

Sparsity-Based Unsupervised Unmixing of Hyperspectral Imaging Data Using Basis Pursuit

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Abstract : Mixing in the hyperspectral imaging occurs due to the low spatial resolutions of the used cameras. The existing pure materials “endmembers” in the scene share the spectra pixels with different amounts called “abundances”. Unmixing of the data cube is an important task to know the present endmembers in the cube for the analysis of these images. Unsupervised unmixing is done with no information about the given data cube. Sparsity is one of the recent approaches used in the source recovery or unmixing techniques. The l_1 -norm optimization problem “basis pursuit” could be used as a sparsity-based approach to solve this unmixing problem where the endmembers is assumed to be sparse in an appropriate domain known as dictionary. This optimization problem is solved using proximal method “iterative thresholding”. The l_1 -norm basis pursuit optimization problem as a sparsity-based unmixing technique was used to unmix real and synthetic hyperspectral data cubes.

Keywords : basis pursuit, blind source separation, hyperspectral imaging, spectral unmixing, wavelets

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