

Prof. Dr. Peter Ruckdeschel
Carl von Ossietzky Universität Oldenburg

Abstract

Titel: "Robust Prediction of Extreme Length of Stays in Intensive Care"

We present research in progress in the framework of our interdisciplinary project "Robust Risk Estimation" funded by Volkswagen Foundation.

In the presence of ever growing costs in intensive care, good predictive tools are a major concern in current public health. A considerable part of these costs can be attributed to extremely long length of stays (LOS) in intensive care. We are concerned with finding (better) predictors of these extremely long stays.

Starting from the 1990s, the interdisciplinary intensive care unit (ICU) of the department for anesthesiology and intensive care medicine of the University Hospital Jena introduced and established the electronic patient documentation system COPRA (www.copra-system.de). It includes all relevant vital parameters as well as diagnoses, laboratory results, all medications, LOS and much more of the ICU patients. Over this time period a very comprehensive database for critical ill patients has emerged. We use a dataset consisting of 40 variables of more than 11,000 patients to derive a robust regression model for predicting LOS.

To obtain a parsimonious model we select relevant variables beforehand. This is done by component-wise gradient boosting, which is a machine learning method for optimizing prediction accuracy and for obtaining model estimates via gradient descent techniques. This method carries out variable selection during the fitting process without relying on heuristic techniques such as stepwise variable selection.

Following the general philosophy of our project "Robust Risk Estimation", we attempt to avoid overly high influence of single observations on future predictions using robust alternatives to classical estimation approaches.