

## A New Hybrid Method for Segmentation and Detection of the Tumors in the Mammographic Images of the Breast Tissue

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### Abstract

**Introduction:** Breast cancer is one of the most common gynecological diseases. Segmentation and boundary detection of the breast tumors are from the most serious challenges in the diagnosis of breast cancer. Nowadays mammography is the best way to detect the breast tumors, in which, inaccurate segmentation and edge detection of the masses may lead to wrong diagnosis or biopsy of the breast tissue. In this paper, a new hybrid method for the segmentation and edge detection of the tumors in the mammographic images of the breast tissue is introduced in order to facilitate automatic classification of tumors as benign or malignant.

**Methods:** In this research, the well-known DDSM database was employed which includes 150 mammography images of malignant tumors, and 150 mammography images of benign tumors. After removing additional areas such as background, edge detection of the tumors was done via segmentation of the image based on the image histogram and the combination of wavelet transform and genetic algorithm as well as mathematical morphology. Also, Ant colony optimization and Particle swarm optimization (PSO) algorithms were used for segmentation of the mammography images and compared with the proposed method.

**Results:** The proposed hybrid method has good accuracy and high speed in segmentation of the mammography images for classification of the breast tumors. The hybrid method including genetic algorithm leads to higher classification accuracy compared with ant colony optimization and PSO algorithms. The segmentation of tumors via the proposed hybrid method leads to classification accuracy 91.4% which is satisfactory.

**Conclusion:** The proposed hybrid method is a fast and efficient method for segmentation and edge detection of the breast tumors. The results of this paper showed that the proposed intelligent method has good ability to detect the tumors to help the radiologists and so the unnecessary biopsy of the breast tissue may be omitted. Secondly, between the applied segmentation algorithms, genetic algorithm leads to higher classification accuracy.

**Keywords:** Breast Cancer; Tumor Detection; Tumor Segmentation; Wavelet Transform; Genetic Algorithm; Ant Colony Optimization Algorithm; Particle Swarm Optimization Algorithm.