5.2 De-noising

Here we demonstrate de-noising results based on the proposed sparse representation in the presence of additive white Gaussian noise (AWGN). We implement the de-noising by soft thresholding the wavelet coefficients in each subband. For each subband, the threshold is chosen by minimizing the Stein’s Unbiased Risk Estimate (SURE) of the mean squared error (MSE) [34].

Note that the aim of this section is not to compare the results to the state-of-the-art in multiview de-noising techniques but to demonstrate that the sparse representation can be used for de-noising applications. In Fig. 15 we compare our algorithm to the competitive SURE-LET OWT de-noising method [35] applied to each image independently. Analyzing the Tsukuba light field, Teddy EPI and Doll EPI datasets, our approach corresponds to a PSNR improvement of up to 2dB. The light field has the most significant gain due to a sparser representation, which results from the larger number of images in the dataset.

![Fig. 15: De-noising comparison between the proposed sparse representation and the SURE-LET OWT method [35]. In the proposed approach, the de-noising is implemented by soft thresholding the transform coefficients in each subband. The threshold step-size is chosen by minimizing the SURE estimate of the MSE.](image)

The subjective results are illustrated in Fig. 16 and these clearly show that the proposed sparse representation attains more visually pleasing results than the SURE-LET OWT method.

![Fig. 16: Subjective de-noising comparison between (b) proposed sparse representation and (c) SURE-LET OWT applied to each image independently.](image)