The Dantzig selector for statistical models of stochastic processes in high-dimensional and sparse settings

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Abstract

The Dantzig selector, which was proposed by Candés and Tao in 2007, is an estimation procedure for regression models in high-dimensional and sparse settings. In this talk, the Dantzig selectors for some statistical models of stochastic processes are discussed. We apply this procedure to Cox's proportional hazards model and some specific models of diffusion processes and prove the consistency and the variable selection consistencies of the estimators. Based on partial likelihood and quasi-likelihood methods which were studied intensively in low-dimensional settings, we study these statistical models of stochastic processes in high-dimensional and sparse settings, which need some mathematically challenging tasks. The consistencies in the sense of the l_q norm for every $q \in [1, \infty]$ of the estimators are derived from the stochastic maximal inequalities to deal the curse of dimension and some matrix factors and conditions on Hessian matrices of likelihood functions to deal with the sparsities. We use Bernstein's inequalities for martingales and the maximal inequalities using Orlicz norm and matrix conditions using restricted eigenvalue, compatibility factor and weak cone invertibility factor, which are known to be weaker conditions than others. We prove that consistency of the estimator implies the variable selection consistency which enables us to reduce the dimension. Using the dimension reduction, asymptotically normal estimators can be constructed.