

Selecting Regularization Parameters for Nuclear Norm Type Minimization Problems

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Abstract: The reconstruction of low-rank matrix from its noisy observation finds its usage in many applications. It can be reformulated into a constrained nuclear norm minimization problem, where the bound η of the constraint can either be explicitly given or be estimated by the probability distribution of the noise. When the Lagrangian method is applied to find the minimizer, the solution can be obtained by the singular value thresholding operator where the thresholding parameter λ is the same as the regularization parameter. In this talk, we derive a closed-form solution for λ in terms of η . For the unconstrained nuclear-norm-type regularized problems, our result allows us to automatically choose a suitable regularization parameter by using the discrepancy principle. Numerical experiments with both synthetic data and real MRI data are performed to validate the proposed approach.

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