Do's and don'ts of model comparison techniques

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Abstract: Several model comparison techniques exist to select a best model from a set of candidate models. This study explores the performance of model comparison statistics among several Bayesian software packages that are often used for spatially discrete disease modelling: the deviance information criterion (DIC), the Watanabe-Akaike information criterion (WAIC) and the log marginal predictive likelihood (LMPL). We focus on the software packages CARBayes, OpenBUGS, NIMBLE and Stan, in which we fit Poisson models to disease incidence outcomes with intrinsic conditional autoregressive, convolution conditional autoregressive and log-normal error terms. From three data analyses, that differ in the number of areal units and disease prevalence, we learn important disparities in model selection. Based on these conclusions, we provide recommendations on the optimal use of model comparison statistics for all kind of applications.

Key words: DIC; Disease mapping; LMPL; Software packages; WAIC

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