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Laplace approximation in NIMBLE

NIMBLE is a flexible platform for programming and fitting hierarchical models in R. It adopts and extends the BUGS language for model declaration, and makes it possible for users to write their own algorithms in addition to using those (e.g. MCMC) provided by NIMBLE. Models and algorithms can then be compiled into C++ for efficiency. The Laplace approximation is often used to integrate out latent states from the complete data likelihood of hierarchical models. The resulting marginal likelihood is then used to estimate parameters of interest. In this talk, we will introduce the new functionality of Laplace approximation in NIMBLE, which depends on the new NIMBLE automatic differentiation system. The Laplace approximation enables one to easily and efficiently fit hierarchical models via maximum likelihood or via MCMC where latent states are completely or partially integrated out. We will use an occupancy model to illustrate the Laplace-within-MCMC functionality in NIMBLE.