AN APPROACH TO PRIOR SELECTION

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Our purpose in this paper is to provide an approach to prior selection in the classical and Bayesian frameworks. The advantage and importance of prior selection come from the fact that it provides a powerful approach when we cannot determine a prior exactly. To make our point clear we give the following example. Let $X_t = \gamma X_{t-1} + \varepsilon_t$ be an $AR(1)$ model, where $\varepsilon_t \sim N(\theta, 1)$ and θ is a random parameter. Consider testing the following hypotheses

$$\begin{cases} H_0 : \theta \sim N(0,1) & \text{(standard Gaussian distribution)} \\ H_1 : \theta \sim C(0,1) & \text{(standard Cauchy distribution)} \end{cases} \tag{1}$$

based on a realization of time series, $\{x_t\}_{t=1}^n$. We introduce a powerful method for testing hypotheses such as (1) in classical statistics. This method can be considered as an alternative method to the parametric empirical Bayes estimation or nonparametric empirical Bayes test, [1]. We extend this method of prior selection to the Bayesian framework.

Key Words: Classic, Bayes and empirical Bayes test, likelihood ratio test, uniformly most powerful test.

References:

[1] Robert, C.P. (2001) *The Bayesian Choice* (2nd edition). Springer, New York.