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论文

一种基于修正扩展形态学算子的高光谱遥感 图像端元提取算法

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摘要：

形态学算子反映了像素的空间相关性信息,将其应用于高光谱遥感图像端元提取可以有效地提升算法性能.本文针对已经普遍用于高光谱遥感图像端元提取的扩展形态学算子在像元排序规则和替换准则上存在的局限性,引入了基准向量的概念并给出计算方法,提出了修正扩展形态学算子.修正后的排序规则和替换准则避免了图像中不同类别交界处的交叉替换现象,保证了正确的覆盖方向,是提高端元提取效果的关键步骤.通过修正扩展形态学算子的基本膨胀和腐蚀运算,定义了相应的开-闭运算和闭-开运算,由此得出了端元判定向量,并给出端元提取算法的详细流程.基于扩展形态学的自动端元提取算法可以综合考虑光谱和空间信息,端元提取效果优于仅依靠光谱信息的算法.算法由IDL7.0实现,并在AVIRIS于Cuprite地区的高光谱遥感图像上进行实验,实验结果从光谱曲线相似性、端元平均相似度和相应地物分布图等方面证明了算法的有效性.

关键词： 高光谱图像　端元提取　形态学　混合像元　线性解混

A Hyperspectral Remote Sensing Image Endmember Extraction Algorithm Based on Modified Extended-morphological Operator

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Abstract:

Applying the morphological operator, which characterizes the spatial correlative informations of pixels, to endmember extraction of hyperspectral remote sensing image can improve the performance of algorithm effectively. In order to overcome the limitations in sorting rules and replacing criteria of extended-morphological operator, which is commonly used in hyperspectral remote sensing image to extract endmembers, the modified extended-morphological operator is proposed after introducing the concept and presenting the calculating method of reference vector. The cross-replacement phenomena at the junction of different classes can be avoided and the correct coverage direction can be ensured when the modified sorting rules and replacing criteria have been applied in endmember extraction algorithm to enhance the results as key means. The endmember extraction algorithm using the determine profiles, generated after open-close and close-open operations defined by basic dilation and erosion operations of modified extended morphology, is described in detail. The automated modified extended-morphological endmember extraction algorithm is achieved by using both spatial and spectral information in a combined manner, thus, the endmember extraction result is superior to the approachs designed from a spectral information viewpoint only. The alogrithm is implemented in IDL7.0 and testd by using real hyperspectral imagery collected by airborne visible/infrared imaging spectrometer in cuprite area, the experimental results of the similarity on spectral curves, the average similarity and the mineral distribution maps verified the validity of the algorithm.

Keywords: Hyperspectral image　Endmember extraction　Morphology　Mixed pixel　Linear unmixing

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