

WAVELET SIGNAL AND IMAGE DENOISING

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The paper deals with the use of wavelet transform for signal and image de-noising using a selected method of thresholding of appropriate decomposition coefficients. The proposed method is based upon the analysis of wavelet transform and it includes description of global modification of its values.

The whole method is verified for simulated signals and applied for processing of biomedical signals representing EEG signals and MR images corrupted by additional random noise. Own algorithms are based upon the use of Matlab Wavelet and Signal Processing toolboxes.

The proposed algorithm includes the following steps:

1. Wavelet decomposition of the noisy image up to the selected level using Daubechies wavelet functions of the selected order
2. Modification of detail decomposition coefficients by the soft thresholding technique estimating the threshold value by the Donoho's method
3. Reconstruction of the MR image from the altered coefficients
4. Image resolution enhancement using the cubic interpolation of the final multi-dimensional signal to increase the number of its pixels

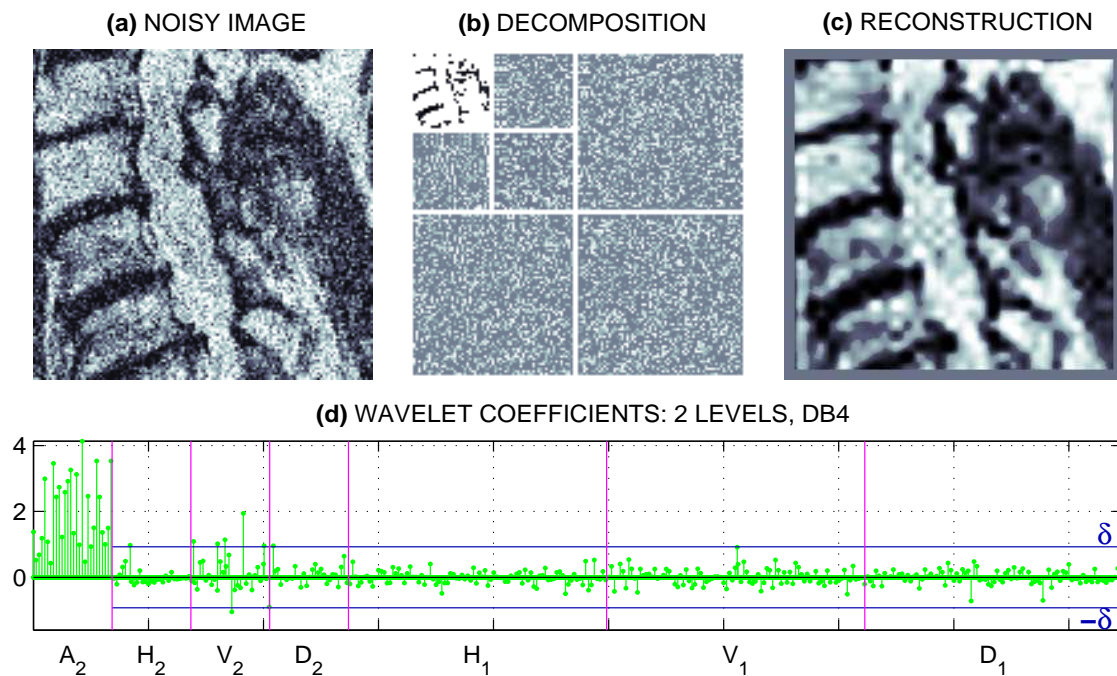


Figure 1: MR image de-noising by thresholding of wavelet detail coefficients up to the second level presenting (a) MR image with the additional white noise, (b) decomposition up to the second level using the *db4* wavelet function, (c) image reconstruction after the thresholding of wavelet coefficients, and (d) wavelet coefficients of the noisy image and the estimate of the threshold level δ