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Nonparametric Bayesian Estimation Structures In TheWavelet Domain Of Multiple Noisy Image Copies

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Abstract : This paper addresses the recovery of an image from its multiple noisy copies using a nonparametric Bayesian estimator in the wavelet domain. In [1], boubchir et al have proposed a prior statistical model based on the ?-stable densities adapted to capture the sparseness of the wavelet detail coefficients. They used the scale mixture of Gaussians theorem as an analytical approximation for ?-stable densities, which is not known in general, in order to obtain a closed-form expression of their Bayesian denoiser. Since the proposed estimator has worked well for one copy of corrupted image, we consider its extension to multiple copies in this paper. So, our contribution is to design two fusion structures based on the Bayesian denoiser and the traditional averaging operation, in order to combine all multiple noisy image copies to recover the noise free image. Because of the nonlinearity of the Bayesian denoiser, averaging then Bayesian denoising or Bayesian denoising then averaging will produce different estimators. We will demonstrate the effectiveness of our Bayesian denoiser fusion structures compared to other denoising approaches. Better performance comes at the expense of higher complexity.

Keywords : nonparametric bayesian estimation, multiple noisy copies image, ?-stable distribution, gaussian scale mixture approximation.