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Title: Variational Image Restoration

Abstract: This research concerns the image deblurring and noise removal problem in a variational framework. Energy functionals in this study consist of a fidelity term and a regularizer that is based on Mumford-Shah segmentation, such that the recovered image and its discontinuities set are simultaneously extracted in the course of the deblurring process. The functionals are formulated using the Gamma-convergence approximation and are iteratively optimized via the alternate minimization method. We first consider the image deblurring problem in the presence of Gaussian/impulsive noise. The suggested approach integrates and extends the robust statistics, anisotropic diffusion and line process (half quadratic) points of view. Then, we extend the deblurring and denoising problem to vector-valued images. Further, we present the shift-variant deblurring case following by simultaneous motion estimation and restoration of motion-blurred video.