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A sparse representation based pansharpening method

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Abstract

Insufficient information captured by a single satellite sensor can hardly be fit real applications. Pansharpening is a hot topic in remote sensing region, which combines the spectral information of multispectral image and spatial details of panchromatic image to obtain high spatial resolution multispectral image. In this paper, we present a novel sparse representation-based pansharpening method, which consists three stages: dictionary construction, panchromatic image decomposition, and high spatial resolution multispectral image reconstruction. First, we use multispectral images as training set and calculate intensity channels of multispectral images. Then we obtain the high-frequency components and low-frequency components of intensity channels. Second, we sparsely decompose the panchromatic image by using a pair of dictionaries to obtain high-frequency components and low-frequency components of the panchromatic image. Third, the optimized high-frequency components of the panchromatic image will be integrated into the multispectral image to generate the final high resolution multispectral image. The quantitative and subjective evaluations show that the proposed method performs better effectiveness and practicality than the existing sparse representation-based methods.

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