Land usage analyse of Stuttgart

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The Objecive and Data Source

Objecive

• Analyse of land usage in Stuttgart

Data Source

• The Postcodes, neighborhoods name, and positions of the neighborhoods in Germany

• data from Foursquare api, such as categories of different venues and their positions

Data cleaning

The data of from other states and cities are cleaned, and the columns like name the country are also delated.

The data from Foursquare api are also processed. The venues in a distance of 600m of a neighborhood are divided into this neighborhood.

Data cleaning

	Postal code	Neighborhood	Borough	Latitude	Longitude
1481	70173	Stuttgart Stuttgart-Mitte	Stuttgart	48.7786	9.1767
1482	70173	Stuttgart	Stuttgart	48.7667	9.1833
1483	70174	Stuttgart Stuttgart-Mitte	Stuttgart	48.7827	9.1720
1484	70174	Stuttgart	Stuttgart	48.7667	9.1833
1485	70174	Stuttgart Stuttgart-Nord	Stuttgart	48.7978	9.1921
1486	70176	Stuttgart Stuttgart-Mitte	Stuttgart	48.7752	9.1585
1487	70176	Stuttgart	Stuttgart	48.7667	9.1833
1488	70176	Stuttgart Stuttgart-West	Stuttgart	48.7736	9.1641
1489	70178	Stuttgart	Stuttgart	48.7667	9.1833
1490	70178	Stuttgart Stuttgart-West	Stuttgart	48.7736	9.1641
1491	70178	Stuttgart Stuttgart-Mitte	Stuttgart	48.7728	9.1731

Data cleaning

	name	categories	lat	lng
0	Weinstube Hirsch	Greek Restaurant	48.726627	9.145099
1	Reyerhof	Farmers Market	48.724423	9.145183
2	Gasthaus Zur Linde	Swabian Restaurant	48.727674	9.150446
3	Osteria Tra Noi	Trattoria/Osteria	48.727878	9.144788
4	Jakes Diner Bar	Burger Joint	48.730788	9.148538

Data cleaning

	Neighborhood	Neighborhood Latitude	Neighborhood Longitude	Venue	Venue Latitude	Venue Longitude	Venue Category
0	Stuttgart Stuttgart-Mitte	48.7786	9.1767	Feinkost Böhm	48.778077	9.176317	Gourmet Shop
1	Stuttgart Stuttgart-Mitte	48.7786	9.1767	Old Bridge	48.780007	9.177899	Ice Cream Shop
2	Stuttgart Stuttgart-Mitte	48.7786	9.1767	Schlossplatz	48.778549	9.179855	Plaza
3	Stuttgart Stuttgart-Mitte	48.7786	9.1767	Oggi Tavola Mediterranea	48.778835	9.176266	Italian Restaurant
4	Stuttgart Stuttgart-Mitte	48.7786	9.1767	Die Bierothek	48.779198	9.178369	Beer Store

Feature selection

After data cleaning, there are 6 attributes and 3039 different venues in the data, which belong to 189 different venue categories. These data indicates the quantity of different venues in a neighborhood. Each neighbourhood is a 600m radius circle in this case
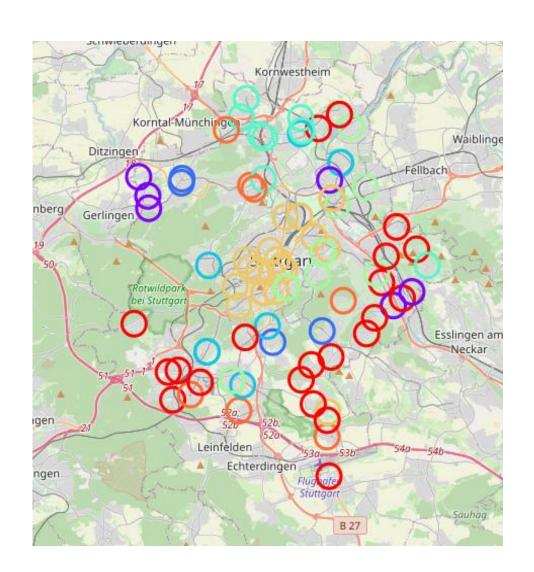
Feature selection

	Neighborhood	1st Most Common Venue	2nd Most Common Venue	3rd Most Common Venue
0	Stuttgart	Bakery	German Restaurant	Hotel
1	Stuttgart Asemwald	Gastropub	Bus Station	Flower Shop
2	Stuttgart B?? snau	Bar	Plaza	Sandwich Place
3	Stuttgart Bad Cannstatt	Café	Bar	Plaza
4	Stuttgart Bergheim	Supermarket	Plaza	Business Service

Exploratory Data Analysis

Neighborhood	African Restaurant	Asian Restaurant	Bakery	Bar	Big Box Store	Building	Bus Station	Café	Chinese Restaurant	Concert Hall	Fast Food Restaurant	Fried Chicken Joint	Gastropub	German Restaurant	Ho
Stuttgart	0	0	1	0	0	0	0	0	0	0	0	0	0	0	
Stuttgart Asemwald	0	0	0	0	0	0	0	0	0	0	0	0	1	0	
Stuttgart B?? snau	0	0	0	1	0	0	0	0	0	0	0	0	0	0	
Stuttgart Bad Cannstatt	0	0	0	0	0	0	0	1	0	0	0	0	0	0	
Stuttgart Bergheim	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
Stuttgart Birkach	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
Stuttgart	0	0	0	0	0	0	0	0	0	0	0	0	0	0	

Exploratory Data Analysis

Conclusions

The neighborhoods in Vaihingen and the neighborhoods in suburbs are classified into another category, in which most common venue is the supermarket. These areas belong to residential areas.

Neighborhood	Cluster Labels	1st Most Common Venue	2nd Most Common Venue	3rd Most Common Venue
Stuttgart Hedelfingen	1	Supermarket	Fast Food Restaurant	Lounge
Stuttgart Obert??rkheim	1	Supermarket	Fast Food Restaurant	Bus Station
Stuttgart Burgholzhof	1	Supermarket	Bakery	Hotel
Stuttgart Hausen	1	Supermarket	Italian Restaurant	Warehouse Store
Stuttgart Giebel	1	Supermarket	Metro Station	Plaza
Stuttgart Bergheim	1	Supermarket	Plaza	Business Service

Conclusions

The most common venues in downtown are various. That indicates the function of this area. In downtown, there are a lot of categories of venues. It indicates the commercial district in Stuttgart.

Neighborhood	Cluster Labels	1st Most Common Venue	2nd Most Common Venue	3rd Most Common Venue
Stuttgart Wangen	0	Concert Hall	German Restaurant	Ice Cream Shop
Stuttgart Rotenberg	0	German Restaurant	Park	Yoga Studio
Stuttgart Untert??rkheim	0	Gastropub	Wine Shop	Pool
Stuttgart Luginsland	0	Playground	Italian Restaurant	German Pop-Up Restaurant
Stuttgart Rohracker	0	Fast Food Restaurant	Supermarket	Light Rail Station
Stuttgart Freiberg	0	Park	Bakery	Drugstore

Conclusions

And the most common venues are metro stations. These areas could be residential areas without enough supply of basic demand or enough jobs. These areas could also be a large enterprise or factory which have a large amount of employees. That means the people here have a high demand for public traffic.

Neighborhood	Cluster Labels	1st Most Common Venue	2nd Most Common Venue	3rd Most Common Venue
Stuttgart Botnang	3	Metro Station	Supermarket	Dance Studio
Stuttgart M?? nster	3	Metro Station	Supermarket	Botanical Garden
Stuttgart Rot	3	Metro Station	Train Station	Bus Stop
Stuttgart Degerloch	3	Metro Station	Supermarket	Bakery
Stuttgart Kaltental	3	Metro Station	Garden	German Restaurant

Conclusions

But some of clusters could not indicate the usage of area, like the neighbourhoods below.

Neighborhood	Cluster Labels	1st Most Common Venue	2nd Most Common Venue	3rd Most Common Venue
Stuttgart Wolfbusch	2	Ice Cream Shop	Supermarket	Drugstore
Stuttgart Weilimdorf	2	Ice Cream Shop	Supermarket	Drugstore
Stuttgart Hoffeld	2	Ice Cream Shop	Bakery	Supermarket
Stuttgart Sillenbuch	2	Ice Cream Shop	Pizza Place	Supermarket

Future directions

In this case, only the position of the neighborhoods and the most common venues are considered. In future, more attributes may be considered, such as the terrain, population, and air pollution. These attributes may contribute to a more accurate result.