

# A Bridge between Cross-validation Bayes Factors and Geometric Intrinsic Bayes Factors

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**Abstract.** Model Selections in Bayesian Statistics are primarily made with a Statistic method known as Bayes Factors. Bayes Factors require a careful assessment of prior distributions as the Intrinsic Priors of Berger and Pericchi (1996) and a complicated integration over the parameter space. Recently researchers have been proposing alternatives to Bayes Factors which require neither integration nor specification of priors. These developments are still in a very early stage and are known as Prior-free Bayes Factors and Bayesian "Stacking." This kind of method and Intrinsic Bayes Factor (IBF) both avoid specification of prior. However, this Prior-free Bayes factor might need a careful choice of a training sample size. We propose here a way of choosing training sample sizes based on Intrinsic Bayes Factors. In this article, we are going to present different cases with a different number of parameters both numerically and theoretically in order to explain the ideas of choosing a reasonable training sample size for this Prior-free Bayes Factors.

**Keywords:** Cross-validation Bayes Factors · Geometric Intrinsic Bayes Factors · Stacking.

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