

论文与技术报告

基于谱域-空域组合核函数的高光谱图像分类技术研究

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摘要:

针对传统高光谱图像分类算法多利用目标的光谱信息, 不重视空间信息的问题, 本文提出了一种综合利用谱域-空域信息的最小二乘支持向量机分类算法。首先利用主成分分析进行特征提取, 然后在保留的主分量图像上用数学形态学得到目标的空域信息。并结合光谱域特征, 探讨了各种组合策略, 构造组合核函数。通过在分类器中引入空域信息, 提高了分类准确率。而且采用了最小二乘支持向量机, 将标准向量机的二次规划问题转换为求解线性方程组的问题。利用了其训练速度快、效率高的优点。高光谱数据实验表明, 本文提出的方法和单独使用谱域或空域信息进行分类相比表现出了一定的优越性, 从而适用于较大规模的高光谱图像分类。

关键词: 主成分分析; 谱域 空域; 核函数; 最小二乘

Research on Classification Technique for Hyperspectral Imagery Based on Spectral-Spatial Composite Kernels

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Abstract:

Hyperspectral image classification methods make best use of spectral information, ignoring objects' spatial information. This paper proposes a novel classification algorithm based on spectral-spatial information through composite kernels of least squares support vector machine (LS-SVM). The algorithm adopts principal component analysis (PCA) for feature extraction. The selected PCs are used to extract targets' spatial information by mathematical morphology approach. Different combination strategies are adopted to combine the spatial features with spectral features. Then composite kernels are constructed. By introducing spatial information into classification, the accuracy is improved. Instead of using the standard SVM, the proposed algorithm adopts LS-SVM which changes the quadratic programming problem into linear equations. The algorithm makes the advantages of LS-SVM' s training speed and classification efficiency. The superiors of the algorithm are verified by the hyperspectral experiment. Compared with the algorithms only using one kind of features in classification, the proposed shows some advantages. So it can be applied to large scale hyperspectral image classification.

Keywords: Principal component analysis spectral spatial kernel functions least squares

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