An Approximate Bayesian Inference approach using an idea of Local and Global approximation

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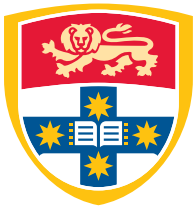

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Statement of originality

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.

I certify that the intellectual content of this thesis is the product of my own work and that all the assistance received in preparing this thesis and sources have been acknowledged.

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Abstract

Lasso penalized regression is a popular technique for simultaneous coefficient estimation and variable selection. Issues associated with this method include potential sensitivity of estimation and variable selection to the choice of tuning parameter, and calculating appropriate standard errors of the estimates. This project will adopt a Bayesian approach and develop various fast Approximate Bayesian Inference (ABI) methods for this problem. ABI methods include Gaussian Variational Approximate inference, Moment Propagation, Approximate Posterior Statistic Matching, and Population Based Variational Bayes (time permitting). A variety of model representations will also be considered. We compare these to much slower MCMC and frequentist methods to assess the accuracy of standard error estimates for ABI methods, as well as model selection accuracy.

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