Finding Most Convenient Neighborhoods to Live in Hamburg

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1 Introduction

Free and Hanseatic City of Hamburg[1](Hamburg) is 7th largest city in the European Union. Germany has 16 federal states and after Berlin, Hamburg is the second-largest city in Germany with a population of over 1.84 million. Hamburg is known as a major international and domestic tourist city. On the other hand Hamburg is one of the economical centres in Germany with GDP[2] 119.0 billion€ in 2018. The city has a relatively high employment rate, at 88 percent of the working-age population, employed in over 160,000 businesses. The average income in 2019 of employees was €48,616. As we can see in the following figure, the unemployment rate is decreasing and in each year so many new opportunities are added up to the job market.

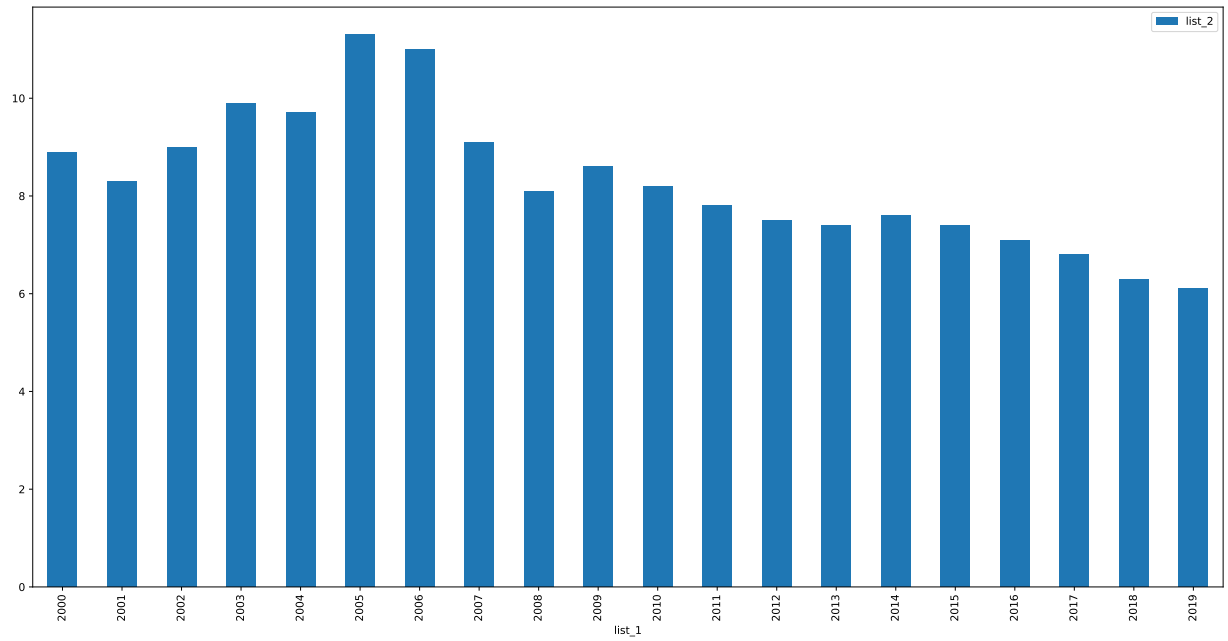


Figure 1: Unemployment Rate

[1]Freie und Hansestadt Hamburg
[2]Gross domestic product

In addition Hamburg is at a sheltered natural harbour with lots of import and export companies. Hamburg consists of seven boroughs[3] and subdivided into 104 quarters[4]. There are 181 localities. Each borough is governed by a Borough Council[5] and administered by a Municipal Administrator[6]. The boroughs are not independent municipalities: their power is limited and subordinate to the Senate of Hamburg. The borough administrator is elected by the Borough Council and thereafter requires confirmation and appointment by Hamburg's Senate. The quarters have no governing bodies of their own.

The part of the North Sea in this aerial picture is called the Hamburg Wadden Sea National Park and belongs administratively to the borough of Hamburg-Mitte. Some 50 people live here on the island Neuwerk (visible just above the centre). In 2008, the boroughs were Hamburg-Mitte, Altona, Eimsbüttel, Hamburg-Nord, Wandsbek, Bergedorf and Harburg.

Figure 2: The 7 boroughs and 104 quarters of Hamburg

Each year Hamburg is targeted by so many immigrants. Newcomers to Hamburg has several questions such as What are the best Hamburg neighborhoods in the sense of convenience? and where is the

[3]Bezirke
[4]Stadtteile
[5]Bezirksversammlung
[6]Bezirksamtsleiter

best place to live in Hamburg?

In this article, we address these preceding questions. Our research is based on several factors like *Crime Rate*, *Transit Access*, *Number of Parks, Restaurants, Sport Centres* and *Entertainment Centres*. The aim of this article is to assist newcomers to settle down in this beautiful city.

2 Methodology

For this project, we used several resources in order to build our data set. In each of the following subsection, we explain our methods.

2.1 Crime Rate

In the first step, we prepare our data for the Crime Rate including cleaning, preprocessing. We downloaded *Polizeiliche Kriminalstatistik* and we extracted our data. We target two years 2018 and 2019 for our purpose. The first problem is converting tables from several pages of a PDF. For this purpose, we need a specific library called **PyPDF2** and also the library **Pandas** has been applied.

Neighborhoods	Fälle 2018	Fälle 2019
Altstadt	6.742	6.324
HafenCity	821	806
Neustadt	5.063	4.956
St. Pauli	18.790	17.797
St. Georg	20.047	18.731

2.2 Hamburg Neighbourhoods

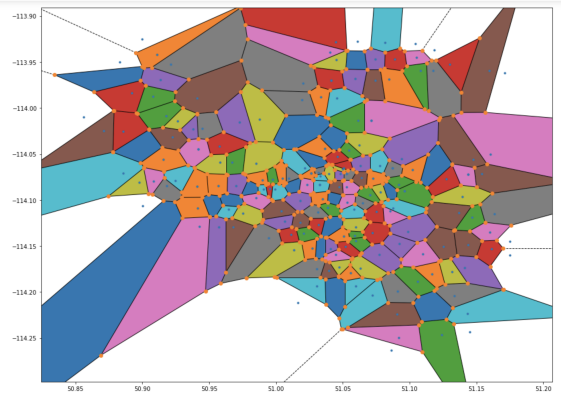
	Neighborhoods	Fälle 2018	Fälle 2019	latitude	longitude
0	Altstadt	6.742	6.324	53.550000	10.000000
1	HafenCity	821	806	53.541562	9.993276
2	Neustadt	5.063	4.956	53.551960	9.985580
3	St. Pauli	18.790	17.797	53.557000	9.964000
4	St. Georg	20.047	18.731	53.555130	10.012310

latitudes and longitudes of neighbourhoods.

We next scrape Hamburg neighbourhoods from Wikipedia, in particular the latitude and longitude of each neighbourhood in Hamburg. For that regard, we invoke the library **wikipedia** which is very fast and robust. Also we utilise the package **BeautifulSoup** from the library **bs4** for parsing coordinates in terms of the latitudes and the longitudes of neighbours in Hamburg. We used the library **smopy** to create a map via the

2.3 Transit Access

We download a dataset from HVV website so that calculate the number of bus stops in each region. So we continue with preprocessing transportation dataset from HVV and our purpose is to find the number of bus stops per neighbourhood. For that regard, we used **Voronoi Diagram**. It is very useful package of **scipy.spatial**. The latitude and the longitude are seed points of the Voronoi. In the right side you can find the Veronio diagram drew by our coordinates.



2.4 Entertainments Counting

We benefited from Foursquare API to scrape the most common venues of given Borough of Hamburg, specifically Parks, Restaurants, Sport Centres and Entertainment Centres. The limit is 100 venues, as it is a free service for the first 100 requests and we choose the radius 500 meters for each borough from their given latitude and longitude pieces of information.

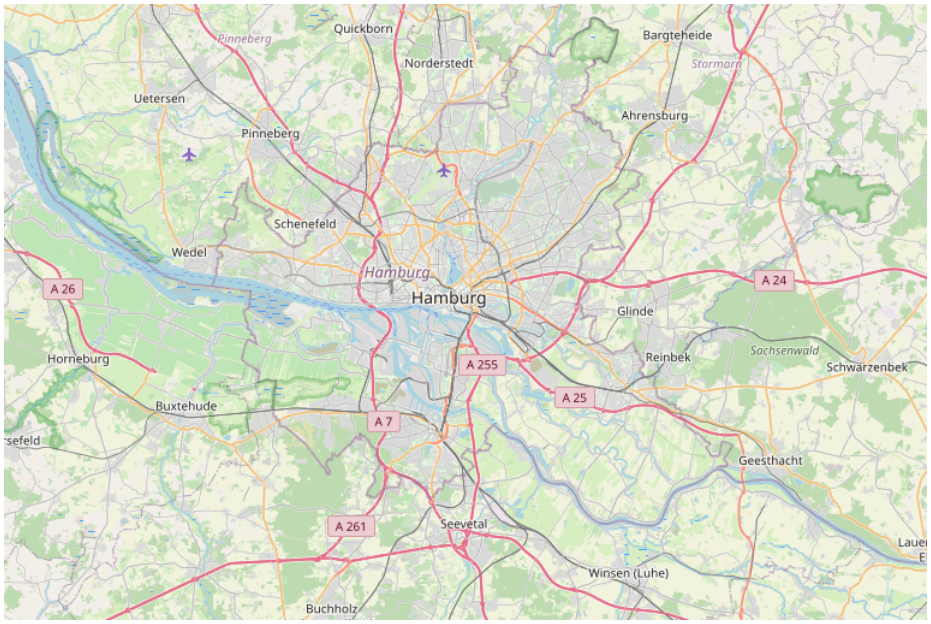


Figure 3: Creating a map via coordinates

2.5 Conclusion

In the last step, we define a total score for each neighbourhood. But we first normalize all values via the library **sklearn** and package **preprocessing**. We note that the higher crime rate, the worst neighbourhood. That's why we consider all of these values as negative values.

Finally we compared different neighbourhoods in Hamburg to find the top 10 convenient neighbourhoods to live for newcomers. My method recommended the top 10 by considering all the features having the same weight. However for some specific , we can modify our methods with using weights which is not a serious problem.

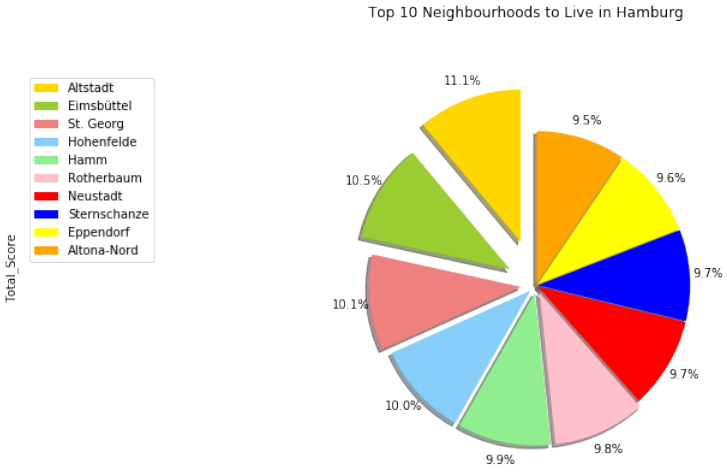


Figure 4: Top 10 convenient neighbourhoods of Hamburg