

Spatially dependent regularization parameter selection in total (generalized) variation models for image restoration

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Abstract:

Multi-scale total (generalized) variation models for image restoration are introduced. The models utilize a spatially dependent regularization parameter in order to enhance image regions containing details while still sufficiently smoothing homogeneous features. The fully automated adjustment strategy of the regularization parameter is based on local variance estimators. For robustness reasons, the decision on the acceptance or rejection of a local parameter value relies on a confidence interval technique based on the expected maximal local variance estimate. In order to improve the performance of the initial algorithm a generalized hierarchical decomposition of the restored image is used. The corresponding subproblems are solved by a superlinearly convergent algorithm based on Fenchel-duality and inexact semismooth Newton techniques. The talk ends by a report on numerical tests, a qualitative study of the proposed adjustment scheme and a comparison with popular total variation based restoration methods.