CrossMark

Variable selection and estimation using a continuous approximation to the L_0 penalty

Yanxin Wang[1,2] · **Qibin Fan**[3] · **Li Zhu**[4]

Abstract   Variable selection problems are typically addressed under the regularization framework. In this paper, an exponential type penalty which very closely resembles the L_0 penalty is proposed, we called it EXP penalty. The EXP penalized least squares procedure is shown to consistently select the correct model and is asymptotically normal, provided the number of variables grows slower than the number of observations. EXP is efficiently implemented using a coordinate descent algorithm. Furthermore, we propose a modified BIC tuning parameter selection method for EXP and show that it consistently identifies the correct model, while allowing the number of variables to diverge. Simulation results and data example show that the EXP procedure performs very well in a variety of settings.

✉ Yanxin Wang
    wyxinbj@163.com

1   School of Science, Ningbo University of Technology, Ningbo 315211, China

2   Department of Statistics, University of Warwick, Coventry CV4 7AL, UK

3   School of Mathematics and Statistics, Wuhan University, Wuhan 430072, China

4   School of Applied Mathematics, Xiamen University of Technology, Xiamen 361024, China