

Objective Bayesian priors

Elías Moreno

Universidad de Granada

Objective Bayesian methods mean that the Bayesian inference is carried out without using subjective prior information on the parameters of the underlying sampling models. This is a realistic setting for complex problems. Therefore, the prior distributions to be used in the Bayesian analysis are solely determined from the sampling models.

While methods for deriving priors for estimation are available since the middle of the last century (Jeffreys 1961, Jaynes 1968, Bernardo 1979, Bernardo and Berger 1992), objective priors for testing problems have only recently been proposed (Berger and Pericchi 1996, Moreno, Bertolino and Racugno 1998). The difficulty with Bayesian testing is that objective priors for estimation are typically improper and while they usually provide proper posterior distributions, on which the estimation is based, they do not determine marginal densities for the data which are needed for testing problems.

In this talk we will focus on intrinsic priors for testing problems involving nested models and some applications in linear models (Casella and Moreno 2002, Moreno, Girón and Torres 2003). The outline of the talk is as follows:

1. Arithmetic intrinsic Bayes factor
2. Intrinsic equation
3. Improper priors
4. Intrinsic priors for linear models
5. An application: calibrating p-values

References

Berger, J.O. and Bernardo, J.M. (1992). On the development of reference priors. *Bayesian Statistics 4* (Bernardo et al eds). *Oxford University Press, Oxford*.

Berger, J.O. and Pericchi, L.R. (1996). The intrinsic bayes factor for model selection and prediction. *JASA*, **91**, 109-122.

Bernardo, J.M. (1979). Reference posterior distributions for Bayesian analysis. *JRSS Series B*, **41**, 113-147.

Casella, G. and Moreno, E. (2002). Variable selection in regression. Submitted.

Jaynes, E.T. (1968). Prior Probabilities. *IEEE Transactions on System Science and Cybernetics*, **SSC-4**, 227-241.

Jeffreys, H. (1961). *Theory of Probability*. Oxford University Press, London.

Moreno, E. Bertolino, F. and Racugno, W. (1998). An intrinsic limiting procedure for model selection and hypothesis testing. *JASA*, **93**, 1451-1460.

Moreno, E., Girón, F.J. and Torres, F. (2003). Intrinsic priors for hypothesis testing in normal regression models. *Rev. R. Acad. Cien. Series A.*, **97**, 53-61.