A fast and more accurate Approximate Bayesian Inference approach for Bayesian Lasso regression

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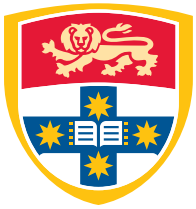

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Statement of originality

This is to certify that to the best of my knowledge, the content of this thesis is my own work. This thesis has not been submitted for any degree or other purposes.

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Abstract

Variational Approximation: as a deterministic approximation algorithm for Approximate Bayesian Inference(ABI), has been used prevalently among the Bayesian Statistical community for fast Approximate Bayesian Inference(ABI). It is also a faster alternative to Monte Carlo methods such as Markov Chain and Monte Carlo(MCMC). Nevertheless, the Variational Approximation algorithm suffers from the loss of approximation accuracy under some special circumstances, such as underestimating the variance when the correlation of variables becomes large.

In addition, the Lasso penalized regression could be estimated in the Bayesian paradigm to facilitate standard error estimates of coefficients and credible intervals.

In this thesis, we develop two fast and more accurate variational approximation algorithms for the Bayesian Lasso regression problem. The main idea behind these methods involves using the information of local parameter estimates by accommodating the univariate and multivariate lasso distribution, which results in more accurate global parameter approximation by Gaussian Variational Approximation. Our experimental results on numerous real-world datasets suggest their high Variational approximation accuracy with a descent time efficiency, compared with the traditional Monte Carlo methods and Mean-Field Variational Bayes(MFVB).

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This paper will provide a

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