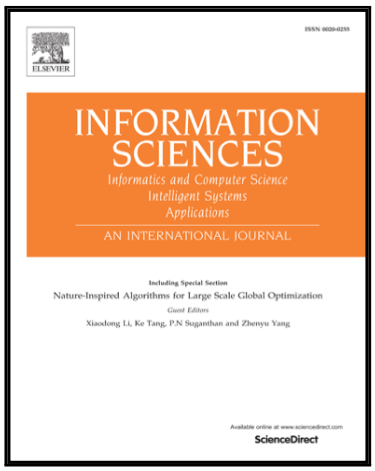

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PII: S0020-0255(17)30544-3
DOI: 10.1016/j.ins.2017.02.044
Reference: INS 12767

To appear in: *Information Sciences*

Received date: 27 March 2016
Revised date: 16 November 2016
Accepted date: 16 February 2017

Please cite this article as: Fan Fan, Yong Ma, Chang Li, Xiaoguang Mei, Jun Huang, Jiayi Ma, Hyperspectral Image Denoising with Superpixel Segmentation and Low-Rank Representation, *Information Sciences* (2017), doi: 10.1016/j.ins.2017.02.044

Hyperspectral Image Denoising with Superpixel Segmentation and Low-Rank Representation

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Abstract

Recently, low-rank representation (LRR) based hyperspectral image (HSI) restoration method has been proven to be a powerful tool for simultaneously removing different types of noise, such as Gaussian, dead pixels and impulse noise. However, the LRR based method just adopts the square patch denoising strategy, which makes it not able to excavate the spatial information in HSI. This paper integrates superpixel segmentation (SS) into LRR and proposes a novel denoising method called SS-LRR. First, the principal component analysis (PCA) is adopted to obtain the first principal component of HSI. Then the SS is adopted to the first principal component of HSI to get the homogeneous regions. Since we excavate the spatial-spectral information of HSI by combining PCA with SS, it is better than simply dividing the HSI into square patches. Finally, we employ the LRR to each homogeneous region of HSI, which enable us to remove all the above mentioned different types of noise simultaneously. Extensive experiments conducted on synthetic and real HSIs indicate that the SS-LRR is efficient for HSI denoising.

Keywords: Homogeneous region, hyperspectral image (HSI) denoising, low-rank representation (LRR), mixed noise, superpixel segmentation (SS)

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