

# Battle of the Neighbourhoods: Hamburg, Germany

## Introduction

At about 1.9 million population, Hamburg is the second most-populated city in Germany. A former free trade city of the Hanseatic League of merchants, it remains a wealthy city-state to this day, housing many corporate headquarters and offices. Its wealth as measured by GDP per capita is second only to the likes of Frankfurt and Wolfsburg (with its Volkswagen headquarter and manufacturing plants). Hamburg should thus be of business interest to investors and business owners alike.

The goal is to utilize Foursquare location data along with other available data on the city of Hamburg to hopefully obtain some insights and identify business opportunities. In particular, we aim to identify in which neighbourhood(s) in Hamburg that one should open a new supermarket or grocery store.

## Data

Conveniently, the German wikipedia page 'Liste der Bezirke und Stadtteile Hamburgs' (list of districts and city parts of Hamburg) already lists all the city parts (i.e. neighbourhoods) along with their area, population, density, and even coordinates. These coordinates can be supplied to Foursquare application to obtain venues and business information, which will then be associated with each of these Hamburg neighbourhoods, providing us with data which can be readily processed and analyzed right away.

## Methodology

Based on the data we have on hand, we decided that we have enough data to make recommendations on where to open a new grocery store, supermarket, and even a new park, namely because along with venues and coordinates, we also possess population data. For groceries, supermarkets, and parks, the proximity to one's residence should be key to the decision to patronize the venue. The same probably cannot be said of other types of shops such as restaurants, cafes, or bar, at least not to same extent.

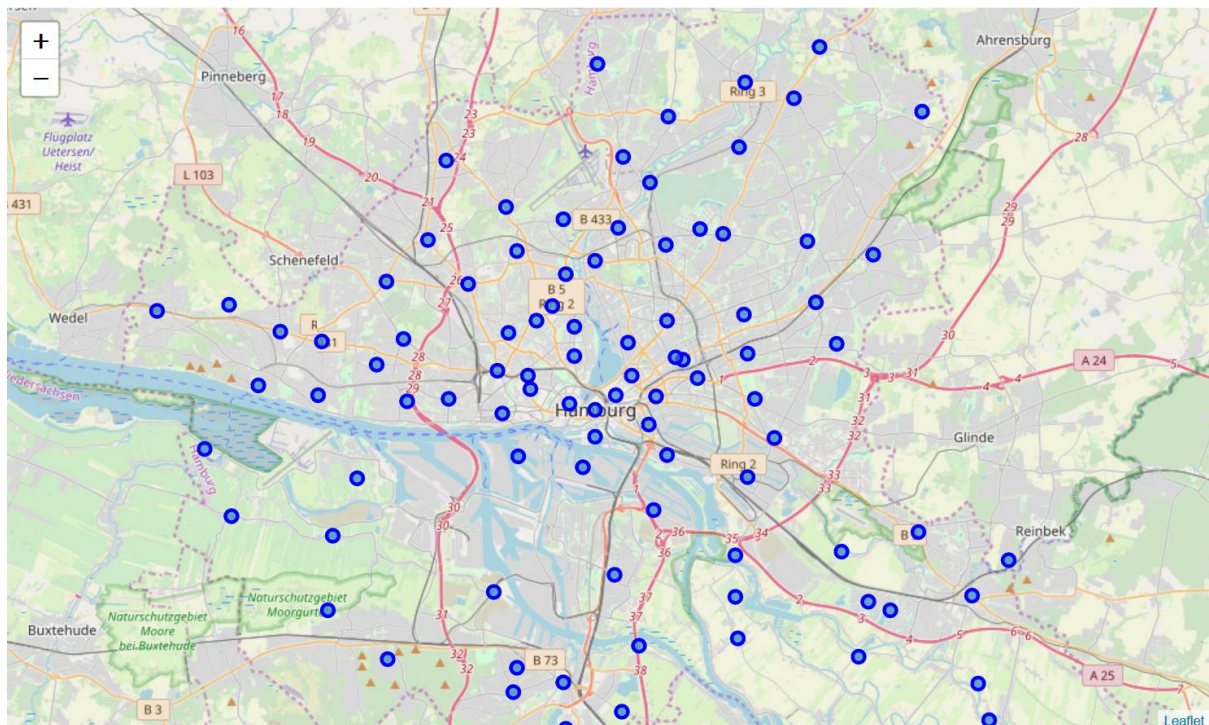
First we read the table from the mentioned Wikipedia page

	Stadtteil	Ortsteile	Bezirk	Area	Population	Density	Coordinates	Map
0.00	Hamburg-Altstadt	nan	Hamburg-Mitte	nan	2272.00	947.00	53° 33' 0" N, 10° 0' 0" O	nan
1.00	HafenCity	nan	Hamburg-Mitte	nan	4592.00	2087.00	53° 32' 28" N, 10° 0' 1" O	nan
2.00	Neustadt	nan	Hamburg-Mitte	nan	12920.00	5617.00	53° 33' 7" N, 9° 59' 8" O	nan
3.00	St. Pauli	nan	Hamburg-Mitte	nan	22436.00	8974.00	53° 33' 25" N, 9° 57' 50" O	nan
4.00	St. Georg	nan	Hamburg-Mitte	nan	11384.00	4743.00	53° 33' 18" N, 10° 0' 44" O	nan
5.00	Hammerbrook	nan	Hamburg-Mitte	nan	4323.00	1441.00	53° 32' 43" N, 10° 1' 50" O	nan
6.00	Borgfelde	nan	Hamburg-Mitte	nan	7696.00	9620.00	53° 33' 17" N, 10° 2' 4" O	nan
7.00	Hamm	nan	Hamburg-Mitte	nan	38773.00	9693.00	53° 33' 39" N, 10° 3' 28" O	nan
8.00	Horn	nan	Hamburg-Mitte	nan	38799.00	6576.00	53° 33' 14" N, 10° 5' 24" O	nan
9.00	Billstedt	nan	Hamburg-Mitte	nan	70355.00	4139.00	53° 32' 26" N, 10° 6' 4" O	nan

Then we processed the data, extracting coordinates, computing area and radius of each neighbourhood.

	Stadtteil	Bezirk	Area	Population	Density	Latitude	Longitude	Radius
0.00	Hamburg-Altstadt	Hamburg-Mitte	2.40	2272.00	947.00	53.55	10.00	781.63
1.00	HafenCity	Hamburg-Mitte	2.20	4592.00	2087.00	53.54	10.00	748.53
2.00	Neustadt	Hamburg-Mitte	2.30	12920.00	5617.00	53.55	9.99	765.33
3.00	St. Pauli	Hamburg-Mitte	2.50	22436.00	8974.00	53.56	9.96	797.90
4.00	St. Georg	Hamburg-Mitte	2.40	11384.00	4743.00	53.55	10.01	781.79
5.00	Hammerbrook	Hamburg-Mitte	3.00	4323.00	1441.00	53.55	10.03	874.04
6.00	Borgfelde	Hamburg-Mitte	0.80	7696.00	9620.00	53.55	10.03	451.35
7.00	Hamm	Hamburg-Mitte	4.00	38773.00	9693.00	53.56	10.06	1009.27
8.00	Horn	Hamburg-Mitte	5.90	38799.00	6576.00	53.55	10.09	1225.74
9.00	Billstedt	Hamburg-Mitte	17.00	70355.00	4139.00	53.54	10.10	2080.51

The neighbourhood locations were then visualized on the map



The venue data was then fetched from Foursquare app.  
The total number of returned venues was 3151.

Neighborhood	Venue
Allermöhe	10.00
Alsterdorf	32.00
Altengamme	6.00
Altona-Altstadt	100.00
Altona-Nord	37.00
Bahrenfeld	28.00
Barmbek-Nord	39.00
Barmbek-Süd	52.00
Bergedorf	43.00
Bergstedt	12.00

One hot encoding was used to convert venue rows into columns, then it was joined with the original table. The sum and mean was likewise computed

	Stadtteil	Bezirk	Area	Population	Density	Latitude	Longitude	Radius	ATM	Accessories Store	Advertising Agency	Afghan Restaurant	Airpo
98.00	Francop	Harburg	8.75	709.00	81.00	53.51	9.85	1492.97	0.00	0.00	0.00	0.00	0.00
99.00	Neuenfelde	Harburg	15.59	4848.00	311.00	53.51	9.80	1992.38	0.00	0.00	0.00	0.00	0.00
100.00	Cranz	Harburg	1.30	799.00	615.00	53.54	9.78	575.18	0.00	0.00	0.00	0.00	0.00
101.00	All	All	740.06	1885264.00	2547.44	nan	nan	nan	1.00	3.00	1.00	1.00	3.00
102.00	Mean	Mean	7.33	18665.98	2547.44	nan	nan	nan	0.01	0.03	0.01	0.01	0.03

One venue was added into each category, to represent the case that a new venue is opened, then the unit is converted to ‘venue per 1 million population’, and only the interested columns were selected.

	Stadtteil	Population	Grocery Store	Park	Supermarket
0.00	Hamburg-Altstadt	2272.00	880.28	440.14	440.14
1.00	HafenCity	4592.00	217.77	435.54	435.54
2.00	Neustadt	12920.00	77.40	77.40	154.80
3.00	St. Pauli	22436.00	44.57	89.14	89.14
4.00	St. Georg	11384.00	263.53	175.69	175.69
5.00	Hammerbrook	4323.00	231.32	231.32	231.32
6.00	Borgfelde	7696.00	129.94	259.88	129.94
7.00	Hamm	38773.00	25.79	77.37	257.91
8.00	Horn	38799.00	51.55	77.32	180.42
9.00	Billstedt	70355.00	28.43	28.43	99.50

## Results

Neighbourhoods that would most benefit from a new grocery store

	Stadtteil	Population	Grocery Store	Park	Supermarket
71.00	Rahlstedt	91740.00	10.90	10.90	130.80
45.00	Winterhude	55900.00	17.89	71.56	71.56
13.00	Wilhelmsburg	54068.00	18.50	73.98	73.98
60.00	Bramfeld	52498.00	19.05	19.05	190.48
53.00	Langenhorn	45666.00	21.90	43.80	109.49
50.00	Barmbek-Nord	41886.00	23.87	23.87	95.50
37.00	Niendorf	40717.00	24.56	49.12	122.80
72.00	Lohbrügge	39809.00	25.12	25.12	125.60
7.00	Hamm	38773.00	25.79	77.37	257.91
55.00	Wandsbek	36149.00	27.66	82.99	138.32

Neighbourhoods that would most benefit from a new supermarket

	Stadtteil	Population	Grocery Store	Park	Supermarket
54.00	Eilbek	22233.00	44.98	89.96	44.98
32.00	Eimsbüttel	58196.00	34.37	68.73	51.55
21.00	Ottensen	35585.00	56.20	84.31	56.20
18.00	Altona-Altstadt	29305.00	68.25	68.25	68.25
45.00	Winterhude	55900.00	17.89	71.56	71.56
13.00	Wilhelmsburg	54068.00	18.50	73.98	73.98
56.00	Marienthal	13382.00	74.73	224.18	74.73
63.00	Sasel	23778.00	42.06	84.11	84.11
59.00	Farmsen-Berne	34689.00	28.83	28.83	86.48
3.00	St. Pauli	22436.00	44.57	89.14	89.14

Neighbourhoods that would most benefit from a new park

	Stadtteil	Population	Grocery Store	Park	Supermarket
71.00	Rahlstedt	91740.00	10.90	10.90	130.80
60.00	Bramfeld	52498.00	19.05	19.05	190.48
50.00	Barmbek-Nord	41886.00	23.87	23.87	95.50
72.00	Lohbrügge	39809.00	25.12	25.12	125.60
25.00	Lurup	36695.00	54.50	27.25	109.01
9.00	Billstedt	70355.00	28.43	28.43	99.50
59.00	Farmsen-Berne	34689.00	28.83	28.83	86.48
97.00	Neugraben-Fischbek	30690.00	32.58	32.58	130.34
22.00	Bahrenfeld	29976.00	33.36	33.36	166.80
38.00	Schnelsen	29300.00	34.13	34.13	204.78

## Discussion

We identified the neighbourhoods in which one would most benefit from opening a new grocery store, supermarket, and park, with a rather simple methodology requiring no advanced machine learning or clustering techniques. It should nevertheless still be convincing as we were able to show the number of venues per population ratios of each neighbourhood which then tells us which neighbourhoods could benefit from an additional venue. Some of the recommended neighbourhoods such as Eimsbüttel, Altona, Winterhude, and Neustadt are fairly central locations and should be the safer choices to open a new venue than other recommended neighbourhoods which are further away and more loosely populated.

If one were to look closely, though, one would notice some peculiarities in the number of venues that Foursquare returned. For example, Foursquare data seems to suggest that there is only 1 ATM in the whole city of Hamburg. Kebab joints, coming in at 2, should not be the case as well as one can almost literally find one or more around every neighbourhood. This does suggest that there is a problem with Foursquare venue data. If this data is ever updated correctly, though, then we can definitely rely on our results. All this being said, a total of 228 supermarkets sounds like a reasonable number, so the results on supermarket is the most reliable of our three.

## **Conclusion**

The purpose of this project is to analyze the neighbourhoods of Hamburg in order to come up with good options for investing in a new grocery, supermarket, or park. This however is by no means a definite revelation and there should be other aspects and parameters at work in determining if and when a business is to be successful. Nonetheless it should have been of some use to narrow down the choices that an investor or business operator could choose in his/her endeavour at a new business and some of the recommended options are as mentioned fairly central so could be solid options in one's next investment.