A Nonlinear Stein Based Estimator for Multichannel Image Denoising

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Abstract

The use of multicomponent images is generalized with the improvement of multisensor having increased spatial and spectral resolutions. However, the registred images are often corrupted by an additive Gaussian noise. In this paper, we are interested in multichannel image denoising based on a multiscale representation of the image. A multivariate statistical approach is retained to take into account both the spatial and the spectral correlations existing between the different wavelet subbands. More precisely, we propose a parametric new estimator that includes in a aa unifying framework, many reported denoising methods. The derivation of the optimal parameters is achieved by applying the Stein's principle in the multivariate case. Experiments performed on multispectral remote sensing images clearly indicate the outperformance of our method with the conventional wavelet techniques.

Index Terms

Multicomponent image, multichannel noise, denoising, multivariate estimation, block estimate, Steins principle, nonlinear estimation, thresholding, M-band wavelet transform, dual-tree wavelet transform, frames.

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