

Haar-Wavelet-Based Just Noticeable Distortion Model for Transparent Watermark

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Abstract

Watermark transparency is required mainly for copyright protection. Based on the characteristics of human visual system, the just noticeable distortion _JND can be used to verify the transparency requirement. More specifically, any watermarks whose intensities are less than the JND values of an image can be added without degrading the visual quality. It takes extensive experimentations for an appropriate JND model. Motivated by the texture masking effect and the spatial masking effect, which are key factors of JND, Chou and Li _1995 proposed the well-known full-band JND model for the transparent watermark applications. In this paper, we propose a novel JND model based on discrete wavelet transform. Experimental results show that the performance of the proposed JND model is comparable to that of the full-band JND model. However, it has the advantage of saving a lot of computation time; the speed is about 6times faster than that of the full-band JND model.

Keyword : Watermark, JND, Wavelet