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A New Variational Model with Group Gradient Sparsity Constraints for Image Fusion

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ABSTRACT:

In this paper, we propose a new pan-sharpening algorithm for high resolution multispectral images by panchromatic image at the same geographical location. In the first, we investigate the relation relating the panchromatic image gradient to the spectral channel gradients, then based on it and the assumption that the fused image after downsampling should be close to the original multispectral image, we construct an energy functional with the group gradient sparsity constraints of the panchromatic image and the multispectral channels, whose minima will give the reconstructed spectral images at higher resolution and the FISTA framework is used to efficiently solve the optimization problem. The visual and quantitative assessment was performed on the proposed method and the results were compared with HIS, PCA and PanSharpen methods on Chinese GF-1/GF-2 images and IKONOS/Quickbird multispectral datasets. The assessment shows that the new proposed method has the best effects in terms of both spatial and spectral qualities.

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