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Short Communications - A Detection of Breast Cancer by using Region Algorithm and Directional Feature Method

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Abstract: Breast Cancer is the most common malignancy in women and is the second most common leading cause of cancer deaths among them. At present, there are no effective ways to prevent and cure breast cancer, because its cause is not yet fully known. Early detection is an effective way to diagnose and manage breast cancer and can give a better chance of full recovery. Several domains and concepts are used in the detection of breast cancer. The main domains used in this detection technique include different types of Region algorithm and Directional feature method. Their region-based algorithm was especially adapted to tumors that extend over a relatively large area.

Keywords: Breast Cancer, Region algorithm and Directional feature method.

I. INTRODUCTION

Cancer is the most vicious disease, the cure of which must be the prime target through scientific investigation. Breast cancer is one of the most lethal and heterogeneous disease in this present era that causes the death of enormous number of women all over the world. It is the second largest disease that is responsible of women death. The early detection of cancer can be helpful in curing the disease completely. At present, there are no effective ways to prevent and cure breast cancer, because its cause is not yet fully known. Early detection is an effective way to diagnose and manage breast cancer and can give a better chance of full recovery.

There are several techniques available in the literature for the detection of cancer. Many researchers have contributed their ideas in the detection of cancer. Here we have mainly discussed about the existing cancer detection techniques. Several domains and concepts are used in the detection of breast cancer. The main domains used in this detection technique include different types of Region algorithm and Directional feature method. Their region-based algorithm was especially adapted to tumors that extend over a relatively large area.

II. DIFFERENT TYPES OF ALGORITHM

II A. Region based algorithm

Brzakovic and Neskovic [1] were described an approach to find tumors from mammograms. They looked for large masses; therefore they digitized a whole mammogram into a 256×256 pixel image. Their region-based algorithm was especially adapted to tumors that extend over a relatively large area.

II B. Region growing algorithm

Bocchi et al 2004 [2] stated that microcalcifications are often early signs of breast cancer. However, detecting them is a

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difficult visual task and recognizing malignant lesions is a complex diagnostic problem. In recent years, several research groups have been working to develop Computer-Aided Diagnosis (CAD) systems for X-ray mammography. They have proposed a method to detect and classify microcalcifications. In order to discover the presence of micro calcification clusters, particular attention is paid to the analysis of the spatial arrangement of detected lesions. A fractal model has been used to describe the mammographic image, thus, allowing the use of a matched filtering stage to enhance microcalcifications against the background. A region growing algorithm, coupled with neural classifier, detects existing lesions. Subsequently, a second fractal model is used to analyze their spatial arrangement .So that the presence of micro calcification clusters can be detected and classified.

Shanmugavadivu and others [3] were proposed a Wavelet Transformation-Based Detection of Masses in digital mammograms (WTBDM) that enables for the early prognosis of breast cancer. The wavelet analysis is explored for analyzing and identifying strong variations in intensities within the mammographic data which highlights and recognizes the masses effectively. The proposed algorithm, in addition to wavelet transformation, uses morphological preprocessing, region properties and seeded region growing to remove the digitization noises, to remove the pectoral muscle and to suppress radiopaque artifacts, thus segmenting the abnormal masses accurately. The combined potential of wavelet and region growing helps for effective masses segmentation that vouches the merit of the proposed technique.

II C. Region of Interest Method

Kegelmeyer and others [4] were presented a pixel- based approach in which Law's texture features and local oriented edge characteristics were extracted from Regions of Interest (ROIs) and a binary decision tree classifier was employed to classify tumor from normal tissues. Bellotti et al 2006 [5] proposed a completely automated CAD system for mass detection. The system included the following three steps. First, an edge-based segmentation algorithm was implemented to select the suspicious region. Then, eight gray-tone independent texture features of the ROIs were derived. Finally, a supervised two- layered feed forward neural network, which was trained with the gradient-descent learning rule, was employed to classify tumor from normal tissues.

The method presented by Cascio and coworkers [6] was provided a segmented output without loss of meaningful information. In this method the Region of Interest (ROI) was obtained through a segmentation process, by means of a contour searching. In the classification step, feature extraction plays a fundamental role. After the features were computed for each ROI, they were used as inputs to a supervised neural network. The output neuron provides the probability that the ROI was pathological or not.

Alolfe and coworkers [7] were stated that clusters of microcalcifications in mammograms are an important early sign of breast cancer in women and proposed to develop a Computer- Aided Diagnosis (CAD) system that can be very helpful for radiologist in diagnosing microcalcifications patterns in digitized mammograms earlier and faster than typical screening programs. The proposed method has been implemented in three stages: (a) the region of interest (ROI) selection of 32×32 pixels size which identifies clusters of microcalcification, (b) the feature extraction stage was based on the wavelet decomposition of locally processed image to compute the important features of each cluster and (c) the classification stage, which classified between normal and microcalcifications patterns. In classification stage, four methods are used, the voting K-Nearest Neighbor classifier (K-NN), Support vector machine (SVM) classifier, Neural Network (NN) classifier, and fuzzy classifier.

Mohd Khuzi [8] stated that digital mammogram has become the most effective technique for early breast detection modality. Digital mammogram takes an electronic image of the breast and stores it directly in a computer and to develop an automated system for assisting the analysis of digital mammograms. Computer image processing techniques was applied to enhance images and this is followed by segmentation of Region of Interest (ROI). Subsequently, the textual features will be extracted from the ROI. The texture features will be used to classify the ROIs as either masses or non-masses. The normal breast image and breast image with masses used as the standard input to the proposed system are taken from Mammographic Image Analysis Society (MIAS) digital mammogram database. In MIAS database, masses are grouped into either spiculated, circumscribed or ill-defined. Additional information includes location of masses' centers and radius of masses. The extraction of textual features of ROIs is done by using gray level co-occurrence matrices (GLCM) which is constructed at four different directions for each ROI. The result show that the GLCM at 0 º, 45 º, 90 º and 135 º with a block size of 8×8, which give significant texture information to identify between masses and non-masses

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tissues.

Rabi Narayan Panda [9] states that mammography is the most contemporary option for the premature detection of breast cancer in women. Nevertheless, the opinion of the radiologist has a remarkable influence on the elucidation of the mammogram. The proposed research intends to develop an image processing algorithm for the recognition of microcalcifications and mass lesions to aid the premature detection of breast cancer. The work proposed deals with a novel approach for the extraction of features like microcalcifications and mass lesions in mammograms for early detection of breast cancer. The proposed technique is based on a three –step procedure: (a) Regions of Interest (ROI) proposed specification, (b) two dimensional wavelet transformation, and (c) feature extraction based on OTSU thresholding the region for the identification of microcalcifications and mass lesions. ROIs are preprocessed using a wavelet–based transformation method and a thresholding is applied to exclude microcalcifications and mass lesions. The method suggested for the detection of microcalcifications and mass lesions from mammogram image segmentation and analysis was tested over several images from mini-MIAS (Mammogram Image Analysis Society, UK) database. The implementation of the algorithm was carried out using matlab codes programming and thus is capable of execution effectively on a simple personal computer with digital mammogram as accumulated data for assessment.

II D. Directional feature method

Lau and Bischof [10] were proposed procedures to compare the corresponding anatomical regions between the left and right breast images in terms of shape, texture and density. They also proposed a directional feature to quantify oriented patterns. However, alignment procedures encounter problems, such as natural asymmetry of the breasts of a given subject, the lack of good corresponding points between the left and right breast images to perform matching and distortions inherent to mammographic imaging. A region growing algorithm, coupled with neural classifier, detects existing lesions. Subsequently, a second fractal model is used to analyze their spatial arrangement .So that the presence of micro calcification clusters can be detected and classified. The method was evaluated using ten pairs of mammograms where asymmetry was a significant factor in the radiologist's diagnosis.

III. CONCLUSIONS

Their region-based algorithm was especially adapted to tumors that extend over a relatively large area. A region growing algorithm, coupled with neural classifier, detects existing lesions. Subsequently, a second fractal model is used to analyze their spatial arrangement. So that the presence of micro calcification clusters can be detected and classified. Their region-based algorithm was especially adapted to tumors that extend over a relatively large area. The implementation of Region of Interest Method was carried out using matlab codes programming and thus is capable of execution effectively on a simple personal computer with digital mammogram as accumulated data for assessment. The Directional feature method was evaluated using ten pairs of mammograms where asymmetry was a significant factor in the radiologist's diagnosis.

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