Abstract

THESIS PAPER: A Comparison of Bayesian Variable Selection Approaches for Linear Models

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Bayesian variable selection approaches are more powerful in discriminating among models regardless of whether these models under investigation are hierarchical or not. Although Bayesian approaches require complex computation, use of the Markov Chain Monte Carlo (MCMC) methods, such as, Gibbs sampler and Metropolis-Hastings algorithm make computations easier. In this study we investigated the effectiveness of Bayesian variable selection approaches in comparison to other non-Bayesian or classical approaches. For this purpose, we compared the performance of Bayesian versus non-Bayesian variable selection approaches for linear models. Among these approaches, we studied Conditional Predictive Ordinate (CPO) and Bayes factor. Among the non-Bayesian or classical approaches, we implemented adjusted R-square, Akaike Information Criterion (AIC) and Bayes Information Criterion (BIC) for model selection. We performed a simulation study to examine how Bayesian and non-Bayesian approaches perform in selecting variables. We also applied these methods to real data and compared their performances. We observed that for linear models, Bayesian variable selection approaches perform consistently as that of non-Bayesian approaches.