

Multivariate Statistics: Exercise 9

December 5, 2018

Factor analysis:

Use the data set *cardata.csv* from last exercise, with the same kind of preprocessing. Use the function `pfa()` for Principal Factor Analysis (PFA) from the package `library(StatDA)` for the following tasks, and always extract two factors (might be too few in practice).

- (a) Compute loadings and scores with your favorite parameter settings, show the results in a biplot, and interpret these results.
 - (b) Compute a diagnostics plot with orthogonal and scores distances, similar as for PCA.
2. Perform the tasks from 1. for robust PFA, based on the MCD estimator (`covMcd()` from the package `rrcov`). Compare with the results from 1.
3. Perform task 1. only for the non-diesel cars (see variable `fuel.type`). Project the diesel cars into the diagnostics plot. What do you conclude?
4.
 - (a) Compute again classical PFA, but don't rotate the loadings.
 - (b) Now load the package `GPArotation`, and compute classical PFA again, once for "varimax" rotation, and once for "oblimin" rotation. Compare and interpret the resulting biplots.
 - (c) Compute "by hand" the rotation matrices which allow you to get from the unrotated loadings 4.(a) to those from 4.(b). Check in which case you get an orthogonal rotation matrix. Using the rotation matrices, how can you obtain the rotated scores?

Save your (successful) R code together with short documentations and interpretations of results in a text file (= R script file), named as *Matrikelnummer_9.R* (no word document, no plots). Submit this file to Exercise 9 of our tuwel course (deadline December 4).