Predicting rental prices in Hamburg
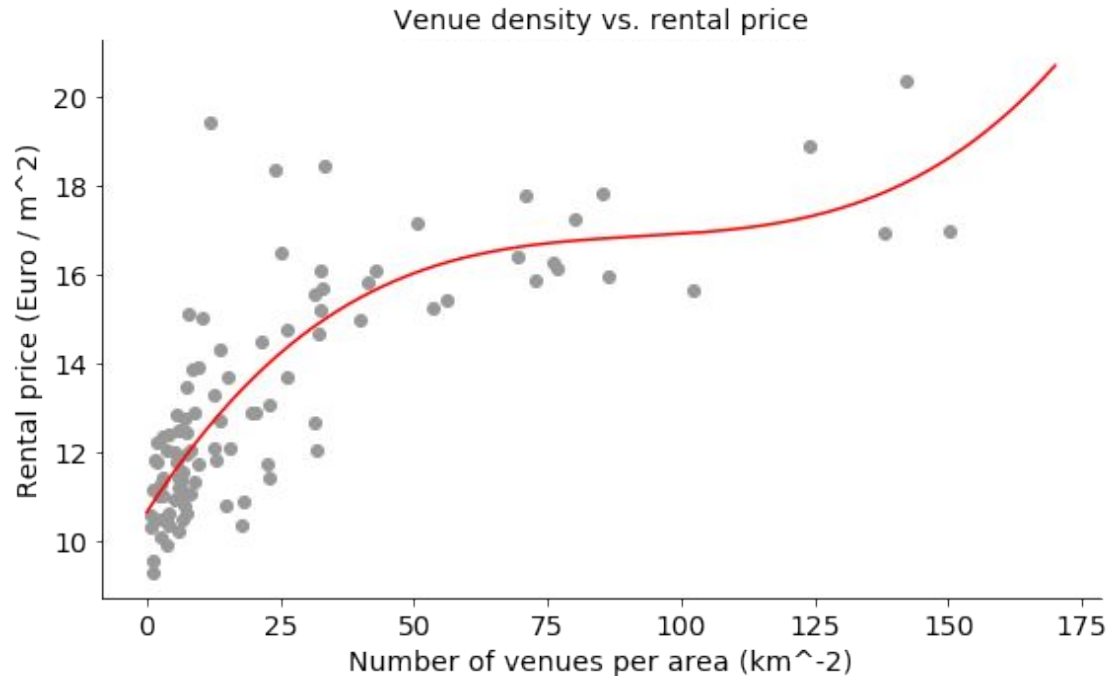
20/04/2020 - Troy Figiel

Introduction

-   Hamburg is a diverse city with many different districts
-   Rental prices in Hamburg also vary significantly
-   Which districts have higher rental prices? Can we understand why?
-   We focus on the amount and type of venues in neighbourhoods

Data acquisition

- Geographical data including postal codes from https://opendatasoft.com
- Rental prices scraped from https://miet-check.de
- Venue information obtained through the Foursquare API (https://foursquare.com)

Venue density as strong predictor

- Venue density as the total number of venues divided by the area of the postal code
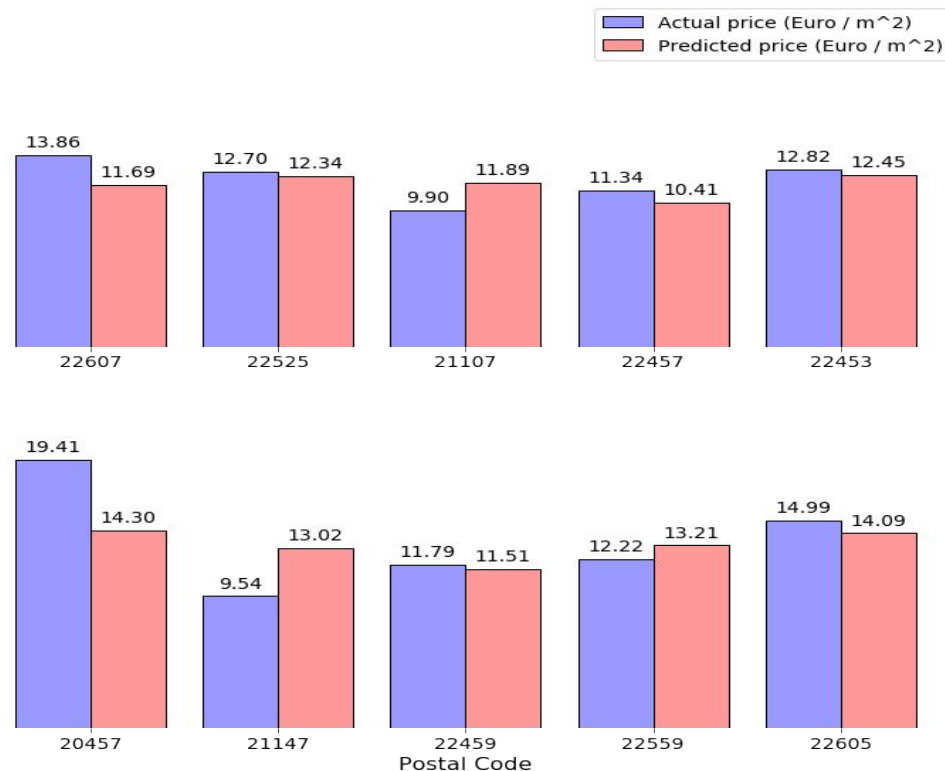

Venue density vs. rental price

Distinguishing venue categories

- Foursquare comes with ten main categories: *Food* and *Shop & Service* are most important for our predictions
- *Food* strongly correlated with the venue density! *Shop & Service* provides a better increase in predictive power
- Increasing the ratio of *Shop & Service* venues has an overall **negative** effect on the rental price
- Strongest effect still provided by venue density

Linear regression on seven features

- We build a linear regression model on seven features including *Food, Shop & Service* and the venue density
- Test the model according to a 90%-10% train-test split
- Overall, good performance, but outliers skew the results!

Improving the model

- Including more categories: Foursquare has many more venue categories. Does our model get better if we include more?
    - **Problem**: The feature space becomes high-dimensional!
    - **Possible solution**: Linear regression might need to be adjusted by a LASSO regularizing term
- One of the outliers in the test case had a very low venue density: The postal code area included a large area of water and the harbour. Can we correct for the venue density?
- Is there variability of the rental prices per postal code? This might be more important when the area is large

Conclusion

- The amount and type of venues have a strong effect on the rental price in an area
- We can predict most rental prices within a euro per square meter!
- Before deciding on a district to move to, it would be wise to consider what type of venues you want to have nearby