

基于首1游程的图像位面并行编码算法

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Bit-plane paralleled image coding algorithm based on run-length coding of first 1 bit

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摘要 图/表 参考文献 相关文章 (15)

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摘要 针对宇航应用领域对图像压缩算法计算复杂度的要求,提出一种全新的“首1游程”位面编码算法。该算法将离散小波系数首1比特及以上位面用本文提出带符号自适应二进制游程算法编码,其下位面则不编码,直接输出比特值。为兼容无损压缩,算法采用了空间数据系统咨询委员会(CCSDS)推荐的整数97小波变换。由于考虑了像素间、位面间的数据依赖性,该算法的数据访问次数、编码复杂度等远远低于目前算法。该算法是一种内嵌式编码算法,可通过截断码流来精确控制压缩比,支持码流的渐进性传输。试验数据显示,与CCSDS推荐的图像压缩算法比较,本算法计算复杂度显著降低,而压缩性能却略高,同时还支持位平面间独立并行编码,提高了压缩速度。该算法可以满足宇航应用中高速、高性能、低复杂、低功耗的要求。

关键词 : 首1游程编码, 位面并行编码, 内嵌式编码算法, 图像压缩

Abstract : In consideration of the demands of image compression algorithm in space application fields for computer complexity, this paper proposes a new “run-length coding of first 1 bit” algorithm. In this algorithm, the first 1 bit plane and above bit planes of Discrete Wavelet Transform (DWT) coefficients are encoded by signed adaptive binary run coding algorithm presented in this paper, and lower bitplane is directly output as it's bit value. To be compatible with a lossless compression, the algorithm uses a 97 integer wavelet transform recommended by Consultative Committee for Space Data System (CCSDS). Because the dependencies between pixels and between bitplanes are considered, the data access times and coding complexity are far lower than that of the current algorithms. Moreover, the algorithm is an embedded coding algorithm, the compression ratio could be precisely controlled by truncating the bit stream, and the progressive transmission of the code stream could be supported. The experimental data show that the complexity of the algorithm is significantly reduced, and the compression performance is slightly higher as compared with that of the image compression algorithm recommended by the CCSDS. Meanwhile, the algorithm also supports bit plane independent parallel coding and improves compression speeds. The algorithm has met the space application requirements for the high-speeds, high performance, low complexity and the low power.

Key words : run-length coding of first 1 bit bitplane paralleled coding embedded coding algorithm image compression

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