

# Nonparametric Bayesian Multi-task Learning with Max-margin Posterior Regularization

Jun Zhu\*

Tsinghua University, Beijing, 100084 China  
dcszj@mail.tsinghua.edu.cn

**Abstract:** Learning a common latent representation can capture the relationships and share statistic strength among multiple tasks. To automatically resolve the unknown dimensionality of the latent representation, nonparametric Bayesian methods have been successfully developed with a generative process describing the observed data. In this paper, we will present a discriminative approach to learning nonparametric Bayesian models under a computational framework called regularized Bayesian inference. In particular, we will discuss how to use the successful principle of max-margin learning to improve the prediction performance of nonparametric Bayesian multi-task models. We will discuss both variational approximation and Markov chain Monte Carlo methods to do posterior inference, with real-world experimental results demonstrating their efficacy.

**Key Words:** regularized Bayesian inference, multi-task learning, max-margin learning, posterior regularization