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成像技术与图像处理

基于预测和JPEG2000的MODIS红外辐射多光谱图像无损压缩算法

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摘要: 为了能够有效地对MODIS (Moderate Resolution Imaging Spectral Radiometer) 红外辐射多光谱图像进行压缩, 提出了一种基于预测和JPEG2000的无损压缩算法。首先计算MODIS数据的谱间Pearson相关系数, 根据得到的相关系数构造出相关系数图。根据谱间相关系数的大小设定阈值以确定图像是直接压缩还是预测后再压缩。根据得到的阈值及对预测起始波段的要求修改相关系数图。然后使用Prim算法计算修改后相关系数图的最小生成树, 据此对各波段进行一阶线性预测。最后使用JPEG2000算法对残差图像和不可预测图像进行压缩。对MODIS红外辐射多光谱图像进行了实验, 并与线性序列的算法进行比较。结果显示, 提出的算法压缩比相对线性预测序列有了显著提高, 说明该算法对MODIS红外辐射多光谱图像是有效的。

关键词: MODIS数据 最小生成树 一阶线性预测 JPEG2000 无损压缩

Lossless Compression Method Based on Prediction and JPEG2000 for MODIS Emissive IR Bands Multispectral Image

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Abstract: In order to effectively compressive MODIS(Moderate Resolution Imaging Spectral Radiometer) emissive IR bands multispectral image, a lossless compression method based on prediction and JPEG2000 was proposed in this paper. Firstly, the Pearson correlation between spectrums in MODIS data was calculated, and then a graph was built according to the coefficient acquired. Whether the current band was compressed directly or not was determined by the threshold setting according to the correlation coefficient. The threshold and requirements to the starting band was used to modify the graph. The MST was established with Prim algorithm, and all bands were predicted with first-order linear predictor and the tree. The residual errors of predicted bands and those compressed directly were all encoded by JPEG2000. Experiments were performed for the MODIS emissive IR bands multispectral image. The experimental results shows that the compression ratio of the proposed algorithm can be significantly improved compared with algorithms with linear sequence.

Keywords: MODIS data MST first-order linear predictor JPEG2000 lossless compression

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