

## Accepted Manuscript

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PII: S0167-9473(16)30235-3

DOI: <http://dx.doi.org/10.1016/j.csda.2016.10.008>

Reference: COMSTA 6358

To appear in: *Computational Statistics and Data Analysis*

Received date: 17 December 2015

Revised date: 28 September 2016

Accepted date: 10 October 2016



Please cite this article as: Li, H., Pati, D., Variable selection using shrinkage priors. *Computational Statistics and Data Analysis* (2016), <http://dx.doi.org/10.1016/j.csda.2016.10.008>

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# Variable Selection Using Shrinkage Priors

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## Abstract

Variable selection has received widespread attention over the last decade as we routinely encounter high-throughput datasets in complex biological and environment research. Most Bayesian variable selection methods are restricted to mixture priors having separate components for characterizing the signal and the noise. However, such priors encounter computational issues in high dimensions. This has motivated continuous shrinkage priors, resembling the two-component priors facilitating computation and interpretability. While such priors are widely used for estimating high-dimensional sparse vectors, selecting a subset of variables remains a daunting task. A general approach for variable selection with shrinkage priors is proposed. The presence of very few tuning parameters makes our method attractive in comparison to adhoc thresholding approaches. The applicability of the approach is not limited to continuous shrinkage priors, but can be used along with any shrinkage prior. Theoretical properties for near-collinear design matrices are investigated and the method is shown to have good performance in a wide range of synthetic data examples and in a real data example on selecting genes affecting survival due to lymphoma.

*Keywords:* Bayesian, Horseshoe, Markov Chain Monte Carlo, Shrinkage priors, Variable selection

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## 1. Introduction

Variable selection in high-dimensional models has received substantial interest in recent years [1] and is a challenging problem for Bayesians. With rapid ad-

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