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**Infrared image denoising using a smoothed $L_0$ sparse regression.** (English) Zbl 1453.94018


Summary: Sparse representation based on image denoising has acquired considerable interest. In the most previous work on the sparse representation, $L_1$ and $L_0$ norm are always used as the sparsity regularisation. Despite the success of $L_1$ or $L_0$ norm, the limitation of this approach on its computational complexity or sparsity affects the efficiency or accuracy. In this paper, a smoothed $L_0$ approach based on infrared image denoising is proposed. Firstly, an improved smoothed $L_0$-based K-SVD ($SL_0$-KSVD) method for dictionary learning is presented. And then the infrared images are sparsely represented by the smoothed $L_0$ method and the coefficients are denoised using the constantly updated K-SVD dictionary. Finally, some experiments are taken on comparing the peak signal to noise ratio (PSNR) performance of our proposed method with its counterparts on different images. The experimental results on both the visualisation and real data of the infrared images demonstrate the superiorities of our proposed method.

**MSC:**

94A08 Image processing (compression, reconstruction, etc.) in information and communication theory

**Keywords:**

sparse representation; infrared images; image denoising; dictionary learning; K-SVD; peak SNR; signal to noise ratio; PSNR

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