A Lossy Image Codec Based on Index Coding

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Abstract

In this paper we propose a new lossy image codec based on index coding. Both J. Shapiro's embedded zerotree wavelet algorithm, and A. Said and W. A. Pearlman's codetree algorithm (which is the state-of-the-art method today) use spatial orientation tree structures to implicitly locate the significant wavelet transform coefficients. Here a direct approach to find the positions of these significant coefficients is presented. The new algorithm combines the discrete wavelet transform, differential coding, variable-length coding of integers, ordered bit plane transmission, and adaptive arithmetic coding. The encoding can be stopped at any point, which allows a target rate or distortion metric to be met exactly. The bits in the bit stream are generated in the order of importance, yielding a fully embedded code to progressively approximate the original image source; thus it's well suited for progressive image transmission. The decoder can also terminate the decoding at any point, and produce a lower bit rate reconstruction image. Our algorithm is very simple in its form (which will make the encoding and decoding very fast), requires no training of any kind or prior knowledge of image sources, and has a clear geometric structure. The image coding results of it are quite competitive with almost all previous reported image compression algorithms on standard test images.