

Segmentation and characterization of masses in breast ultrasound images using active contour

ABSTRACT

The active contour or Snake is a computer generated curve, used to trace boundaries of images. This paper presents the application of Snake for the segmentation of masses on breast ultrasound images and the characterization of the segmented masses as malignant or benign. Initially, the Balloon Snake is chosen to segment the masses. Comparison on the masses areas segmented by the Balloon Snake is done against the areas traced by radiologist. Experimental result shows that from fifty masses tested, the Balloon Snake successfully segment the masses with accuracy of 95.71%. Then, a mass is characterized as benign or malignant using a proposed method namely the semi-automated characterization (SAC) method. The method is based on the segmented masses produced by the Balloon Snake. The criterion of angular margin is considered in characterizing the masses as malignant or benign by the SAC method. The characterization reading of a mass by the SAC method is compared with thirty sets of characterization readings of a mass by different radiologists. The comparison is made in terms of sensitivity and specificity values. Based on the values, the receiver operating characteristics (ROC) curve is plotted for each set of comparison. From the thirty sets of comparisons, it is found that the area under curve of all the thirty ROC curves are greater than 0.7. The value implies that the SAC method gives high accuracy in characterizing benign from malignant mass. Since the method is based on the segmented masses by the Balloon Snake, the value also implies that the accuracy of Balloon Snake in segmenting the images is high (95.71%).