Abstract:
In many applications Bayes theorem is employed using priors that shall represent the absence of prior knowledge. The selection of according priors has long been researched, and several different principles have been suggested. The reference prior of Berger & Bernardo may be viewed as the currently favored one. For single-parameter problems it maximizes the expected Kullback-Leibler divergence between posterior and prior, and thus selects the prior such that it is least informative in a specified sense. We derive a noninformative prior by sequential maximization of Shannon's mutual information in the multi-group parameter case assuming reasonable regularity conditions. It is shown that the derived prior coincides with the reference prior proposed by Berger and Bernardo, and that it can be considered as useful alternative expression for the calculation of the reference prior. We further give an explicit expression of the reference prior for the generalized marginal random effects model and prove propriety of the resulting posterior. The frequentist properties of the proposed inference are investigated through simulations and the robustness is studied when the underlying distributional assumptions are violated. Finally, we apply the model to the adjustment of current measurements of the Planck constant.