



Selecting Tuning Parameters for sparse regression models via Generalized Information Criterion

Fumitake Sakaori*

Chuo University, Tokyo, Japan - sakaori@math.chuo-u.ac.jp

Sparse regression models, e.g., Lasso, SCAD, and elastic net, have become very popular. These methods estimate model parameters by minimizing penalized or regularized objective function, where the penalty is imposed to the L_1 -norm of the parameters, and then simultaneously produce estimators of the parameter and sparseness of variables, that is, variable selection. Hence, prediction accuracy and sparsity for these methods depend on selection of the tuning parameters. Suitable choice of tuning parameters give a prediction optimality and/or a consistency of selecting variables. Information criteria such as AIC and BIC are often used to select the tuning parameters for gaussian sparse regression models. However, these criteria have been derived for only maximum likelihood estimators, and are not appropriate for regularized estimators. For non-MLE estimators, the generalized information criteria (GIC) given by Konishi and Kitagawa (1996) can be used instead of AIC and BIC. GIC is a natural extension of AIC or TIC for non-MLE estimators with differentiable functional form. In this study, we derive the exact GIC for some sparse regression models, and verify its properties.

Keywords: Lasso; GIC.