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Hardware Design of the Discrete Wavelet Transform: an Analysis of Complexity, Accuracy and Operating Frequency

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Abstract

The purpose of this paper is to present a comparative analysis of hardware design of the Discrete Wavelet Transform (DWT) in terms of three design goals: accuracy, hardware cost and operating frequency. Every design should take into account the following facts: method (non-polyphase, polyphase and lifting), topology (multiplier-based and multiplierless-based), structure (conventional or pipelined), and quantization format (floating-point, fixed-point, CSD or integer). Since DWT is widely used in several applications (e.g. compression, filtering, coding, pattern recognition among others), selection of adequate parameters plays an important role in the performance of these systems.

Key words: Discrete Wavelet Transform; topology; quantization format; accuracy.

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