Computer-assisted diagnosis system for breast cancer in computed tomography laser mammography (CTLM)

ABSTRACT

Computed tomography laser mammography (Eid et al. Egyp J Radiol Nucl Med, 37(1): p. 633ï 643, 1) is a non-invasive imaging modality for breast cancer diagnosis, which is time-consuming and challenging for the radiologist to interpret the images. Some issues have increased the missed diagnosis of radiologists in visual manner assessment in CTLM images, such as technical reasons which are related to imaging quality and human error due to the structural complexity in appearance. The purpose of this study is to develop a computer-aided diagnosis framework to enhance the performance of radiologist in the interpretation of CTLM images. The proposed CAD system contains three main stages including segmentation of volume of interest (VOI), feature extraction and classification. A 3D Fuzzy segmentation technique has been implemented to extract the VOI. The shape and texture of angiogenesis in CTLM images are significant characteristics to differentiate malignancy or benign lesions. The 3D compactness features and 3D Grey Level Co-occurrence matrix (GLCM) have been extracted from VOIs. Multilayer perceptron neural network (MLPNN) pattern recognition has developed for classification of the normal and abnormal lesion in CTLM images. The performance of the proposed CAD system has been measured with different metrics including accuracy, sensitivity, and specificity and area under receiver operative characteristics (AROC), which are 95.2, 92.4, 98.1, and 0.98%, respectively.

Keyword: Breast cancer; Computed tomography laser mammography (CTLM); Computer-aided diagnosis systems (CADs); 3D shape features; 3D GLCM features; Multi-layer perceptron neural network (MLPNN)