

Automatic Early Breast Cancer Segmentation Enhancement by Image Analysis and Hough Transform

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Abstract : Detection of early signs of breast cancer development is crucial to quickly diagnose the disease and to define adequate treatment to increase the survival probability of the patient. Computer Aided Detection systems (CADs), along with modern data techniques such as Machine Learning (ML) and Neural Networks (NN), have shown an overall improvement in digital mammography cancer diagnosis, reducing the false positive and false negative rates becoming important tools for the diagnostic evaluations performed by specialized radiologists. However, ML and NN-based algorithms rely on datasets that might bring issues to the segmentation tasks. In the present work, an automatic segmentation and detection algorithm is described. This algorithm uses image processing techniques along with the Hough transform to automatically identify microcalcifications that are highly correlated with breast cancer development in the early stages. Along with image processing, automatic segmentation of high-contrast objects is done using edge extraction and circle Hough transform. This provides the geometrical features needed for an automatic mask design which extracts statistical features of the regions of interest. The results shown in this study prove the potential of this tool for further diagnostics and classification of mammographic images due to the low sensitivity to noisy images and low contrast mammographies.

Keywords : breast cancer, segmentation, X-ray imaging, hough transform, image analysis

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