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论文

基于FastICA的高光谱图像目标分割

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摘要:

面向高光谱图像目标识别与分类的应用背景, 提出了一种基于快速独立成分分析 (FastICA) 的高光谱图像目标分割算法。通过引入虚拟维数对图像中的目标端元数量进行估计, 利用基于非监督正交子空间投影的异常端元提取算法自动获取目标端元光谱, 并将其作为FastICA的初始混合矩阵。采用最小噪声分量变换对原始数据进行降维, 利用FastICA从降维后的主成分中依次提取出图像中的独立分量。最后, 对各独立分量进行恒虚警率检测与形态学滤波, 得到最终的目标分割结果。对AVIRIS型高光谱图像的实验结果表明, 该方法可有效探测出图像中的目标, 并可获得较好的分割结果。

关键词: 高光谱图像, 独立成分分析, 虚拟维数, 目标分割

Target Segmentation for Hyperspectral Imagery Based on FastICA

Abstract:

Oriented the application background of target recognition and classification for hyperspectral imagery, a new target segmentation method for hyperspectral imagery based on fast independent component analysis (FastICA) is proposed. The concept of virtual dimensionality was introduced to determine the number of target endmembers. The

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mixing matrix of FastICA was initialized by anomaly endmembers, which were extracted from hyperspectral imagery by using unsupervised orthogonal subspace projection. Minimum noise fraction was employed for dimensionality reduction of original data volumes, and FastICA transform was performed on the selected principal components with high signal-noise ratio (SNR) to generate independent components. Finally, constant false alarm rate (CFAR) detection was performed on each IC, which was followed by morphologic filtering. Experimental results on AVIRIS data show that the proposed algorithm can give better target detection performance, as well as better target segmentation.

Keywords: hyperspectral imagery, independent component analysis, virtual dimensionality, target segmentation

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