Variational Rician Denoising Models using Spatially Adapted Nonconvex Hybrid Regularization

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ABSTRACT

Magnetic resonance imaging (MRI) has advanced in recent but frequently suffers from noise pollution. Rician noise often occurs in the magnitude MR image where the real and imaginary images are both corrupted by Gaussian noise. In this manuscript, we propose variational models for restoring images corrupted by Rician noise and/or blurring. The novel energy functional consists of a convex fidelity term and a nonconvex higher-order regularization term. In addition, we adopt spatially adaptive regularization parameters (SARP) approach. Both nonconvex higher-order regularization and SARP enable us to efficiently denoise piecewise-smooth images while preserving details and edges. From numerical experiments, we demonstrate the superiority of our models over state-of-the-art methods.

REFERENCES