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Blind Minimax Estimation

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Abstract

We consider the linear regression problem of estimating an unknown, deterministic parameter vector based on measurements corrupted by colored Gaussian noise. We present and analyze blind minimax estimators (BMEs), which consist of a minimax estimator whose parameter set is itself estimated from measurements. This approach results in several extensions of the James-Stein estimator; however, unlike the James-Stein result, some of these extensions are non-shrinkage, making them applicable in a wider range of problem settings. We demonstrate analytically that the BMEs strictly dominate the least-squares estimator, i.e., they achieve lower mean-squared error for any value of the parameter vector. We also show through simulation that the BMEs generally outperform other extensions of the James-Stein technique.

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