Stability of the Gibbs Sampler for Bayesian Hierarchical Models

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We characterise the convergence of the Gibbs sampler which samples from the joint posterior distribution of parameters and missing data in hierarchical linear models with arbitrary symmetric error distributions. We show that the convergence can be uniform, geometric or sub-geometric depending on the relative tail behaviour of the error distributions, and on the parametrisation chosen. Our theory is applied to characterise the convergence of the Gibbs sampler on latent Gaussian process models. We indicate how the theoretical framework we introduce will be useful in analyzing more complex models.

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