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Exploiting chrominance planes similarity on listless quadtree coders

Abstract

This study proposes an efficient algorithm for colour image compression with listless implementation based on set partition block embedded coding (SPECK). The objective of this work is to develop an algorithm that exploits the redundancy in colour spaces, low complexity quadtree partitioning and reduced memory requirements. Colour images are first transformed into luminance chrominance (YCbCr) planes and a wavelet transform is applied. A reduction of the memory requirement is achieved with the introduction of a state marker that matches each colour plane to eliminate the list with dynamic memory in the original colour SPECK coder (CSPECK). The wavelet coefficients are scanned using Z-order that matches the subband decompositions. The proposed algorithm then encodes the de-correlated colour plane as one unit and generates a mixed bit stream. The linear indexing and initial state marker are modified to jointly test the chrominance plane together. Composite colour coding enables precise control of the bit rate. The performance of the proposed algorithm is comparable with CSPECK, set partitioning in hierarchical trees (SPIHT) and JPEG2000 but with less memory requirements. For progressive lossless, a saving of more than 70% than final working memory against CSPECK and SPIHT highlights the benefit of the proposed algorithm.

Keywords

Wavelet transforms; Data compression; Image coding; Block codes