

On Denoising Methods based on Edge-Preserving Smoothing Filters

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ABSTRACT

The denoising is an underlying process in signal/image processing such as enhancement, analysis, and a certain parameter estimation. While there have been many reports for the study of denoising methodology, the development for efficient denoising methods is still a real challenge even in the image processing. The present paper reviews the recent denoising methods for images, including the neighborhood filter and NL-means filter, in the context of a nonlinear diffusion PDE inspired by the model of Perona-Malik or Weickert. By analyzing edge-preserving smoothing features of anisotropic nonlinear diffusion, we develop an adaptive edge-preserving smoothing filter in the spatial-range domain. The denoising performances of the discussed methods are compared through the mathematical analysis and numerical experiments.