

Data Analysis Project 1

MA8701

Group 5 : Yellow Submarine

15 February, 2021

Note on Open Science

To pursue the idea of reproducible research, the chosen dataset as well as the code for our analysis are publicly accessible:

- dataset: <https://data.ub.uni-muenchen.de/2/1/miete03.asc>
- code: <https://github.com/FlorianBeiser/MA8701>

The Data Set

In this project, we analyse a real dataset using shrinkage methods. For our project work we use the Munich Rent 2003 data set as described in <https://rdrr.io/cran/LinRegInteractive/man/munichrent03.html>. The data set has 12 covariates, of which many are suffering multicollinearity, a brief introduction to these parameters are listed below:

- `nmqm`: rent per square meter (double)
- `wfl`: area in square meters (int)
- `rooms`: number of rooms (int)
- `bj`: year of construction (factor)
- `bez`: district (factor)
- `wohngut`: quality of location (int)
- `wohnbest`: high quality of location (int)
- `ww0`: hot water supply available (int)
- `zh0`: central heating (int)
- `badkach0`: tiled bathroom (int)
- `badextra`: high-quality bathroom (int)
- `kueche`: upscale kitchen equipment (int) and the response
- `nm`: rental price (double).

For the data analysis, the aim is to perform regression. Our data set is suited for that, since it suffers from multicollinearity as we see in Figure 1. For further data analysis, we store the data set in an R data frame.

Regression

We start with a vanilla LM regression for reference.

```
##          summary.lm_mod...coef.summary.lm_mod...coef...4.....0.05...4...1.4.
## (Intercept)                                6.944363e-09
## wfl                                           1.183420e-130
## rooms                                         4.474346e-02
## bj1924                                        3.936400e-07
```

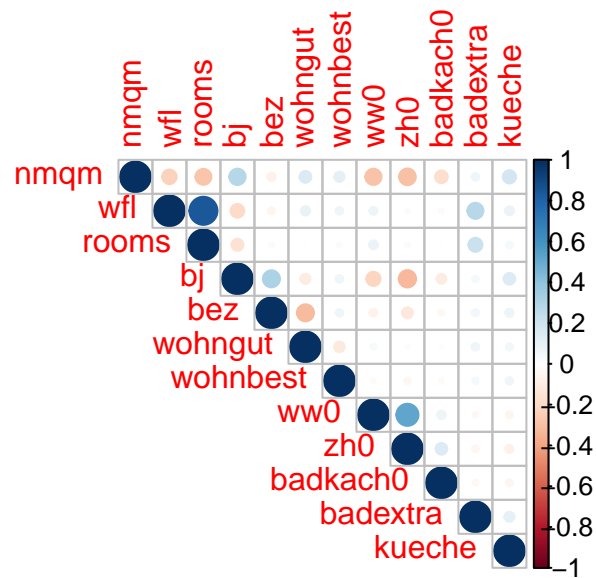


Figure 1: Correlation between the covariates

Clearly, the area `wfl` is strongly related to the rent price. Surprisingly in the regression, the significance of different `bjs` and `bezs` varies a lot.

Shrinkage

After we saw the results for the plain linear regression, we continue with the shrinkage methods.

```
-> ->
```

```
-> -> -> -> -> -> -> -> -> -> ->
```

```
->
```

```
->
```