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Title: Multi-pass Bayesian Estimation: a robust Bayesian method
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The prior plays a central role in Bayesian inference, but specifying a prior is often difficult, and a prior considered appropriate by a modeller may be significantly biased. To address this, we propose multi-pass Bayesian estimation (MBE), a robust Bayesian method capable of adjusting the prior’s influence on the inference result based on the prior’s quality. MBE adjusts the relative importance of the prior and the data by iteratively performing approximate Bayesian updates on the given data, with the number of updates determined using a cross-validation method. Our method provides robust inference results as compared to standard Bayesian inference and maximum likelihood estimations on several simulated and real-world datasets.