This work considers the minimax and adaptation rates in the multivariate isotonic regression setting. The minimax theorem is used as the theoretical foundation to build a case for developing estimators which lie in-between the max-min and min-max estimators over possibly smaller classes of upper and lower sets, including a subclass of block estimators. Further, based on appropriate moment conditions on the noise, the research proceeds by providing corresponding risk bounds for such general estimators for isotonic regression on graphs. The asymptotic properties of these estimates are studied in detail and in particular the block estimate is shown to possess the so-called oracle property in variable selection.

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MSC:

62G05 Nonparametric estimation
62G08 Nonparametric regression and quantile regression
62H22 Probabilistic graphical models
62K20 Response surface designs
62C20 Minimax procedures in statistical decision theory

Keywords:

isotonic regression; multiple isotonic regression; isotonic regression on graphs; max-min estimator; min-max estimator; block estimator; lattice design; random design; minimax rate; adaptive estimation; variable selection; oracle property

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