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论文

基于支持向量描述的自适应高光谱异常检测算法

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摘要：

提出了一种应用于高光谱异常检测的自适应支持向量数据描述方法.根据高光谱数据和局部异常检测模型的特点,通过局部背景分波段二阶分布统计,分析了核参量与局部背景总体标准差的变化关系,构造了随检测背景变化的局部检测核参量,使得检测算法针对不同背景分布自适应地调整检测核参量.克服了传统支持向量描述算法由于采用固定核参量带来的复杂背景下检测性能下降的问题.通过模拟数据和真实高光谱数据的测试检验,接收机特性曲线表明该算法相对于传统固定核参量支持向量数据描述方法,在相同虚警概率下检测概率提高了10%.

关键词： 高光谱 异常检测 自适应 核方法 支持向量描述

Support Vector Data Description Based on Adaptive Anomaly Detection Method in Hyperspectral Imagery

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Abstract:

An adaptive support vector data description (SVDD) method is proposed for anomaly deteciton in hyperspectral imagery.According to the features of hyperspectral data and the local detection model,the second-order statistic information between hyperspectral bands of local background is calculated firstly.Based on the relationship between kernel parameter and the local second-order statistic information,an adaptive kernel parameter estimation method is derived.The parameter estimation of kernel function can be obtained along with the shifting of the background clutter pixels automatically.The degeneration of detection performance brought by a global fixed kernel parameter SVDD method in a background of miscellaneous terrain is improved by the proposed algorithm.Numerical experiments are conducted on simulated data and real hyperspectral imagery.Using receiver operating characteristic (ROC) curves,the results show that the detection probability of the proposed algorithm is 10 percentage better than the classical fixed kernel parameter SVDD at the same false alarm rates.

Keywords: Hyperspectral imagery Anomaly detection Adaptive Kernel-based method Support vector data description

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