

An Enhanced Denoising Technique Using Dual Tree Complex Wavelet Transform

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Abstract

This paper, describes the design of Hilbert transform wavelet bases using filters satisfying simultaneous magnitude and half sample delay constraints. These bases are crucial in the design and implementation of Dual Tree Complex Wavelet Transform, DTCWT, or simply known as DDWT and is characterized by shift invariance features. Next, the DDWT is used in image de-noising. In this respect, the DDWT wavelet coefficient matrices of the upper and lower trees are thresholded over two steps. In the first step, these coefficients are thresholded using their Hidden Markov Model HMM representation. In the second step, the thresholding levels are optimally chosen to minimize a specific objective function of the total variation of the de-noised image. Several illustrative examples are given to demonstrate the superiority of the proposed technique when compared with other published approaches.

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