Abstract of the Dissertation

Objective Bayesian Hypothesis Testing in Multivariate Situations

by

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When we use Bayesian methods to test hypotheses and select models, the Bayes factors are highly sensitive to the prior distributions of the parameters and this dependence does not disappear even when the sample size increases. If we choose non-informative priors especially when the prior information is weak, the Bayes factor is defined up to a ratio of unspecified constants. Most of the methods are classified into four categories: default proper prior, BIC and its modifications, intrinsic Bayes factor and fractional Bayes factor. In my dissertation, I discuss the usage of the last three methods in multivariate linear regression model selection problem.

I give the intrinsic prior for means and the common variance for multiple linear regression model. It is a further more achievement based on the results of my master thesis. Besides, the fractional intrinsic prior for multivariate linear normal regression model with unknown mean and variance is also provided. Hence, I successfully prove the conjecture in Berger and Pericchi (2001). In addition to that, I calculate the fractional intrinsic priors for Gaussian Graphical Models (GGM) problem by using several different combinations of priors, and receive neat results. The achievements are meaningful and influential for model selection problems like them. At last, I compare the behaviors of BIC, FBF approximation and EBIC in GGM situations by simulation study. During my computations, I prove some significant lemmas, which are very useful and helpful in universal problems.