

Documents

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QR based de-noising scheme for medical ultrasound images

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Abstract

A novel scheme based on QR decomposition is proposed in this paper to remove multiplicative noise, speckle noise, from medical ultrasound images. A speckle noisy image is segmented into small overlapping blocks. A global covariance matrix for the whole image is obtained by calculating the average of covariances of the corresponding blocks. QR decomposition is then applied to the global covariance matrix. Based on the principle of orthogonality of signal and noise, it is found that the first subset of orthogonal vectors of the Q matrix resulted from the QR decomposition is sufficient to construct a projection matrix capable of filtering out speckle noise. When it is applied to simulated and real medical ultrasound images, and with reasonable performance in terms of resolution and edge detection, the proposed approach has outperformed benchmark filtering schemes such as Wavelets, Wiener and Lee. It has secured the highest Signal to Noise Ratio (SNR) and Peak Signal to Noise Ratio (PSNR). © 2017 IEEE.

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