Finding an optimal location for a new Chinese restaurant

in Düsseldorf, Germany

Business problem

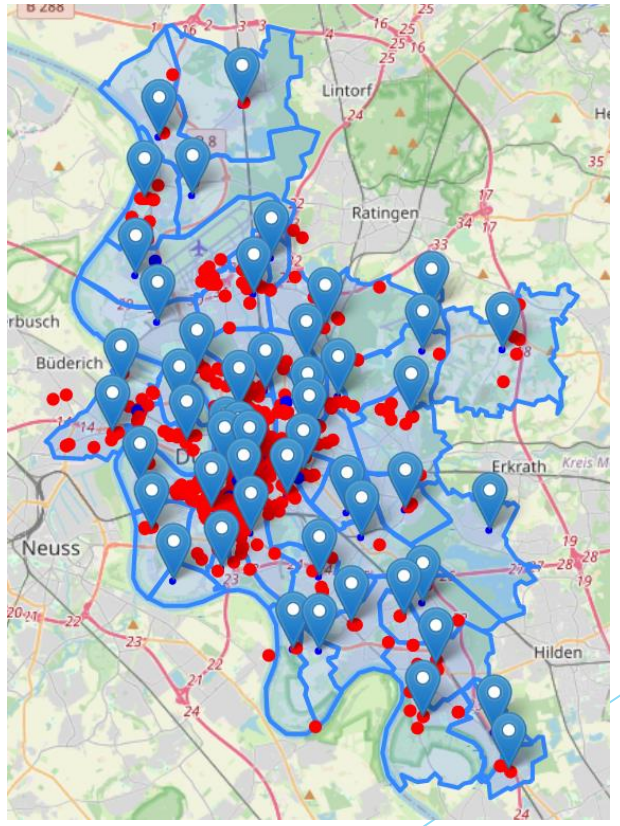
- Finding an **optimal location for a new restaurant** is a difficult process and can determine its success.
- There is an abundance of restaurants in the city of Düsseldorf and we are aiming to find a location that is **not already crowded with restaurants.**
- We are particularly interested in areas with **no or few chinese restaurants in the vicinity**.
- Another preference is that the location is **as close to city center as possible** as the population density will be higher.
- We will use data science to **generate a few most promissing neighborhoods** based on these criteria. Advantages of each area will then be clearly expressed so that the best possible location can be chosen by the stakeholders.

Data sources

- Düsseldorf geojson file from https://opendata.duesseldorf.de/sites/default/files/Stadtteile_WGS84_4326.geojson
- Venue information from **Foursquare API**
- Other information: **OpenStreetMap API, Overpass API**

District selection – Primary analysis

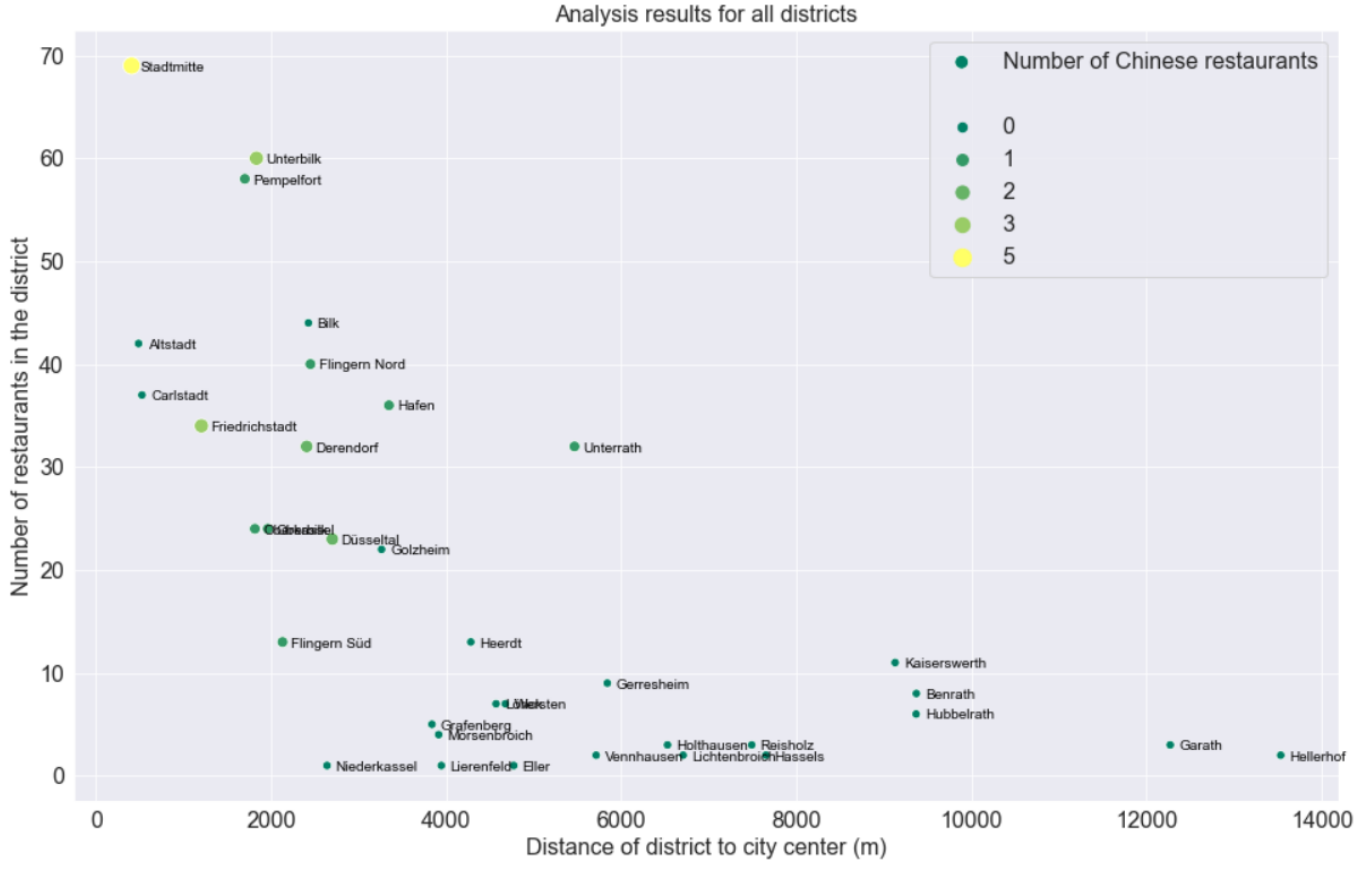
- **First, we select some candidate districts (macro level selection).**
- Parameters:
  - Restaurants in district (big red dots)
  - Chinese restaurants in district (big blue dots*)
  - Distance between city center and district center



*small blue dots mark the respective district centers

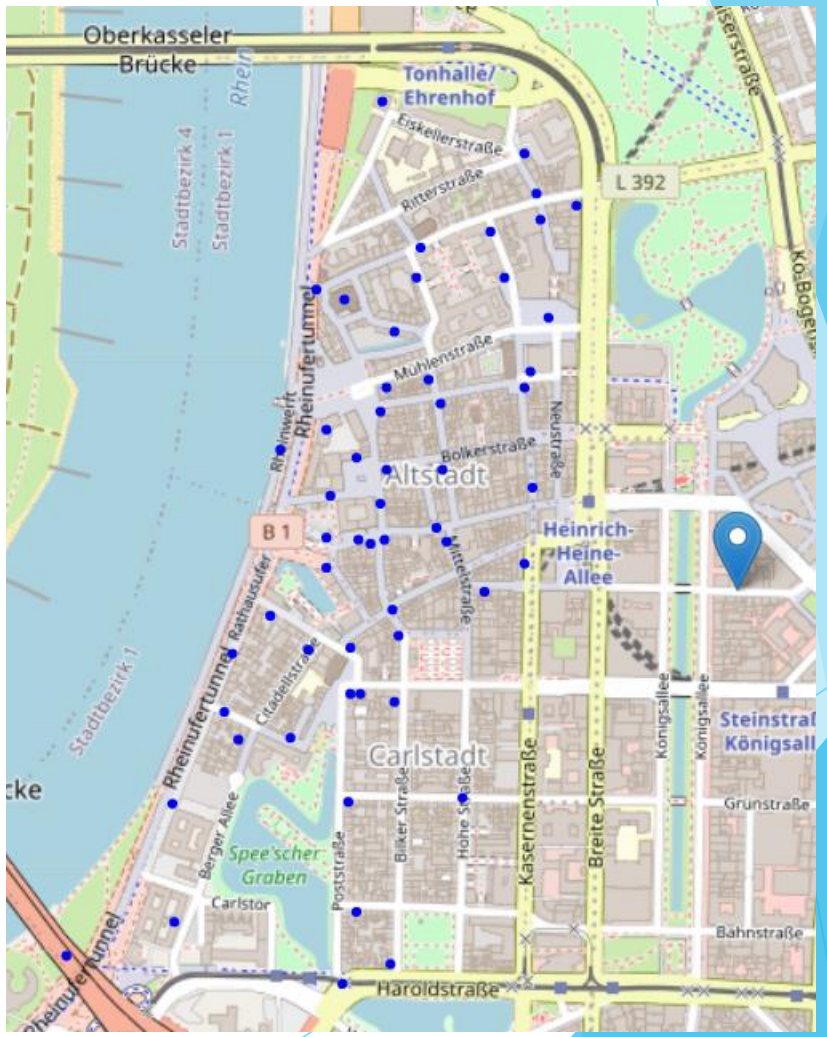
District selection - Results

- Multi-objective optimization problem.
- Pareto optimal solutions:
  - Altdstadt, Carlstadt and Niederkassel.
  - Have no Chinese restaurants.
  - good trade-off between the number of restaurants in the district and their distance to the city center.
- Niederkassel is a far less popular part of town and not well visited.
- The other two districts are popular districts of Düsseldorf. Selected as candidates



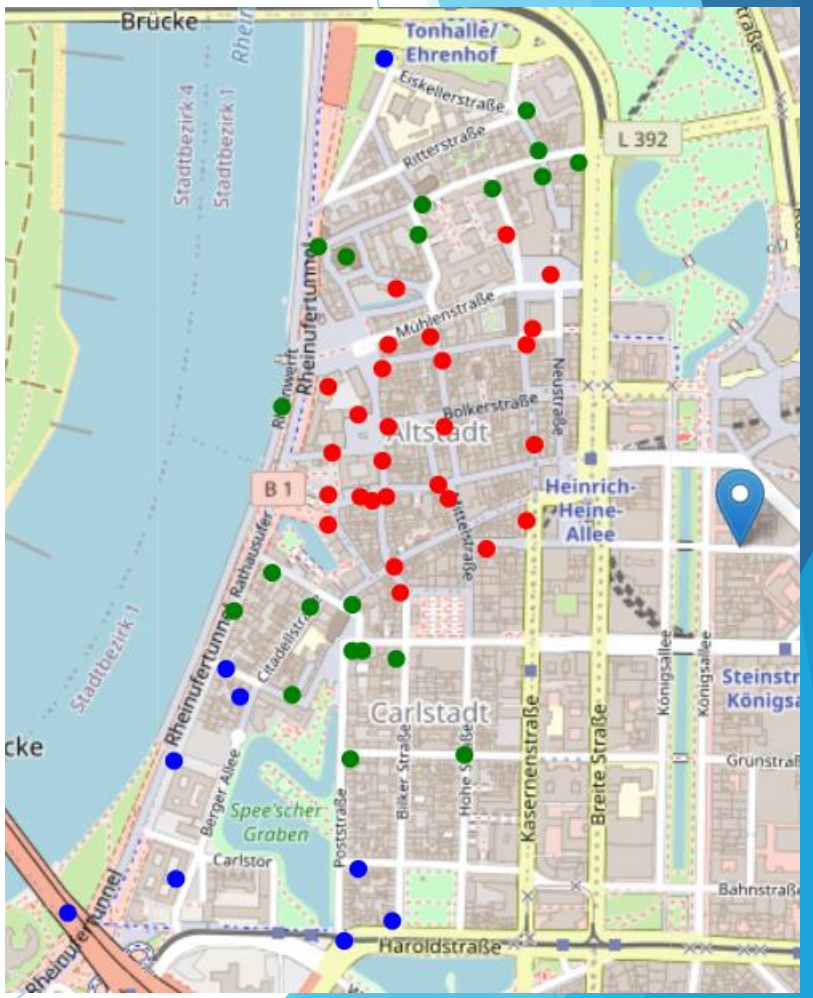
Location selection – Secondary analysis

- **First, we select generate candidate locations (micro level selection).**
- We extract each street name inside the two polygons using **OverpassAPI.**
- Each street is a candidate
- K-Means will be applied to search for candidates
- Parameters:
  - Restaurants in 200m radius
  - Distance t next Chinese restaurants
  - Distance to city center



Location selection – K-Means results

- Blue cluster: nearly **no restaurants** in the vicinity, **high distance to the next Chinese restaurant** and a **higher distance to the city center.**
- Red cluster: **high restaurant density** (>20), **low distance to the next Chinese restaurant** and **medium distance to the city center**
- Green cluster: **medium restaurant density** (10), **medium distance to the next Chinese restaurant** and **medium distance to the city center**
- asd



Location selection – Discussion

- Depending on the stakeholders preferences, the locations in the first and second cluster can be considered optima.
- The locations in the first cluster have almost no restaurants nearby and are the furthest away from nearby Chinese restaurants.
  - However, this could also be due to the fact that these locations have certain disadvantages such as few parking spaces, far from the city center, etc.
- The areas in the second cluster on the other hand have some restaurants nearby and are closer to the city center.
  - These areas could prove to be better candidates. A deeper analysis with more parameters could clarify this.

Conclusion

- In this study, we generated location proposals for a new **Chinese restaurant** in **Düsseldorf, Germany.**
- We performed a **two step analysis** to reach our goal.
- In a first step, we **identified the candidate districts** in which we might be willing to open the restaurant.
- In the second step, we used **unsupervised learning** to **generate clusters of candidate locations** (street namess).
- Advantages of each cluster were clearly expressed so that the best possible location can be chosen by the stakeholders.
- Using the candidate locations the stakeholders can search for places to rent or buy.