A New Contourlet-based Compression and Speckle Reduction Method for Medical Ultrasound Images

Abstract

In this paper a threshold based method for speckle reduction and image compression of medical ultrasound images was presented. First, two ultrasound medical image despeckling methods were compared: wavelet-based and contourlet-based, to find the best. Different measures were used for performance comparison and these methods were implemented both on synthesized data and real ultrasound images. It is found that, performance of the both techniques vary with the level of the speckle noise, and in the case of preserving image details and edges which is very important for medical image processing, contourlet-based method shows better performance over wavelet-based speckle reduction specially in high levels of noise. Then, a new contourlet-based lossy image compression method was presented for medical ultrasound images. In this algorithm, contourlet transform was used for image decomposition. Then, a new thresholding process was applied on the coefficients before quantization. The compression threshold was elected due to coefficients occurrence in the contourlet domain. This algorithm has the ability of simultaneous speckle reduction using another thresholding. Due to this time saving ability, the algorithm can be used in online image transmission systems. The proposed method was implemented on a real ultrasound images and ultrasound phantom image. Results proved that our proposed method has acceptable and good performance over common compression methods such as wavelet-based SPIHT in the
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The case of PSNR.

References


Index Terms

Computer Science
Image Processing

Keywords

Contourlet Transform  Compression Ratio  Image Compression  Speckle Reduction  PSNR

Ultrasound image
Wavelet