



KU LEUVEN

Statistics and Econometrics Seminar

Joint organization by
ORSTAT, Faculty of Business and Economics and the Statistics Research Group,
Faculty of Science
Leuven Statistics Research Center

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“A robust variant of the lasso: sparse least trimmed squares regression”

Thursday, February 23, 2012

12.00–13.00h

Location: Room HOG 03.101, Naamsestraat 69, Leuven.

Supporting research project: GOA-project 2007/04

Abstract. Since the availability of data sets with a large number of variables is increasing, sparse model estimation is a topic of high importance in modern data analysis. Sparse regression allows for better prediction performance through variance reduction, while at the same time improving interpretability of the resulting models due to the smaller number of explanatory variables. A frequently used estimator for sparse regression is the least absolute shrinkage and selection operator (lasso), which adds an L_1 penalty on the coefficients to the least squares objective function. Due to the nature of the penalty, the regression coefficients are shrunk such that variability in prediction may be reduced and computational problems with high-dimensional data are avoided, while variable selection is achieved at the same time by shrinking some coefficients to exactly 0. However, the lasso is not robust against outliers in the data. Modifications of the lasso that are robust against vertical outliers have been proposed in the literature, but those proposals are not robust against leverage points. By adding an L_1 penalty on the coefficient estimates to the well known least trimmed squares (LTS) estimator, a robust and sparse estimator is introduced. For the computation of this sparse LTS estimator, a C-step algorithm is presented. The breakdown point of sparse LTS and other lasso-type estimators is computed, and sparse LTS is compared to other methods for sparse regression and variable selection.

Joint work with: Christophe Croux and Sarah Gelper.