Abstract

We consider multiple isotonic regression with deterministic lattice designs or random designs in a hypercube. The least squares estimator (LSE) is known to nearly attain the minimax rate when the range of the unknown mean function is bounded by a positive constant and in the two-dimensional case to nearly achieve the parametric rate when the unknown mean function is piecewise constant in a rectangular partition of the design space. However, there is still a gap between the risk bound for the LSE and the minimax rate, and the feasibility of adaptation to the parametric rate in the piecewise constant case is unclear in general dimension. As the high entropy of the level set for the LSE could be the culprit behind the analytical or possibly real sub-optimality of the LSE, we consider a simpler block estimator instead. We prove that the block estimator attains the minimax rate when the range of the unknown mean is bounded by a constant and achieves the parametric rate up to a logarithmic factor in the piecewise constant case in general dimension. Moreover, perhaps more interestingly, we prove that the block estimator nearly achieves variable selection consistency in the following sense. When the unknown mean function depends only on an unknown subset of variables, the block estimator nearly matches the minimax rate based on the oracular knowledge of the set of active variables.

** This is joint work with Hang Deng.

All interested are welcome!
For details, please contact ISOM Department.