Lecture 5.3 (10:20-10:45)

Robust Sure Independence Screening

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We consider the problem of variable screening in ultra-high-dimensional generalized linear models (GLMs) of nonpolynomial orders. Since the popular SIS approach is extremely unstable in the presence of contamination and noise, we discuss a new robust screening procedure based on the minimum density power divergence estimator (MDPDE) of the marginal regression coefficients. Our proposed screening procedure performs well under pure and contaminated data scenarios. We provide a theoretical motivation for the use of marginal MDPDEs for variable screening from both population as well as sample aspects; in particular, we prove that the marginal MDPDEs are uniformly consistent leading to the sure screening property of our proposed algorithm. Finally, we propose an appropriate MDPDE based extension for robust conditional screening in GLMs along with the derivation of its sure screening property. Our proposed methods are illustrated through extensive numerical studies along with an interesting real data application.