THE SPARSE REPRESENTATION MODEL FOR IMAGE DEBLURRING UNDER RANDOM VALUED IMPULSE NOISE

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ABSTRACT

In this article, we introduce a new patch-based model for restoring images simultaneously corrupted by blur and random-valued impulse noise. The model involves a ℓ_0-norm data-fidelity term, a sparse representation prior over learned dictionaries, and the total variation regularization. Unlike previous works, one-phase approach is utilized for random-valued impulse noise. The ℓ_0 data-fitting term plays an influential role for removing impulse noise. Furthermore, the sparse representation prior over learned dictionaries enables to preserve textures and fine details, while total variation regularization locally smooths the regions with reducing the artifacts induced by the patch-based prior. To handle nonconvex and nondifferentiable terms, we adopt a variable splitting scheme, and then the penalty method and alternating minimization algorithm are employed. This results in an efficient iterative algorithm for solving our model. Comparisons with the state-of-the-art methods, numerical results demonstrate the superiority of our proposed model for deblurring images in the presence of random-valued impulse noise.

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