

**LOW BIT RATE COLOR IMAGE CODING  
WITH ADAPTIVE ENCODING OF WAVELET CO-EFFICIENTS**

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Current trends in image coding exploit the advantage of subband / wavelet decompositions in reducing the complexity in optimal scalar / vector quantizer (SQ / VQ) design. Compression ratios of the order of 10:1 to 20:1 with high visual quality has been achieved by using vector quantization of subband decomposed color images in perceptually weighted color spaces. We report the performance of the embedded zerotree wavelet (EZW) using successive-approximation quantization and an adaptive arithmetic coding for effective reduction in bit rates while maintaining high visual quality of reconstructed color images. For 24 bit color images, excellent visual quality is maintained upto a bit rate reduction to approximately 0.48 bpp by EZW yielding a compression ratio (CR) of 50 : 1. Further bit rate reduction to 0.375 bpp results in visible degradation by EZW as well as by a recently developed adaptive vector quantizer, namely , AFLC-VQ. However, the bit rate reduction by AFLC-VQ was computed from the quantizer output and did not include any subsequent entropy coding. Therefore an entropy coding of the multi-resolution codebooks generated by adaptive vector quantization of the wavelet coefficients in the AFLC-VQ scheme should reduce the bit rate to at least 0.36 bpp (CR 67:1) at the desired quality currently obtainable at 0.48 bpp by EZW.

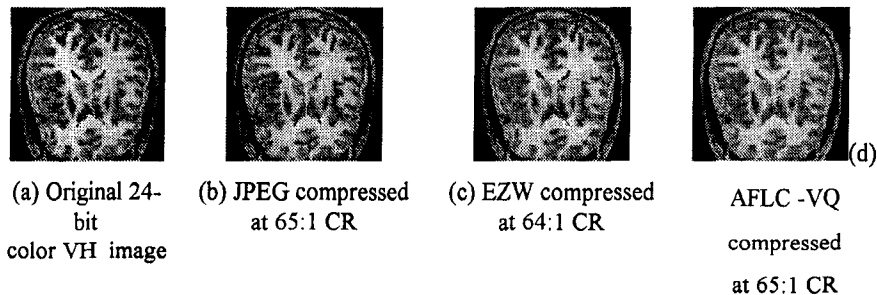


Figure 1. Reconstructed Visible Human images

Table 1. Visible Human (VH) Image Statistics

Image	Compression	MSE	PSNR (dB)	CR	bpp
24-bit color Visible Human	JPEG	51.11	31.05	65:1	0.368
24-bit color Visible Human	EZW	55.25	30.71	64:1	0.375
24-bit color Visible Human	AFLC	117.5	27.43	65:1	0.369

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