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A novel analytical integer optimization method for wavelet based subband coding. (English)

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Summary: In subband coding (SBC), the original signal is decomposed into some frequency subbands and then the total available number of bits is divided between different subbands of the signal. In the most of existing SBC methods, the number of allocated bits can be real and negative, while in practice the number of bits must be integer and nonnegative. In this paper an analytical solution is derived for subband coding with optimum nonnegative integer bit allocation and multi-resolution filter bank (including wavelet filter bank). The analytical solution is applicable for either non-uniform or uniform SBC. A modified discrete bisection algorithm is also proposed which can reduce the computational complexity of searching in a group of discrete functions. The computational complexity of proposed method is lower than the complexity of integer optimization algorithms which are applicable to SBC. Compared to the common SBC algorithms with real-valued bit allocation (in which the number of bits should be rounded), the proposed method has much less quantization error.

MSC:
90C10 Integer programming
91B32 Resource and cost allocation (including fair division, apportionment, etc.)
90B80 Discrete location and assignment

Keywords:
wavelet filter bank; subband coding; data compression; integer optimization

Software:
WSAT(OIP); PipLib

Full Text: DOI

References:


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