Nonparametric variable selection via sufficient dimension reduction

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Abstract: Sufficient dimension reduction (SDR) has proven effective to transform high dimensional problems to low dimensional projections, while losing no regression information and pre-specifying no parametric model during the phase of dimension reduction. However, existing SDR methods suffer from the fact that each dimension reduction component is a linear combination of all the original predictors, and thus can not perform variable selection. In this talk, we propose a regularized SDR estimation strategy, which is capable of simultaneous dimension reduction and variable selection. We demonstrate that the new estimator achieves consistency in variable selection without requiring any traditional model, meanwhile retaining $n^{1/2}$ estimation consistency of the dimension reduction basis. Both simulation studies and real data analyses are reported.