Public Abstract

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Title:Bayesian Variable Selection in Parametric and Semiparametric High Dimensional Survival Analysis

In this dissertation, we propose several Bayesian variable selection schemes for Bayesian parametric and semiparametric survival models for right-censored survival data.

In the first chapter we introduce a special shrinkage prior on the coefficients corresponding to the predictor variables. The shrinkage prior is obtained through a scale mixture representation of Normal and Gamma distributions. The likelihood function is constructed based on the Cox proportional hazards model framework, where the cumulative baseline hazard function is modeled a priori by a gamma process.

In the second chapter we extend the idea of the shrinkage prior such that it can incorporate the existing grouping structure among the covariates. Our selected priors are similar to the elastic-net, group lasso, and fused lasso penalty. The proposed models are highly useful when we want to take into consideration the grouping structure.

In the third chapter we propose a Bayesian variable selection method for high dimensional survival analysis in the context of parametric accelerated failure time (AFT) model. To identify subsets of relevant covariates the regression coefficients are assumed to follow the conditional Laplace distribution as in the first chapter. We used a data augmentation approach to impute the survival times of censored subjects.