

Estimating generalized linear latent variable models with higher-order extended variational approximations

Generalized linear latent variable models (GLLVMs) support joint modeling of continuous, count, ordinal, and binary variables with arbitrary structures among latent variables and observed variables. Estimation of GLLVMs is challenging when specifying complex models that include many types of observed variables and many latent variables. Recently, various methods based on the variational approximation have been proposed in the literature to estimate GLLVMs. To improve the estimation accuracy of these methods, we derive an extended variational approximation estimator for GLLVMs based on a higher-order expansion and evaluate its properties. The approach is compared against alternative methods, such as the computationally efficient but less accurate Laplace approximation and the gold standard method of adaptive Gauss-Hermite quadrature. We discuss the trade off between accuracy and computational efficiency with respect to different estimation methods and different model structures.