Generalized Information Criteria for Model Selection with Penalized Maximum Likelihood Estimation

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Abstract

Penalized maximum likelihood estimation has been developed for high dimensional variable selection. The methods with different regularization parameters produce a set of candidate models. Usually cross-validation methods were used to select a best model from the candidate models. Instead we consider generalized information criteria for selecting the best model. We investigate the properties of the criteria. We present the probability of selecting a model by the criteria, and derive the conditions under which the criteria are consistent, overfitted, or underfitted. Simulation examples and an application to actual data are given to verify our results.