

Non-Local Simultaneous Sparse Unmixing for Hyperspectral Data

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Abstract : Sparse unmixing is a promising approach in a semisupervised fashion by assuming that the observed pixels of a hyperspectral image can be expressed in the form of linear combination of only a few pure spectral signatures (end members) in an available spectral library. However, the sparse unmixing problem still remains a great challenge at finding the optimal subset of endmembers for the observed data from a large standard spectral library, without considering the spatial information. Under such circumstances, a sparse unmixing algorithm termed as non-local simultaneous sparse unmixing (NLSSU) is presented. In NLSSU, the non-local simultaneous sparse representation method for endmember selection of sparse unmixing, is used to finding the optimal subset of endmembers for the similar image patch set in the hyperspectral image. And then, the non-local means method, as a regularizer for abundance estimation of sparse unmixing, is used to exploit the abundance image non-local self-similarity. Experimental results on both simulated and real data demonstrate that NLSSU outperforms the other algorithms, with a better spectral unmixing accuracy.

Keywords : hyperspectral unmixing, simultaneous sparse representation, sparse regression, non-local means

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