



Concentration of maxima and fundamental limits in high dimensional testing and inference

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Abstract:

Considered is the problem of exact support recovery for a high-dimensional sparse signal observed in additive light-tailed noise. In the high-dimensional asymptotic regime, the broad class of thresholding support estimators is shown to obey a phase transition phenomenon governed by the signal size and its sparsity. This phase transition is remarkably universal since it takes place for independent as well as for very strongly dependent light-tailed errors. The solution of the problem utilizes the concept of relative stability of maxima - a type of concentration of maxima phenomenon, which is very robust to dependence. For Gaussian error arrays, a characterization of the concentration of maxima phenomenon is established along with bounds on its rate. Examples of non-Gaussian error arrays are also briefly discussed.

Keywords:

exact support recovery; phase transition; concentration of maxima; relative stability; sparse signals

References:

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