Ultrasound Medical Image denoising using Hybrid Bilateral filtering

Abstract

Medical imaging is placing a major role in diagnosing the diseases and in image guided surgery. There are various imaging modalities for different applications giving the anatomical and physiological conditions of the patient. All these modalities will introduce some amount of noise and artifacts during medical image acquisition. If the noise and artifacts are not minimised diagnosis will become difficult. One of the non-invasive modality is ultrasound where no question of radiation but suffers from speckle noise produced by the small particles in the tissues whose size is less than the wavelength of the ultrasound. The presence of the speckle noise will cause the low contrast images where low contrast lesions and tumors can't be detected in the diagnostic phase. So there is a strong need in developing the despeckling techniques to improve the quality of ultrasound images. Many image denoising techniques based on spatial filtering, total variational filtering, bilateral filtering and multiresolution filtering etc. In most of the filtering techniques the objective is removing the noise while preserving the edges in the image. Still research is going on in the improvement of denoising procedures without losing the diagnostic details. Here in this paper we are proposing a method which will combine the bilateral filtering and multiresolution approach (Discrete Wavelet Transform) to remove the noise from ultrasound medical images. The advantage of this method is it removes the noise in the approximation subband or low frequency subband in
the wavelet decomposition. The performance of the filtering was evaluated using several image quality metrics and the results showed that the proposed hybrid filter is outperforming the methods based on wavelet transforms and spatial filtering.

References


Index Terms

Computer Science

Image Processing
Keywords
Image Fusion  Discrete Wavelet Transform  Image Gradient