Graph Laplacian in $\ell^2 - \ell^q$ regularization for image reconstruction

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Abstract

The use of the Laplacian of a properly constructed graph for denoising images has attracted a lot of attention in the last years. Recently, a way to use this instrument for image deblurring has been proposed in [1].

In this talk, we consider the $\ell^2 - \ell^q$ regolarization method, $0 < q < 2$, for image reconstruction with application in computer tomography and image deblurring [2]. Using the majorization-minimization method, we reduce to the minimization of a quadratic functional, whose solution is approximated in a subspace of fairly small dimension. Thanks to the projection into properly constructed subspaces of small dimension, the proposed algorithm can be used for solving large scale problems. Moreover, the projected problem can be also used for estimating the regularization parameter by the generalized cross validation or the discrepancy principle. Some numerical results compare our proposal with total variation and sparse wavelets reconstructions.

References

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