



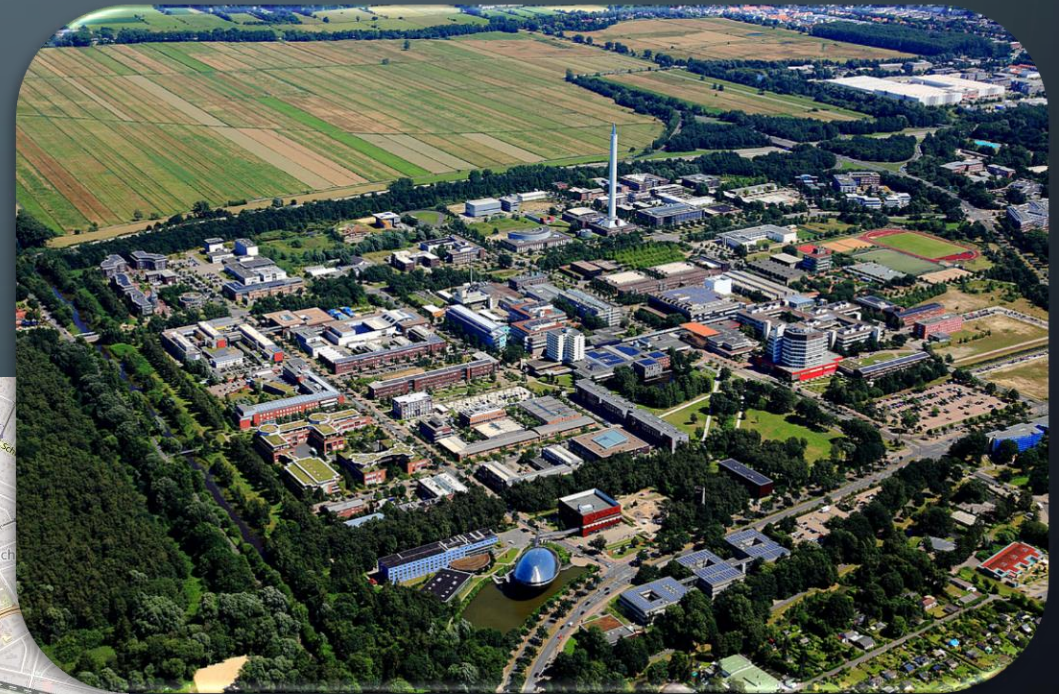
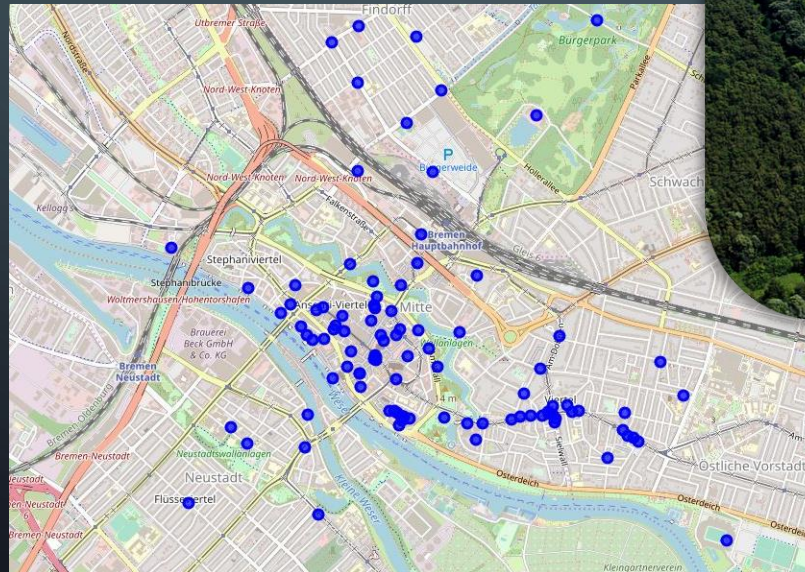
URBAN AUDIT

RECOMMENDATIONS FOR STUDENTS WHO WANT TO SHIFT THEIR UNIVERSITY PLACE

ANIKA CORNELIUS – 6/5/2019

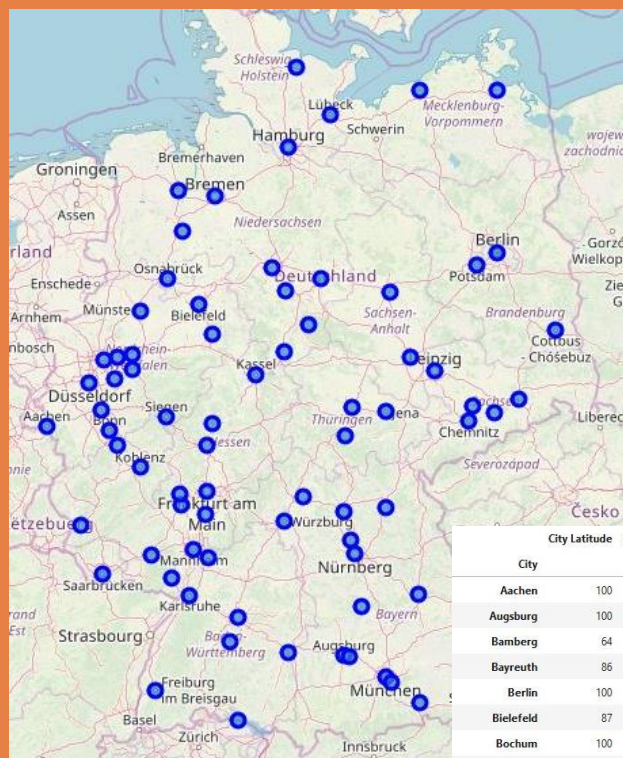
THE ACTUAL SITUATION

- A mathematics-student from Bremen in Germany wants to switch university but he enjoys the venues and leisure time possibilities in Bremen
- He wants to find similar cities with the same faculty



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THE DATA



City Latitude	City Longitude	Venue	Venue Latitude	Venue Longitude	Venue Category
City					
Aachen	100	100	100	100	100
Augsburg	100	100	100	100	100
Bamberg	64	64	64	64	64
Bayreuth	86	86	86	86	86
Berlin	100	100	100	100	100
Bielefeld	87	87	87	87	87
Bochum	100	100	100	100	100
Bonn	100	100	100	100	100
Braunschweig	100	100	100	100	100
Bremen	100	100	100	100	100
Chemnitz	55	55	55	55	55

	City	ATM	Advertising Agency	Afghan Restaurant	African Restaurant	Airport	American Restaurant	Amphitheater	Apple Wine Pub	Aquarium	...	Vietnamese Restaurant	Vineyard	Water Park	Waterfront	Whisky Bar	Wine Bar	Wine Shop	Yoga Studio	Zoo	Zoo Exhibit
0	Aachen	0.0	0.0	0.0	0.0	0.000000	0.000000	0.00	0.0	0.0	...	0.02	0.0	0.000000	0.0	0.0	0.01	0.0	0.00	0.00	0.0
1	Augsburg	0.0	0.0	0.0	0.0	0.000000	0.000000	0.01	0.0	0.0	...	0.01	0.0	0.000000	0.0	0.0	0.00	0.0	0.00	0.01	0.0
2	Bamberg	0.0	0.0	0.0	0.0	0.015625	0.000000	0.00	0.0	0.0	...	0.00	0.0	0.015625	0.0	0.0	0.00	0.0	0.00	0.00	0.0
3	Bayreuth	0.0	0.0	0.0	0.0	0.000000	0.011628	0.00	0.0	0.0	...	0.00	0.0	0.011628	0.0	0.0	0.00	0.0	0.00	0.00	0.0
4	Berlin	0.0	0.0	0.0	0.0	0.000000	0.000000	0.00	0.0	0.0	...	0.00	0.0	0.000000	0.0	0.0	0.02	0.0	0.01	0.00	0.0

	City	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	Aachen	Café	Bar	Coffee Shop	Sushi Restaurant	Italian Restaurant	Bakery	Park	Supermarket	Plaza	Ice Cream Shop
1	Augsburg	Italian Restaurant	Café	Steakhouse	Bar	Beer Garden	German Restaurant	Hotel	Bakery	Pub	Turkish Restaurant
2	Bamberg	Café	German Restaurant	Supermarket	Hotel	Beer Garden	Brewery	Park	Plaza	Pub	Pool
3	Bayreuth	Supermarket	Italian Restaurant	German Restaurant	Big Box Store	Café	Drugstore	Bar	Bakery	Opera House	Brewery
4	Berlin	Coffee Shop	Bookstore	Ice Cream Shop	Concert Hall	Park	Art Gallery	Garden	Vegetarian / Vegan Restaurant	Science Museum	Hotel

- Overview of German cities with mathematical faculties
- Their latitude and longitude informations
- The venues and the venue categories in the cities

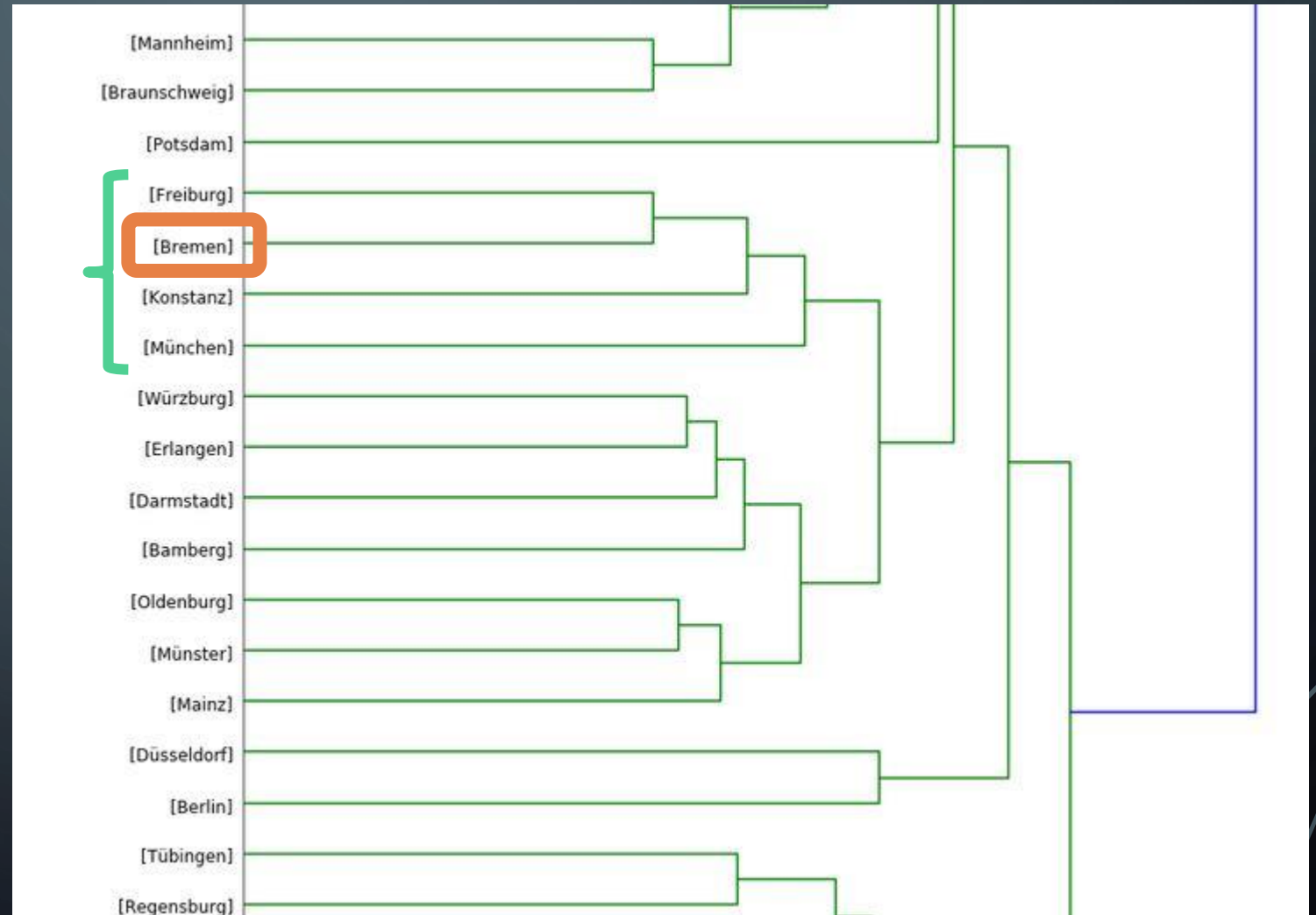
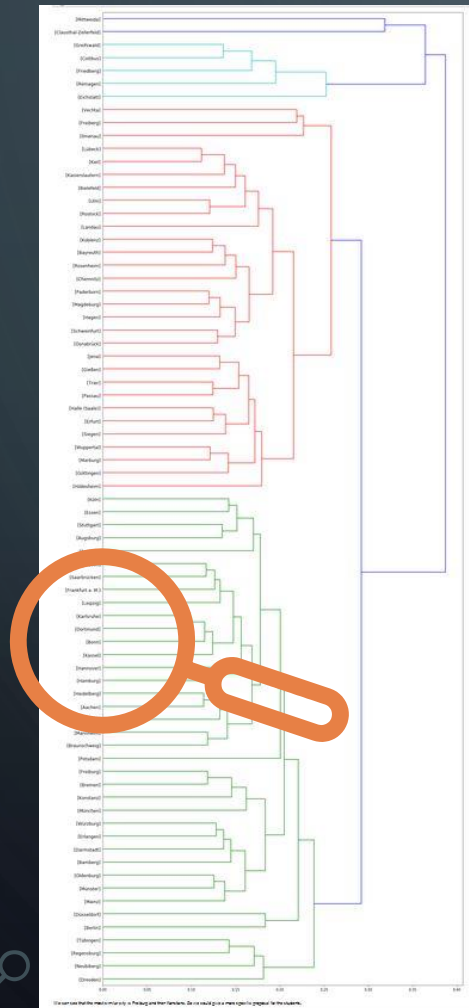
K-MEANS



• The “Bremen-cluster”:

	City	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	Aachen	Café	Bar	Coffee Shop	Sushi Restaurant	Italian Restaurant	Bakery	Park	Supermarket	Plaza	Ice Cream Shop
1	Augsburg	Italian Restaurant	Café	Steakhouse	Bar	Beer Garden	German Restaurant	Hotel	Bakery	Pub	Turkish Restaurant
5	Bielefeld	Bar	Supermarket	Restaurant	Café	Burger Joint	Hotel	Italian Restaurant	Sushi Restaurant	Middle Eastern Restaurant	Park
6	Bochum	Bakery	Café	Supermarket	Park	Event Space	Sushi Restaurant	Bar	Ice Cream Shop	Market	Asian Restaurant
7	Bonn	Café	German Restaurant	Pub	Italian Restaurant	Plaza	Museum	Burger Joint	Movie Theater	Korean Restaurant	Coffee Shop
8	Braunschweig	Café	Italian Restaurant	Bar	Park	Turkish Restaurant	Plaza	Coffee Shop	Pizza Place	Steakhouse	Restaurant
9	Bremen	Café	Hotel	German Restaurant	Bar	Italian Restaurant	Vegetarian / Vegan Restaurant	Middle Eastern Restaurant	Burger Joint	Market	Asian Restaurant
13	Darmstadt	Café	Italian Restaurant	German Restaurant	Middle Eastern Restaurant	Supermarket	Organic Grocery	Park	Beer Garden	Sushi Restaurant	Bar
14	Dortmund	Café	Italian Restaurant	German Restaurant	Coffee Shop	Pub	Turkish Restaurant	Trattoria/Osteria	Japanese Restaurant	Sushi Restaurant	Bar
16	Düsseldorf	Japanese Restaurant	Hotel	Coffee Shop	Brewery	Grocery Store	Plaza	Bar	Park	Dessert Shop	Art Museum
20	Essen	Café	Italian Restaurant	Pub	Restaurant	Ice Cream Shop	Nightclub	Falafel Restaurant	Park	Indie Movie Theater	Plaza
21	Frankfurt a. M.	Café	Bar	Hotel	German Restaurant	Art Museum	Restaurant	Japanese Restaurant	Plaza	Market	Burger Joint
32	Heidelberg	Café	Bar	Plaza	Coffee Shop	Hotel	Falafel Restaurant	Burger Joint	Italian Restaurant	Cocktail Bar	Ice Cream Shop
37	Karlsruhe	Café	Italian Restaurant	Pub	Coffee Shop	Turkish Restaurant	German Restaurant	Bar	Burger Joint	Ice Cream Shop	Thai Restaurant
38	Kassel	German Restaurant	Café	Cocktail Bar	Ice Cream Shop	Italian Restaurant	Drugstore	Pub	Art Museum	Art Gallery	Plaza
39	Kiel	Café	Coffee Shop	Hotel	Supermarket	Gas Station	Lounge	Japanese Restaurant	Italian Restaurant	Burger Joint	Restaurant
41	Köln	Italian Restaurant	Café	Hotel	Plaza	Bakery	Brewery	Art Museum	Scenic Lookout	Vietnamese Restaurant	Cocktail Bar
44	Leipzig	Hotel	Café	Zoo Exhibit	Coffee Shop	Bar	Irish Pub	Cocktail Bar	Park	Plaza	German Restaurant
47	Mainz	German Restaurant	Café	Ice Cream Shop	Bar	Coffee Shop	Plaza	Wine Bar	Restaurant	Pizza Place	Supermarket
48	Mannheim	Café	Bar	Italian Restaurant	Hotel	Burger Joint	Coffee Shop	Park	Turkish Restaurant	German Restaurant	Clothing Store
51	München	Café	Plaza	German Restaurant	Hotel	Ice Cream Shop	Cocktail Bar	Church	Italian Restaurant	Department Store	Coffee Shop
52	Münster	Café	Italian Restaurant	Coffee Shop	German Restaurant	Bar	Park	Supermarket	Hotel	Nightclub	Ice Cream Shop
54	Nürnberg	Café	Bar	Coffee Shop	Hotel	Burger Joint	Steakhouse	Franconian Restaurant	Asian Restaurant	Ice Cream Shop	Sushi Restaurant
59	Potsdam	Historic Site	Palace	Park	German Restaurant	Café	French Restaurant	Coffee Shop	Ice Cream Shop	Hotel	Italian Restaurant
64	Saarbrücken	Café	Bar	Italian Restaurant	German Restaurant	Coffee Shop	Turkish Restaurant	Ice Cream Shop	Sushi Restaurant	Nightclub	Hotel
67	Stuttgart	Italian Restaurant	Bar	German Restaurant	Café	Plaza	Park	Ice Cream Shop	Cocktail Bar	Sushi Restaurant	Movie Theater
72	Wiesbaden	German Restaurant	Café	Park	Plaza	Hotel	Thai Restaurant	Bar	Falafel Restaurant	Italian Restaurant	Burger Joint

HIERARCHICAL CLUSTERING



DISCUSSION

- The kMeans clustering on the 10 most common venue-categories yields three big clusters and some smaller ones
- The hierarchical clustering on the frequency of all venue-categories in the cities yields 4 big clusters but the most similar city can be spotted in the dendogram
- The differences in the results are on the one hand because of the different data and on the other hand because of the different method
- Bremen is a city in a quite big cluster so I would recommend a student from Bremen to have a look on the dendogram and check the cities of Freiburg, Konstanz and Munich

PERSPECTIVE

- To get better results → add more data to the dataset:
 - Living costs and available apartments
 - Number of students and inhabitants
 - Other faculties
 - ...
- Built a tool
 - Input: subject, city, ...
 - Output: recommendation for 1-3 similar cities