Tikhonov Regularization using Finite Element Method for a Variational Denoising Problem

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A local adaptive control of regularization for a denoising problem is proposed in this article. Our goal is to solve a linear variational denoising problem which is based on the idea of Tikhonov regularization using finite element method with un-structured grid as a domain of computation and also the control of adaptation for local smoothness parameters in the certain regions of image where the solution is less regular and the absolute average error is large. The regularization process is performed by an adaptive algorithm which is intelligent in the sense that the optimal selection of local regularization parameters is automatic. The algorithm decreases the absolute average error and increases the quality of diffusion at each adaptive step.

Keywords: Image denoising, Regularization, Adaptive Control of regularization, Adaptive finite elements, Optimization.