L_1-*Statistical Procedures and Related Topics*
IMS Lecture Notes – Monograph Series (1997) Volume 31

Bayes factors for intrinsic and fractional priors in nested models. Bayesian robustness

Elias Moreno

University of Granada, Spain

Abstract: For model selection the Bayes factor is not well defined when using default priors since they are typically improper. To overcome this problem two methods have recently been proposed. These methods, intrinsic and fractional, are studied here as methods to producing proper prior distributions for model selection from the improper conventional priors for estimation. For nested models, fractional priors are here defined and a comparison with intrinsic priors introduced by Berger and Pericchi is carried out. Robustness of the Bayes factor as the prior varies over the classes of intrinsic and fractional priors, is studied. Some illustrative examples are provided.

Key words: Bayes factor, bayesian robustness, fractional priors, intrinsic priors, model selection.

AMS subject classification: Primary 62A15; secondary 62F15.

1 Introduction

Suppose that two models M_1 and M_2 are proposed to describe the data $z = (x_1, x_2, ..., x_n)$. Under model M_i the data are distributed as $f_i(z|\theta_i)$, and the prior distribution for θ_i is $\pi_i(\theta_i)$, $i = 1, 2$. The Bayesian way to compare the two models consists in computing the posterior odds

$$\frac{\Pr(M_2|z)}{\Pr(M_1|z)} = B_{21}(z)\frac{\Pr(M_2)}{\Pr(M_1)}.$$

Thus, the Bayes factor $B_{21}(z)$ encapsulates all what the data have to say