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Title:  Interplay between Bayesian theory and computation

Abstract:

We advocate a quasi-likelihood approach and a spike-and-slab modeling framework for large-scale Bayesian data analysis. The resulting posterior distribution ($\Pi$ say), in the linear regression case can be sampled by Markov chain Monte Carlo (MCMC) at the cost of $O(p^2)$ per iteration (compared to at least $O(\min(n,p)p^2)$ for the state of the art), where $n$ is the sample size and $p$ is the dimension of the parameter space.

Of practical importance are the questions of quantifying the mixing times of MCMC sampling from $\Pi$, and understanding the behaviors of variational approximations to $\Pi$. We argue — and this is the main theme of the talk — that the theoretical statistical properties of $\Pi$ can be exploited to shed some light on these computational questions. We illustrate the results with sparse linear regression and sparse principal component analysis.