应用

基于光谱加权直推式支持向量机的高光谱图像半监督分类

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摘要：

高光谱图像分类中的有标签的样本获取较为困难，而半监督分类可以利用到大量未标签样本所含信息，来提高分类准确率。其中直推式支持向量机是标准支持向量机在半监督学习问题上的一种扩展。本文中我们采用凹凸过程规划将直推式支持向量机的非凸目标函数分解为凸函数和凹函数的组合，从而将非凸问题转化为凸优化问题求解。并且针对高光谱图像不同波段鉴别地物类别的能力的差异，为了充分利用各个波段的分类能力，我们引入了光谱权值对支持向量机的核函数进行了改进，对不同的波段赋予不同的权值。实验表明，本文提出的方法在分类正确率以及使用的样本规模上，都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： 半监督；直推式；凹凸过程优化；光谱加权

Semisupervised Classification of Hyperspectral Image Based on Spectrally Weighted TSVM

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Abstract:

In hyperspectral image classification labeled samples is difficult to obtain. Semisupervised classification method can make use of the information contained in the large number of unlabeled samples to improve the classification accuracy. Transductive support vector machine (TSVM) is an extension of the support vector machine (SVM) in the semisupervised learning. In this paper we use Concave-Convex Procedure (CCCP) to optimize the nonconvex objective function of TSVM. The noconvex function is decomposed into the combination of convex part and concave part. So the problem is changed into an convex optimization problem. In hyperspectral image, each band's ability to distinguish different material is not in the same range. In order to make a better use of bands' classification abilities, the spectrally weighted vector is introduced. Then the kernel function is modified by the spectrally weighted vector. So different bands have different weighted values. Experiments show that the proposed method has shown superiority in the classification accuracy and the use of sample size. Thus the proposed method can be applicable to large-scale hyperspectral image classification.

Keywords: semisupervised transductive Concave-Convex Procedure spectrally weighted

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