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论文

基于优选样本的KPCA高光谱图像降维方法

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摘要:

降维是高光谱图像常用的预处理手段,而核主成份分析通过非线性映射能够挖掘数据的高阶统计特性,是目前较常使用的特征提取方法.本文提出了一种基于优选样本的核主成份分析高光谱图像降维方法,算法挑选参与核主成份分析运算的样本时兼顾整幅高光谱图像的统计特性,以与全图能量分布相近的最小样本集为最终选择样本.本算法由IDL7.0实现,并在实际高光谱图像Cuprite上进行实验.结果表明,在大幅缩短运算时间的同时,降维效果优于传统的核主成份分析方法.

关键词: 高光谱图像 核主成份分析 非线性映射 迹 降维

A Dimensionality Reduction Method Based on KPCA with Optimized Sample Set for Hyperspectral Image

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Abstract:

Dimensionality reduction is a common preprocessing for hyperspectral image,and Kernel Principal Components Analysis(KPCA),as a common feature extraction method,makes use of nonlinear mapping to capture higher-order statistics of data.An optimization sample set algorithm,which is used in KPCA for dimensionality reduction of hyperspectral image was proposed.This algorithm picks sample set used in KPCA taking the statistics of the whole hyperspectral image into account simultaneously,and the minimum sample set with similar energy distribution of the full image is the final selection.The algorithm was implemented in IDL7.0 and tested by using the real hyperspectral image from Cuprite.The experiment results show that the new algorithm is able to save computing time significantly and perform better than conventional KPCA in dimensionality reduction.

Keywords: Hyperspectral image Kernel Principal Components Analysis(KPCA) Nonlinear mapping Trace Dimensionality reduction

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