Application of wavelet techniques for cancer diagnosis using ultrasound images: A Review

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A B S T R A C T

Ultrasound is an important and low cost imaging modality used to study the internal organs of human body and blood flow through blood vessels. It uses high frequency sound waves to acquire images of internal organs. It is used to screen normal, benign and malignant tissues of various organs. Healthy and malignant tissues generate different echoes for ultrasound. Hence, it provides useful information about the potential tumor tissues that can be analyzed for diagnostic purposes before therapeutic procedures. Ultrasound images are affected with speckle noise due to an air gap between the transducer probe and the body. The challenge is to design and develop robust image preprocessing, segmentation and feature extraction algorithms to locate the tumor region and to extract subtle information from isolated tumor region for diagnosis. This information can be revealed using a scale space technique such as the Discrete Wavelet Transform (DWT). It decomposes an image into images at different scales using low pass and high pass filters. These filters help to identify the detail or sudden changes in intensity in the image. These changes are reflected in the wavelet coefficients. Various texture, statistical and image based features can be extracted from these coefficients. The extracted features are subjected to statistical analysis to identify the significant features to discriminate normal and malignant ultrasound images using supervised classifiers. This paper presents a review of wavelet techniques used for preprocessing, segmentation and feature extraction of breast, thyroid, ovarian and prostate cancer using ultrasound images.

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