Comparison of Bayesian objective procedures for variable selection in linear regression

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Erratum to: Test

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The original version of this article unfortunately contained flaws in Lemma 3.1 and Theorem 3.2. The corrected Lemma 3.1 and Theorem 3.2 are given below:

Lemma 3.1 *The lower bound of the Bayes factor (3.5), $\inf_{\mathcal{B} \in [0,1]} B_{li}^*(n, \mathcal{B}) = B_{li}^*(n, 0)$ is given by*

$$\left(\frac{1}{\pi} \left(\frac{n}{i+1} \right)^{(n-i)/2} B \left(\frac{1+i-n}{2}, \frac{1}{2} \right) \right. \\ \left. \times {}_2F_1 \left(\frac{i-n}{2}, \frac{1+i-n}{2}, \frac{2+i-n}{2}; -\frac{i+1}{n} \right) \right)^{-1}, \quad (3.8)$$

where ${}_2F_1(a, b, c; z)$ denotes the hypergeometric function.

Further, for all $i \geq n$, the inf is an increasing function of i .

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Proof As the Bayes factor is an increasing function of the statistic $\mathcal{B}$, the minimum is attained at $\mathcal{B} = 0$. For $\mathcal{B} = 0$, the Bayes factor (3.5) reduces to the expression

$$B_{1i}^*(n, 0) = \left(\frac{2}{\pi} \int_0^{\pi/2} \left(1 + \frac{n}{(i+1) \sin^2 \varphi} \right)^{(n-i)/2} d\varphi \right)^{-1}.$$

This inf becomes 0 for $i < n$ as the integral diverges to infinity, and is equal to (3.8) for $i \geq n$. Note that for $i = n$, the inf equals 1. The proof that (3.8) is increasing in i , for $i \geq n$, is somewhat cumbersome as the proof uses some specific properties of the hypergeometric function and hence it is omitted. $\square$

Theorem 3.2 *For any model M_i with i regressors such that $i \geq n$, the posterior probability $P^*(M_i|n, \mathcal{B}_{1i}^*)$ is a decreasing function of i that attains its maximum at $i = n$; the maximum of this probability being $1/2$.*

Proof As $i \geq n$, the value of the R_i^2 statistic is equal to 1 and consequently $\mathcal{B}_{1i}^*$ is equal to 0; therefore, from Lemma 1 and the fact that the posterior probability is a monotonic decreasing function of the Bayes factor, the theorem follows suit. $\square$

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