High-dimensionality-adjusted Consistent Information Criterion in Multivariate Linear Models

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Abstract: In this paper, we deal with a variable selection in multivariate linear regression models, based on minimization of the generalized Cp (GCp) criterion when the dimension of the response variables vector may be large. Recently, Yanagihara (2016) proposed the high-dimensionality-adjusted consistent GCp (HCGCp) that is the consistent GCp criterion for which consistency can be achieved whenever the dimension of the response variables vector is fixed or goes to infinity. A high probability of selecting the true subset of explanatory variables can be expected under a moderate sample size when the HCGCp criterion is used to select variables, even when there is a high-dimensional response variables vector. Unfortunately, Yanagihara (2016) showed the consistency of HCGCp under the assumption that the true distribution of response variables is the multivariate normal distribution. Needless to say, nobody knows the true distribution of response variables. Hence, we show that the robustness to nonnormality of the HCGCp, i.e., the HCGCp has a consistency property under the violation of normality of the true distribution.