

液晶与显示 2011, 26(6) 847-852 ISSN: CN:

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成像技术与图像处理

适于航天应用的高速SPIHT图像压缩算法

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摘要: SPIHT和无链表SPIHT(Not List SPIHT)是高效的图像压缩算法,但是抗误码性差、压缩速度慢等缺点限制了其在航天领域的应用。文章针对上述两个缺点对算法进行了改进,采用Le Gall5/3小波对遥感图像进行小波分解,将小波域系数分家族块进行索引、扫描和码率分配,按照比特平面或运算进行重要性预测,实现了 N 个位平面同时编码。改进算法与SPIHT相比易于硬件编程实现,仿真结果显示,解压后图像峰值信噪比(PSNR)提高了0.2~0.6 db,压缩速度提高了4~6倍。用硬件实现时如果采用并行和流水线操作,速度还可以进一步提高。

关键词: 航天应用 高速SPIHT 抗误码性 比特平面并行

Image Compression Algorithm of High-Speed SPIHT for Aerial Applications

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Abstract: SPIHT and NLS (Not List SPIHT) are efficient image compression algorithms, but the algorithms application is limited by the shortcomings of the poor error resistance and slow compression speed in the aviation areas. In this paper, the error resilience and the compression speed were improved. The remote sensing images were decomposed by Le Gall5/3 wavelet, and wavelet coefficients were indexed, scanned and allocated by the means of family blocks. The bit-plane importance was predicted by bitwise OR, so the N bit-planes can be encoded at the same time. Compared with the SPIHT algorithm, this modified algorithm is easy implemented by hardware. The experiments results show that the PSNR of reconstructed images was increased about 0.2 to 0.6 db and the speed was 4~6 times faster than the SPIHT encoding process. The speed can be further improved via virtue of the parallelism and pipelining, when it is implemented by the hardware.

Keywords: aerial applications high-speed SPIHT error resistance bit-plane parallel

收稿日期 2011-03-30 修回日期 2011-05-24 网络版发布日期 2011-12-20

基金项目:

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