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Color image restoration with Fuzzy Gaussian mixture model driven nonlocal filter

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Abstract

© Springer International Publishing Switzerland 2015. Color image denoising is one of the classical image processing problem and various techniques have been explored over the years. Recently, nonlocal means (NLM) filter is proven to obtain good results for denoising Gaussian noise corrupted digital images using weighted mean among similar patches. In this paper, we consider fuzzy Gaussian mixture model (GMM) based NLM method for removing mixed Gaussian and impulse noise. By computing an automatic homogeneity map we identify impulse noise locations and utilize an adaptive patch size. Experimental results on mixed noise affected color images show that our scheme performs better than NLM, anisotropic diffusion and GMM-NLM over different noise levels. Comparison with respect to structural similarity, color image difference, and peak signal to noise ratio error metrics are undertaken and our scheme performs well overall without generating color artifacts.

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Keywords

Gaussian mixture, Image denoising, Mixed noise, Nonlocal means, Type-2 fuzzy sets