

Seamless-L0 (SELO) Method for Variable Selection

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We propose the seamless-L0 (SELO) penalty for penalized likelihood variable selection methods. The SELO penalty function is symmetric about 0 and non-differentiable at the origin, yet it is smooth, increasing and concave on the positive real numbers. The penalized likelihood procedure with SELO penalty is shown to have the oracle property; the result holds for the usual linear regression model and, when certain regularity conditions are satisfied, for generalized linear models. Tuning parameter selection is crucial to the performance of the SELO procedure. Tuning parameter selection procedures which do not require the use of testing data are of particular interest. We propose a BIC-like tuning parameter selection method for SELO and show that it consistently identifies the true model. Simulation results and a real data example show that the SELO procedure with BIC tuning parameter selection performs very well, even when the sample size is relatively small.