

On the Distribution of the Adaptive LASSO Estimator

Dr. U. Schneider (University of Vienna)
joint work with B.M. Pötscher (University of Vienna)

January 14, 2009

Penalized least squares (or maximum likelihood) estimators, such as the famous LASSO, have been studied intensively in the last few years. While many properties of these estimators are now well understood, the understanding of their distributional characteristics, such as finite-sample and large-sample limit distributions, is still incomplete.

We study the distribution of the adaptive LASSO estimator (a variant of the LASSO introduced by Zou, 2006) for an orthogonal normal linear regression model in finite samples as well as in the large-sample limit. We show that these distributions are typically highly non-normal regardless of the choice of tuning of the estimator. The uniform convergence rate is obtained and shown to be slower than $n^{-1/2}$ in case the estimator is tuned to perform consistent model selection. Moreover, we derive confidence intervals based on the adaptive LASSO and also discuss the questionable statistical relevance of the 'oracle'-property of this estimator. Simulation results for the non-orthogonal case complement and confirm our theoretical findings for the orthogonal case. Finally, we provide an impossibility result regarding the estimation of the distribution function of the adaptive LASSO estimator.

Dr. Schneider will give a second talk: Jan. 15, 2009, 14:15 – 15:15 in the Institut für Numerische und Angewandte Mathematik (NAM), Seminar Room (2nd floor), Lotzestr. 16-18, 37083 Göttingen, <http://www.num.math.uni-goettingen.de>

On the Distribution of the Adaptive LASSO Estimator, Part II.

In this talk, we will revisit some of the topics from part I and discuss these in more depth. In particular, we will look at certain penalized least squares (LS) estimators and discuss some ideas behind them, including the underlying optimization problems and computational issues, as well as their relationship to other classical (post-)model selection estimators.

Moreover, we will go back to the framework of moving-parameter asymptotics from the first talk and examine why one needs to use such techniques. In this context, we will also look at more results of penalized LS estimators in terms of their model selection probabilities.