurich. In order to achieve this goal, three questions have to be asked:

- Which data determines the attractiveness of a neighbourhood for young people?
- What are Zurich's urban neighbourhoods? What are Zurich's outskirts?
- Which of the urban neighbourhoods is most attractive for living?

### 1.3. Targeted Audience

The results of this project might be relevant for people who intent to move to Zurich (e.g. experts, exchange students) or people who want to spend some holidays in Zurich. The results of this project might provide a starting point for finding an apartment in an attractive neighbourhood. This contribution is valuable insofar as moving to another city is often difficult because people lack knowledge about the quality of different neighbourhoods.

## 2. Data

This Section describes the datasets that were included for this project. Three datasources will be incorporated for this project:

- **Zurich Neighbourhoods Geo Location:** As not structured list with Geo Location data for Zurich's neighbourhoods was found, data was gathered for each of the 34 neighbourhoods via GeoHack and stored in an Excel spreadsheet. This dataset included the variables: `_district`, `quarter`, `latitude_` and `_longitude_`. (Source: <https://tools.wmflabs.org/geohack/>)
- **Census Data on Neighbourhood Level:** The statistical office of Zurich provides detailed statistics for each neighbourhood. This data was downloaded and matched with the Zurich Neighbourhoods Geo Locations (see above). By that the additional data on the population and commercial density in each neighbourhood was obtained. (Source: <https://www.stadt-zuerich.ch/prd/de/index/statistik/kreise-quartiere.html>)
- **Foursquare Venue Data:** This data was used to cluster Zurich's neighbourhoods based on venue characteristics and a k-nearest algorithm.



### 3. Methodology

All procedural details of this project are explained step-by-step in the corresponding Python Notebook (see: <https://github.com/gianfink/ds-clapstone>). However, the fundamental idea of this project is to combine Zurich census data with Foursquare Venue data to find the most attractive neighbourhoods in Zurich.

In a first step, census data on population and work were collected from various sources and stored in a csv file on neighbourhood level. Based on this information the workplace-population-ratio was computed. This ratio tells us for each neighbourhood, how many workplaces are available per inhabitants and area of the neighbourhood. This allows to identify which neighbourhoods are mainly for living and which neighbourhoods are mainly for work. A high workplace-population ratio indicates a work neighbourhood and a low ratio indicates a living neighbourhood.

In a second step, Foursquare venue data was used to cluster Zurich's neighbourhoods based on a k-mean clustering algorithm. Thus, similar neighbourhoods were grouped into clusters based on their similarity.

In a third step, a qualitative analyses of the five most common venues in each neighbourhood was used to reveal what type of venues (e.g. restaurants, bars, hotels, etc.) are most common in a given neighbourhood. This step allowed to assign each neighbourhood to one of three types (i.e. Urban Outskirt, Urban Downtown and Outskirt).

Finally, in each cluster the neighbourhoods with the lowest workplace-population-ratios were chosen to be the most attractive neighbourhoods for different types of people.

### 4. Results

#### 4.1 Segmentation Results

The segmentation of Zurich's neighbourhoods based on Foursquare venues resulted in the five neighbourhood clusters illustrated in Figure 1. As one can see the clusters fall into two main categories. The red cluster includes urban neighbourhoods. These were characterized by that fact that most common venues in this neighbourhood are restaurants, bars and supermarkets. The other clusters (blue, green, purple and orange) represent Zurich's outskirts. When studying the most frequent venues in these clusters one will realize that more bus stations, tram stations and smaller grocery stores are included. Table 1 displays population density, workplace density and workplace-population-ratio for each of Zurich's neighbourhoods ordered by cluster. Assuming that young people want to live in urban areas with many bars and leisure activities which are not business districts, it is possible to depict the most attractive

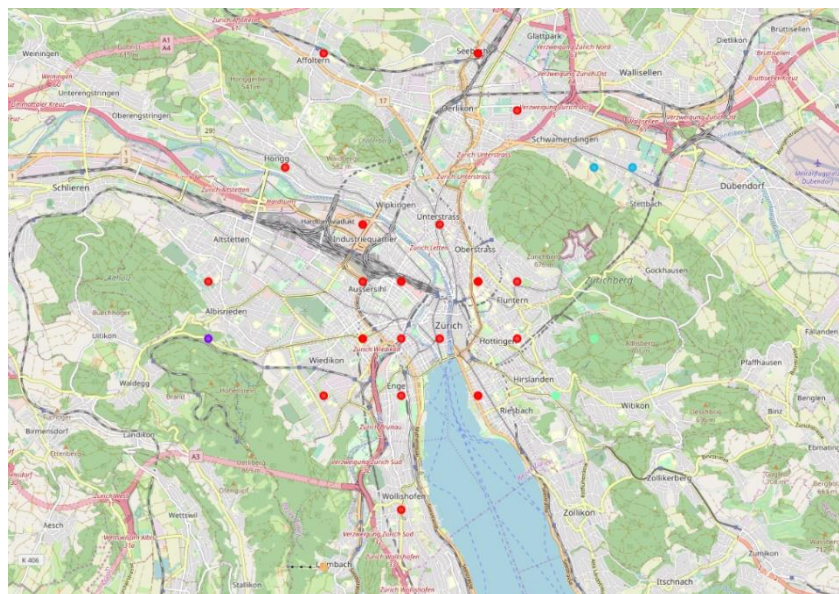


Figure 1: Neighbourhood Clusters in Zurich.

Cluster	Neighbourhood (Quarter)	Workplace Density	Population Density	Workplace-Population-Ratio
Cluster 1 (red) Urban Neighbourhoods	Saatlen	209	7824	0.03
	Affoltern	151	4422	0.03
	Friesenberg	79	2157	0.04
	Höngg	161	3490	0.05
	Seebach	329	5467	0.06
	Wollishofen	203	3343	0.06
	Wipkingen	547	7808	0.07
	Hard	658	8945	0.07
	Oerlikon	696	8722	0.08
	Altstetten	357	4590	0.08
	Sihlfeld	1201	13501	0.09
	Unterstrass	880	9744	0.09
	Fluntern	318	3042	0.10
	Alt-Wiedikon	1088	9662	0.11
	Oberstrass	442	4100	0.11
	Hottingen	358	2255	0.16
	Langstrasse	2050	10489	0.20
	Gewerbeschule	2710	13099	0.21
	Escher Wyss	1220	4872	0.25
	Werd	3668	14371	0.26
	Enge	1082	4024	0.27
	Mühlebach	2697	10043	0.27
	Seefeld	670	2171	0.31
	Rathaus	4179	8703	0.48
	Hochschulen	1311	1211	1.08
	Lindenhof	5191	4387	1.18
Cluster 2 (purple) Outskirt West	Albisrieden	240	4859	0.05
Cluster 3 (blue) Outskirt North-East	Hirzenbach	121	5011	0.02
	Schwamedingen-Mitte	230	5050	0.05
Cluster 4 (green) Outskirt South-East	Witikon	105	2242	0.05
	Hirlanden	344	3410	0.10
	Weinegg	452	3148	0.14
	City	3006	1245	2.41
Cluster 5 (orange) Outskirt South	Leimbach	73	2107	0.03

Table 1: Neighbourhood Clusters in Zurich.

neighbourhoods for young people based on the workplace-population-ratio. Based on this assumption, the neighbourhoods Saatlen, Affoltern, Friesenberg, Höngg and Seebach are the most attractive neighbourhoods for young people as they provide the benefits of urban areas (e.g. many bars, restaurants, parks, etc.), but have only few businesses running.

For families which might prefer to live in outskirts, the neighbourhoods Leimbach, Albisrieden, Hirzenbach, Schwamedingen-Mitte, Witikon, Hirlanden, and Winegg might be more interesting as they provide more green spaces and have a lower population density compared to urban neighbourhoods.

## 4.2 Limitations

The current analyses have several limitations. First, it should be considered that not all relevant aspects for choosing a neighbourhood were incorporated. For instance, rental prices or the availability of schools was not included in this analyses. Second, for this analysis five clustering segments were identified. The analyses was also performed with other values of  $k$  (i.e.  $k=3$ ,  $k=4$ ,  $k=5$ ,  $k=6$ ,  $k=7$ ). With  $k$  values below five it seemed that not sufficient cluster splitting was achieved and with  $k$  values above five to clear distinction between clusters was possible. With  $k=5$  it seems that is possible to accurately separate urban from more rural areas in Zurich. However, for more specific questions related to the neighbourhood choice in Zurich it might make sense to perform a more granular cluster analysis.

## 5. Discussion

When moving to a new (unknown) location it is most difficult to find the right neighbourhood to live in because relevant information about a new place is missing. In this Clapstone Project we used Data Science to deal with this problem and evaluated the most attractive neighbourhoods for young people in Zurich. Different neighbourhoods in Zurich were clustered and the top neighbourhoods were picked based on population census data on neighbourhood level. As a result, it seems recommendable for young people to move to Saatlen, Affoltern, Friesenberg, Höngg and Seebach. In these districts there should be a decent availability of bars, restaurants and other leisure time activities, but at the same time not too many office buildings.

## 6. Conclusion

Although there are many different factors that affect the choice of a neighbourhood when moving to a new city it seems advisable for young adults to consider one of the urban districts when looking for a place in Zurich. Based on a neighbourhood clustering and census data the five most attractive districts in Zurich have been identified. However, one should also consider other factors such as rent prices or availability of schools (for parents) before making a final decision.

## Appendix

	quarter	1st Most Common Venue	2nd Most Common Venue	3rd Most Common Venue	4th Most Common Venue	5th Most Common Venue
0	Affoltern	Bus Station	Supermarket	Hotel	Light Rail Station	Department Store
1	Albisrieden	Trail	Yoga Studio	Electronics Store	French Restaurant	Food & Drink Shop
2	Alt-Wiedikon	Café	Pizza Place	French Restaurant	Italian Restaurant	Swiss Restaurant
3	Altstetten	Bus Station	Pizza Place	Middle Eastern Restaurant	Soccer Field	Fried Chicken Joint
4	City	Swiss Restaurant	Mediterranean Restaurant	Italian Restaurant	Museum	River
5	Enge	Italian Restaurant	Park	Bar	History Museum	Restaurant
6	Escher Wyss	Café	Bar	Hotel	Nightclub	Restaurant
7	Fluntern	Bakery	Plaza	Tram Station	Grocery Store	Bus Station
8	Friesenberg	Supermarket	Restaurant	Indian Restaurant	Art Gallery	Tram Station
9	Gewerbeschule	Bar	Italian Restaurant	Thai Restaurant	Café	Asian Restaurant
10	Hard	Swiss Restaurant	Restaurant	Café	Bar	Italian Restaurant
11	Hirslanden	Swiss Restaurant	Mediterranean Restaurant	Italian Restaurant	Museum	River
12	Hirzenbach	Tram Station	Soccer Field	Baseball Field	Steakhouse	Ethiopian Restaurant
13	Hochschulen	Hotel	Italian Restaurant	Restaurant	Vegetarian / Vegan Restaurant	Bakery
14	Hottingen	Swiss Restaurant	Hotel	Bookstore	Bakery	Restaurant
15	Höngg	Tram Station	Pizza Place	Grocery Store	Plaza	Bus Station
16	Langstrasse	Bar	Italian Restaurant	Thai Restaurant	Café	Asian Restaurant
17	Leimbach	Grocery Store	Tennis Court	Bus Station	Moroccan Restaurant	Dessert Shop
18	Lindenhof	Swiss Restaurant	Café	Hotel	Bar	Plaza
19	Mühlebach	Italian Restaurant	Hotel	Café	Bar	Supermarket
20	Oberstrass	Hotel	Italian Restaurant	Restaurant	Vegetarian / Vegan Restaurant	Bakery
21	Oerlikon	Hookah Bar	Supermarket	Bakery	Grocery Store	Korean Restaurant
22	Rathaus	Hotel	Italian Restaurant	Restaurant	Vegetarian / Vegan Restaurant	Bakery
23	Saatlen	Bagel Shop	Bus Station	Pool	Tram Station	Lounge
24	Schwamedingen-Mitte	Tram Station	Pizza Place	Italian Restaurant	Yoga Studio	Electronics Store
25	Seebach	Hookah Bar	Supermarket	Bakery	Grocery Store	Korean Restaurant
26	Seefeld	Italian Restaurant	Hotel	Café	Bar	Supermarket
27	Sihlfeld	Café	Pizza Place	French Restaurant	Italian Restaurant	Swiss Restaurant
28	Unterstrass	Italian Restaurant	Café	Middle Eastern Restaurant	Bakery	Swiss Restaurant
29	Weinegg	Swiss Restaurant	Mediterranean Restaurant	Italian Restaurant	Museum	River
30	Werd	Restaurant	Italian Restaurant	Café	Plaza	Bar
31	Wipkingen	Café	Bar	Hotel	Nightclub	Restaurant
32	Witikon	Other Great Outdoors	Swiss Restaurant	Yoga Studio	Food & Drink Shop	Fast Food Restaurant
33	Wollishofen	Irish Pub	Restaurant	Bus Station	Supermarket	Cheese Shop

Figure 2: Most common venues by Zurich's neighbourhoods.