

“Non-local Prior Densities for Objective Bayes Hypothesis Tests”

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Abstract

Common objective Bayesian hypothesis tests result in exponential accumulation of evidence in favor of the alternative hypothesis when the alternative hypothesis is true, but only sub-linear accumulation of evidence in favor of point null hypotheses when the null hypotheses are true. Thus, it is often impossible for an experiment to provide “strong evidence” in favor of the null hypothesis even when moderately large sample sizes have been obtained. Because Bayesian hypothesis tests yield probability statements regarding the truth of the null hypothesis (rather than a frequentist decision to simply “not reject”), this imbalance in the rates of accumulation of evidence is highly problematic. In this talk, I review and contrast asymptotic convergence rates of Bayes factors for different classes of objective prior distributions and propose two new classes of prior densities that correct the imbalance inherited by standard objective priors. These prior densities are used to construct alternative hypotheses in Phase II clinical trials with continuous monitoring, and the operating characteristics of the resulting designs are compared to more standard Bayesian Phase II designs