Combining Clustering, Morphology and Metaheuristic Optimization Technique for Segmentation of Breast Ultrasound Images to Detect Tumors

Abstract

A framework which combines morphological operations and metaheuristic optimization technique with clustering method for the precise segmentation of breast tumours using ultrasound images is proposed in this study. Malignant tumours are pernicious when neglected to detect and treat at the earliest. Women with dense breasts are more prone to this malady and ultrasonography is the suitable screening cum diagnosis method to aid the physician to estimate the amount of malignancy. This method is exclusively proposed for segmenting B-mode breast ultrasound images, characterized by low contrast and critically affected by speckle noise which hinders the finer details. The images are median filtered initially, in order to suppress the speckle noise and they are enhanced by a sticks algorithm based filter. The clustering is performed by FCM algorithm which is optimized by Particle swarm optimization. Automated morphological operations are performed on the clustered image as post processing procedure to improve the accuracy. To evaluate the proposed method, a database of 32 pathologically proven breast lesion images including 18 benign cysts and 14 malignant tumours is used. The segmented contours are compared with manually delineated contours and obtained MR of 93.24%, OF of 0.903 and EF of 0.1017. Moreover, the quantitative results are
compared and analyzed with other existing methods and the values evidenced that the proposed method distinctly outperforms other methods.

References

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Index Terms

Computer Science  Image Processing

Keywords

Breast Ultrasound  Segmentation  Clustering  Morphology  Particle swarm optimization.