Model Confidence Bounds for Variable Selection

Yang Li

Renmin University of China
E-mail: yang.li@ruc.edu.cn

Abstract: In this article, we introduce the concept of model confidence bounds (MCBs) for variable selection in the context of nested models. Similarly to the endpoints in the familiar confidence interval for parameter estimation, the MCBs identify two nested models (upper and lower confidence bound models) containing the true model at a given level of confidence. Instead of trusting a single selected model obtained from a given model selection method, the MCBs proposes a group of nested models as candidates and the MCBs' width and composition enable the practitioner to assess the overall model selection uncertainty. A new graphical tool — the model uncertainty curve (MUC) — is introduced to visualize the variability of model selection and to compare different model selection procedures. The MCBs methodology is implemented by a fast bootstrap algorithm that is shown to yield the correct asymptotic coverage under rather general conditions. Our Monte Carlo simulations and a real data example confirm the validity and illustrate the advantages of the proposed method.