CAD Based System for Automatic Detection & Classification of Suspicious Lesions in Mammograms

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Abstract

It is very difficult to detect the breast cancer in its earlier stage as it shows symptoms gradually. So it is very important to keep track of any abnormality present in the breast. Breast cancer is the leading cause of death due to cancer among the women. Computer Aided Diagnosis (CAD) is an important tool in assisting doctors in the early detection of cancers. Earlier diagnosis of breast cancer is of great importance as far as modern medical treatments are concerned. Mammography is currently used for the reliable and early detection of cancers in breast. This paper presents, a novel algorithm for CAD based breast cancer analysis. The proposed system develops a systematic scheme to classify the breast cancer into normal, benign and malignant type. Here, AI based Training and Classification method using Back Propagation Neural Network classifier is proposed. These classification techniques find even the minute area of suspicion which can be either cancerous or fatty and this area is used for classification. Adaptive thresholding and multi-resolution analysis are used for lesion detection. Multi-resolution analysis provides a framework for interpreting the image information. The proposed system uses wavelets transform, coarse segmentation, fine segmentation and area Analysis. Wavelet transform is used for multi-resolution analysis. Wavelet based method is used for coarse segmentation and window based method is used for fine segmentation. For obtaining the rough localization of suspicious lesions, coarse segmentation is used. A window based adaptive thresholding is done on the resultant image to get the fine segmentation. Fine segmentation is used for accurately spotting and detecting even the fine lesions. Area analysis of white pixel is performed in fine segmented image. The proposed method is tested with images in the Mini Mammography database of the Mammographic Image Analysis Society (MIAS).

Keywords: CAD, neural network classifier, multi-resolution analysis, wavelet transform, coarse segmentation, fine segmentation, mass classification

1. INTRODUCTION

Cancer is a disease, which is characterized by an uncontrolled multiplication of cells. It can be affected on almost all body parts. In all living things, cells are the basic building block and they are able to perform different function, which is essential for the human body's growth. Compared to normal cells, cancer cells have abnormal life cycles, which means cells divide excessively and form tumors. Because of the mutation, normal cells become cancerous cells. The cancers can be either benign or malignant. An un-inhibited growth of breast cells is called breast cancer, which usually develops in the milk producing glands. Breast cancer is the most common disease among the cancerous diseases that affect women. The major factors affecting the breast cancer are age, genetics, overweight, lack of exercise, smoking cigarettes, eating unhealthy food and so on. The treatment for the breast cancer depends on the type of cancer, which can occur in different parts of the breast. Several approaches are used for mammogram mass detection and classification. Detection of suspicious lesions in mammograms using multi-resolution analysis and adaptive thresholding technique has been proposed by Kai Hu, Xieping Gao, and Fei Li [1]. This paper proposes an effective method for mammographic lesion detection. This approach uses wavelet based multi-resolution analysis and also uses combination of global and local adaptive thresholding techniques. Both gray- level and shape features are used for detection. It uses multi-resolution analysis is used for getting the low-frequency images. But there is no preprocessing steps are applied in the mammogram images. It will affect the proper localization of lesions in mammogram images. Sometimes this will lead to miss classification. Preprocessing steps are necessary for correct detection of lesions in mammograms. In Fraschini et al. [2] presented a novel and simple signal analysis method for mass classification. And this method uses small one dimensional signal crossing the ROI. This approach allows reducing the volume of data to be processed as well as reduces the computation time. But there is no preprocessing steps are used and it will affect the accurate detection and classification. Preprocessing is an important step for medical images. Lori Mann Bruce, Nithya Shanmugam in [5] proposed a neural network approach for mammographic mass classification with wavelet transform. It classifies the mammogram masses into either round or irregular shapes. For extracting the features DWT is used, which extract the scalar-energy features. The advantage is that haar mother wavelet extracted a set of features from the automated-segmented data to obtain better classification results. But here neural network was only tested using the apparent test method and the behavior of the neural network to an input vector not included in the training set cannot be predicted. Also the generalization ability of the neural network could also not be tested due to limited training data. The proper selection of mother wavelets is an important criterion for optimum performance. Zhang and M. D. Desai in [3] have been proposed a method to detect and segment the lesions in mammograms. This paper is based on histogram based adaptive thresholding algorithms, which uses wavelet-transform-based methods. In this method, discrete wavelet transform is used for finding the threshold value for segmentation of mammograms. It helps to detect the lesions in mammograms. It is a global segmentation method also very Simple and fast. But it is not very effective when the target region and the background region show minor differences in gray-level values. If the normal tissues have higher gray-level value, then it is considered as a abnormal by this method. And only obtain a rough representation of lesion's locations because of global thresholding. Also only gray-level features are used for lesion detection. Shape and texture features are not taken into account lesions are mainly characterized by a single feature in this method. A local adaptive thresholding method has been proposed by Guillaume Kom, Alain Tiedeu, and Martin Kom [4]. Window based concept is used in this approach. It helps for improvement in mass segmentation. But in this method, for the center region of suspicious lesions, it gives an empty area in the segmentation result. And also lesions are mainly characterized by a single feature in this method i.e., gray-level feature. A curvelet based approach for breast cancer diagnosis is proposed by Mohamed Meselhy Eltoukhy1, Ibrahima Faye, and Brahim Belhaouari Samir in [14]. The proposed system used curve let transform for feature extraction and Nearest Neighbor Euclidian distance based classifier is used for classification. This method is very stable, efficient and near-optimal representation of smooth objects can be achieved using curvelet-transform. Also Multi-dimensional features in wedges can be captured by this approach. But it faces 2 problems. First one is for detecting abnormality. And second one is for distinguishing the abnormal tissues into between benign and malignant. An adaptive threshold method for mass detection in mammographic images has been presented by Mohamed Meselhy Eltoukhyl, Ibrahima Faye [6]. This system is used for both detection and segmentation of suspicious masses in mammograms. This approach uses the sensitivity equation to measure how many masses are correctly identified. And it uses the advantages of multi-resolution. Here extracted features have a good ability to differentiate between different classes. It is adaptive thresholding technique. In this paper, a novel detection and classification algorithm for mammographic lesion detection is presented. Lesion's gray-level feature and shape feature are used in this method. This approach improves the sensitivity of the CAD system and obtains the better results for abnormality. More preprocessing steps are done in this paper for improving the detection and helps for elimination of unwanted signals. Detection is done based on multi-resolution analysis using wavelet transform. Then wavelet based thresholding and window based thresholding is applied for lesions detection. Back propagation neural network is used for classification tasks. These classification techniques find even the minute area of suspicion which can be cancerous or fatty and this area is used for classification. The rest of the paper is organized as follows. Methodologies used in the proposed system are reviewed in Chapter 2. In Chapter3 architecture design is presented. Chapter 4 presents the Experiment result and analysis. Finally Chapter 5 concludes the work.

2. METHODOLOGIES

2.1 Edge Enhancement using Sharpen Filters

Gray-level images are obtained from mini-MIAS database of mammograms. Preprocessing is the first step, which helps to improve the image quality. Pre-processing is very important in image processing technique. In mammography, x-ray images are used, which has low quality. So there is a need of enhancement techniques. Kai Hu, Xieping Gao, and Fei Li [1] have proposed a detection algorithm for mammographic lesions, but there is no preprocessing steps are used. This will affect the correct lesion detection. So in the proposed system, edge enhancement algorithm and noise removal algorithm are used for preprocessing of mammogram images. Edge enhancement helps to enhance the edges, which are boundaries between the objects. Preprocessing is a technique which is used for enhancement of images. Pre-processing helps to suppress the unwanted features in the image so that image features can be enhanced and image should be clearer for further processing Harvinder Singh, Prof (Dr). J.S. Sodhi in [13] proposed an edge enhancement algorithm using sharpen filters. It is adopted in the proposed system. Laplacian filter, a sharpen filter is used in this algorithm [13] to enhance the edges in the mammogram images. In this filter, first and second derivative is used.

The first derivative equation is

$$\frac{\partial g}{\partial x} = g(x+1) - g(x) \quad (1)$$

The second derivative equation is

$$\frac{\partial^2 g}{\partial x^2} = g(x+1) + g(x-1) - 2g(x) \quad (2)$$

First compute the first order derivative for producing the thicker edges and it helps for extracting the edges in an image. Then compute the second order derivative is used to produce the fine details. Then in order to get the sharpened image, a weighted laplacian is subtracted from the original mammogram image. Fig. 1 shows the input and edge enhanced image.

The equation of laplacian is

$$\nabla^2 g = \frac{\partial^2 g}{\partial x^2} + \frac{\partial^2 g}{\partial y^2} \quad (3)$$

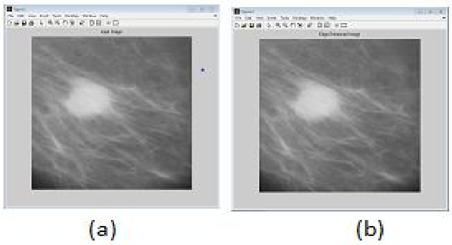


Figure 1 (a) Input Image (b) Edge Enhanced Image

2.2 Noise removal Techniques

After edge enhancement, noise removal techniques are applied. Noise is unnecessary information present in the image and it will affect the quality of the image as well as for the accurate detection process. So this technique has a vital role in image processing techniques and it will help to obtain a suitable image for further processing steps. Here Weiner filter a 2D filter [15] which is used for removing the noise from the mammogram image. One specialty of this filter is that it is an adaptive filter and also it minimizes the mean square error value of the image. It is based on the mean and standard deviation values.

2.3 Wavelet Transform

Wavelet transform is an image processing technique, used for getting the time and frequency information, whereas Fourier transform only gives the frequency information. DWT helps to determine the high frequency and low frequency component in an image. Using wavelet, we can obtain the lesion information from the images. A wavelet based adaptive thresholding method for lesion detection has been proposed by Bharatha Sreeja, Rathika, and Devaraj in [8] .This seems to be a good method for obtaining the low frequency sub-images. So in the proposed system uses wavelet transform method for detection of lesions. 2D DWT is used for decomposing the image into 4 parts and this will helps to get a sub-image of suitable size. This is called multi- resolution of the image. Here, 1st level of decomposition is performed on mammogram image. As a result it is decomposed into 4 orthogonal sub bands such as low-low (LLI1), low-high (LHI1), high-low (HLI3) and high- high (HHI4) components. This LLI1 is the approximation images, which is obtain using low pass filter and it can be further decomposed into another four sub bands, and the low-low 2 (LLI2) from this second decomposition sub band is decomposed once again and so on. LHI2, HLI3, HHI4 are 3 detailed images. In DWT, low pass filter and high pass filter are used for signal decomposition. Approximation images contain the low frequency information whereas the detail signal contains the high frequency information

2.4 Morphological Filter Enhancement

Morphological filter is mainly used for shape analysis and it helps to enhance the contrast of images. Using this filter interesting features can be extracted without blurring. To provide the enough illumination on all parts of images Morphological filter enhancement is used. As a result of morphological filter enhancement, gray-level feature and shape feature of the mammogram image will be enhanced and this will be very suitable for further processing of lesion detection. The 2 major morphological operations are erosion and dilation. Dilation is a technique which is used for expanding the shape of foreground parts in the image and it is a thickening operation whereas erosion is a technique which is used to contract the shape of foreground parts in the image and it is a shrinking operation. Opening and closing operation uses these 2 techniques. To suppress the bright details opening operation are used and dark details are suppressed using Closing operation. For morphological filter enhancement, structuring element is used, which is a binary image. This structuring element is placed on the image and operation is performed. Wang, Ray Liu, S.-C. B. Lo and M. T. Freedman in [11] have proposed a computerized method for detection lesions using morphological techniques. Here morphological filter operation is performed on the low frequency sub-mage (LLI1). Initially square shape structuring element is defined, which has size smaller than target. Then perform the first Top-Hat operation, which is obtained by subtracting the opening image (erosion followed by dilation operation) from the original image. It helps to extract the textures without pattern of interest. Then perform the second top-hat operation using a structuring element whose size should be larger than the target. This operation helps to extract the interesting pattern. This dual top-hat operation helps to enhance the mass pattern. This filter enhancement technique is very effective in mammographic image processing and this method is very simple. The proposed approach uses this technique for extracting the shape features.

2. 5 Coarse Segmentation

Global thresholding is one of the common techniques for image segmentation. It is based on the global information, such as histogram. The masses usually have greater intensity than the surrounding tissue. It can be used for finding global threshold value. After finding a threshold value, abnormality region can be segmented. Global thresholding is not a very good method to identify ROI (Region of Interest), because masses are often overlapped on the tissue of the same intensity level. Zhang and Desai in [3] have proposed a method, which uses multiple thresholds for separating the suspicious areas in mammograms. Here, threshold values are chosen adaptively for segmenting tumors in mammograms. Regions having gray levels below the threshold are assigned as background and regions having gray levels above the threshold are assigned as suspicious regions.

2.6 Fine Segmentation

Guillaume Kom, Alain Tiedeu, Martin Kom in [4] has proposed a local thresholding method for detection of lesions. This method is seems to be nice. So in the proposed system, this technique is applied after coarse segmentation. A convolution operation [12] is performed on the coarse segmented image and morphologically enhanced image. Convolution helps to extract information from the image. In this process, morphological filtered image is placed on the coarse segmented image and then perform element-wise multiplication and this will produce a convoluted image. Then apply fine segmentation on this convoluted image [1]. In this method threshold is computed locally compared to global thresholding. It uses window based thresholding for segmenting the image and it will apply on the coarse segmented image. It uses both large and small window. Large window is used to find the highlighted area on the mammograms whereas small window is used for finding the suspicious portions in the mammogram. Fine segmentation helps to detect the suspicious parts in the mammogram images. It helps to find even minute suspicious part, which can be either fatty or cancerous parts. It is an adaptive thresholding method and a threshold is calculated for each pixel in the mammogram images. Based on this threshold value, pixel is classified as suspicious pixel or normal pixel. To calculate the threshold value for each pixel, I(i,j) following equations are used. If I (i, j) $\geq$ T (i, j) and LWdif $\geq$ mean, then the pixel I(i, j) is in suspicious area, else it is in the normal area. T (i, j) is a value of adaptive threshold.

$$T(i.j) = mean + LWdif$$
$$LWdif = LWmax(i,j) - LWmin(i,j) \quad (4)$$

Mean is an average of pixels intensity in a small neighborhood around the pixel I(i,j); and LWmax (i, j) and LWmin (i, j) are large window's maximum and minimum intensity values. γ is a thresholding bias coefficient. It is selecting empirically. In local adaptive thesholding method, first define the small and large window size of pixel I (i.j). For this purpose symmetric method is used to fill the boundary points in an mammogram image. Then define the mean value and difference in maximum and minimum intensity value in large window. Using these values find the local threshold for classification. The condition I(i, j) > T(i, j) and LWdif > mean is used to classify the image into 2 groups.

2.7 AI Based Training and Classification

Normally cancers can be of malignant or of benign types. Here malignant types are the most dangerous one; it can spread to other body parts and can lead to death of the patient. But benign cancers are not that much dangerous, it has similarity to normal cells in appearances. The growth rate of benign cells is very slow compared to malignant cells and it can't spread to other body parts. In Image Processing, Neural network is mainly used for machine learning [5]. In this work, the classification phase consists of a back propagation neural network. It can be used to find the abnormalities in the mammographic images. Neural network is mainly used for machine learning. Supervised learning is used for training this network. It is used to provide artificial intelligence to the system. It can be used for classification purpose. Neural network mainly consist of 3 layers: Input layer, Hidden layer and Output layer and it is known as 3 layer feed forward networks. The proposed system uses Back Propagation Feed Forward Neural Network for training and classification. All the inputs are given to these input layers. And these will be passed to Hidden layers, which are used to extract the features from the input images. And these extracted features will be stored in an output layers. Neural network is widely used in mammography mass CAD. Mainly it consist of 3 phases: Design phase, Training phase and testing phase

2.7.1 Design Phase

- Define number of nodes in input, hidden and output layers.
- Define activation function for each of the nodes
- Define Training function. In proposed system,
- Trainingdx is used, which is gradient descent.
- Define neural network performs function. MSE (Mean Squared Error) is the default one.

2.7.2 Training Phase

Once the network has designed, train the network using extracted features. Here, training instances are given to the system repeatedly, so that it has to find the best set of weight and biases. And BNN uses Trainingdx algorithm, which is a iterative gradient algorithm. The main aim of this algorithm is to minimize the value of mean square error. This phase is mainly used to extract the features from input data sets. Using these optimum features, system is trained. And structure of this virtual network is stored in database.

2.7.3 Testing Phase

This is the 3rd phase. Here test image is given to this neural network. The reduced features of this test image will be tested with the trained classifier to determine the output. In this proposed method AI (Artificial Intelligence) based training and classification is performed. It is performed after fine segmentation method. It consists of training and test datasets. Here, system is trained with no; of malignant, benign and normal images from training dataset using Back propagation neural network classifier. Area of the white pixel after fine thresholding is taken as the extracted features for classification processes. These features will be stored in the database for further processing. And then testing is performed with test dataset. Here image is tested with the trained classifier by using the stored features. Then it classifies the test image into normal, malignant and benign according to the stored features in the database.

3. PROPOSED SYSTEM ARCHITECTURE

Mammography [10] is the best radiographic method used for early detection of suspicious lesions. Computer Aided Diagnosis system is used for the analysis of mammography. The proposed algorithm mainly consists of 2 stages. Stage1: Detection of suspicious lesions in mammogram, Stage2: Classification of the masses into 3 categories such as normal, benign and malignant.

3.1 Detection of Suspicious Lesions

In the first stage, detection of suspicious lesion is detected. Here breast cancer detection based on adaptive thresholding in mammograms is used. Mammographic lesions are detected in different levels of resolutions. In this method, combination of global and local adaptive thresholding [1] is used, which is very helpful for mammographic lesion detection. Gray-level images contains intensity information and for the lesion regions this values haves global superiority in the whole image. But there is a problem, if both mammographic masses and dense breast tissues are overlapped; it has greater density than masses. So that it is misclassified as a lesion. In this paper, lesions detection is mainly based on both gray-level feature and shape features. Wavelet based multi-resolution analysis is performed in preprocessed mammographic images. Original mammogram, M_0 has the finest resolution; After performing the DWT transform 2 times, lower resolution sub images, M_1 and M_2 of the original image are obtained and these M_0, M_1 and M_2 are the multi-resolution representation of the original mammogram. Multi-resolution analysis is used for getting the different resolutions in the images and 2D wavelet transform is used for this purpose. Wavelet [8] is used for decomposition of images in different resolutions. Here 2-level decomposition is used. Few levels of decompositions are necessary to analyze the mammogram, because of mammograms nature. We can effectively detected tumors in mammogram by selecting an appropriate wavelet with a right resolution level. To remove the singularities in the mammogram image, multi scale analysis [1] is used. Multi scale analysis is suitable for target segmentation. Next perform fine segmentation to obtain the better lesion detection. Here the rough segmentation is done by using wavelet based histogram thresholding method [3]. It is performed on low frequency sub-image which is obtained from 1st level decomposition of wavelet transform. After applying 1 dimensional wavelet transform on the first level wavelet decomposed image, find the PDF (Probability Density Function). Calculate the local minima of the 1-D wavelet transformed PDF at the suitable scale and then perform scale 1-5, one dimensional db-6 wavelet transform. The threshold value is selected by using that global local minima value. Then segmentation is done by using threshold value to obtain the coarse segmented areas. After coarse segmentation a binary image is obtained as an output. Binary image is a black and white image, where black portion is background and white region is lesion. After performing the discrete wavelet transform, morphological filter enhancement is performed on the 1st level decomposed sub-image. This will help to improve the contrast of the mammographic images. After the coarse segmentation, it uses a window-based adaptive thresholding technique to implement the fine segmentation, which is a Local adaptive thresholding. A threshold is computed for each pixel in the mammographic image, in order to identify it as a suspicious lesion pixel or a normal tissue pixel by local windows. The architecture of the proposed system is shown in the Figure 2.

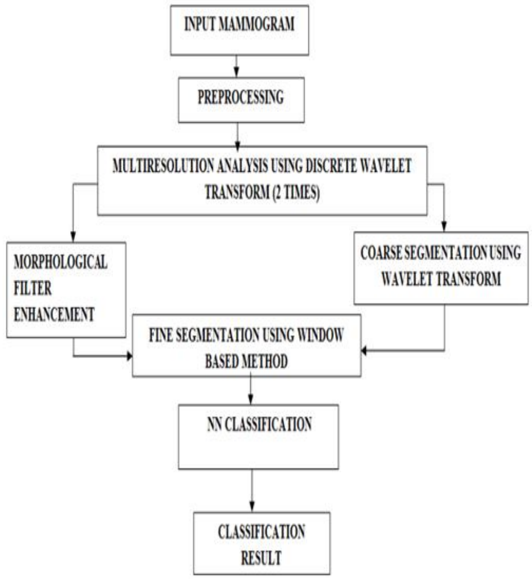


Figure 2 System Architecture

To improve the existing algorithm for selecting a threshold for each pixel, it presents a new algorithm as follows. If mean > LWdif and (|mean-I(i, j)|/mean) < 1 - α , Then I(i,j) is probably a pixel in suspicious lesion area. Calculate the local adaptive threshold is using the equation

$$T(i,j)=\begin{cases} \alpha.mean & if\ mean > I(i,j) \\ mean & otherwise \end{cases} \quad (5)$$

Else

$$T(i,j) = mean + \gamma.LWdif$$

$$LWdif = LWmax(i,j) - LWmin(i,j) \quad (6)$$

Let C1 and F1 be the segmentation results after the coarse segmentation and the fine segmentation, respectively. C1 and F1 are mapped to C2 and F2, Respectively. This C2 is used for AI based training and classification. It is used for calculating the area of white pixels in the entire image. This method finds even a single cell growth. So it identifies even a minute suspicious portion. It can be used for classifying the image into 3 classes such as normal, benign and malignant.

3.2 Classification using BNN

In the second stage, classification step is performed. It is used for classifying the mammogram images into 3 categories: Normal, benign, malignant. Classification phase mainly consists of training and testing phase. Classification's stage is training phase and it is the feature extraction stage. Here first step is dataset collection from mini-MIAS database. Then perform preprocessing and DWT is applied on this preprocessed image. After that combination 2 adaptive thresholding is performed. First one is coarse segmentation and second is fine segmentation. Then extract the features using BNN classifier. Here, the ratio of white pixels in the entire fine segmented image is calculated. For training the classifier extracted features are used. These features are stored for testing stage. Testing is the second phase and it is the phase of classification. The extracted features are given to the classification stage as inputs. In this proposed work, AI based Training and Classification is performed on image after fine segmentation. Classification is done on the test image, based on the stored features. Back Propagation Neural network is used for correctly classifies the mammogram. Diagram of feature extraction and classification is shown in Figure 3. In this method, both gray-level features and shape features are used for lesion detection. Normally white intensity in malignant cancer is very high, compared to benign. So this intensity ratio can be used for classification process. After fine segmentation, lesions are detected in white pixels. It can find even the minute area of suspicion which can be either cancerous or fatty and this area is used for classification. Calculate the area of white pixels in the fine segmented image. Based on this area of white pixels, cancers are classified into malignant, benign and normal types. Classification mainly consists of training and testing. In the training stage, features are extracted and it is fed into the classifier algorithm. To perform classification, back propagation neural network is used in this work.

4. EXPERIMENTAL RESULT AND ANALYSIS

The data used in the experiments are obtained from the mini- MIAS database of mammograms [5]. All images in this database are digitized. And they are resized at a resolution of 1024 *1024 pixels .The proposed algorithm was implemented in a MATLAB environment. Here gray-level feature and shape feature are used. To obtain better detection result, compared to [1], edge enhancement algorithm based on sharpening filter is used. After edge enhancement, image should be clearer for further processing. Then Noise removing steps are applied. For extracting the shape based features morphological techniques are used in the proposed system. Classification mainly consists of training and testing. In the training stage, features are extracted and it is fed into the classifier algorithm. To perform classification, back propagation neural network is used in this work.

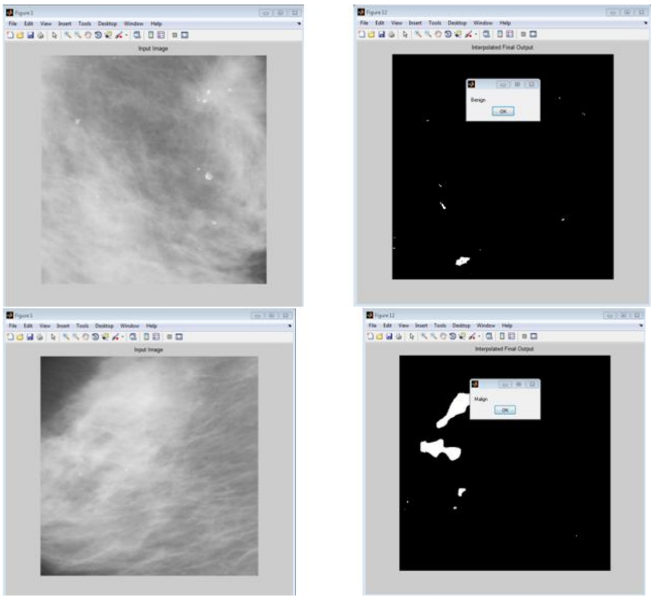
Table 1: Training and Testing Sets

a) Class	*b)* Training Set	(1) Test Set
Normal	40	81
Benign	30	59
Malignant	25	30

The proposed system is trained with 95 images form MINIMIAS [9] database. The testing image includes 81 normal images and 89 abnormal (benign and malignant). To measure the performance of CAD system sensitivity is usually used, which measures system reliably for making positive identifications. A highly sensitivity system improves the accuracy of the system.

$$sensitivity = \frac{true\ positive}{true\ positive + false\ negatives} \quad (7)$$

Where true positive is the no: of abnormal mass correctly classified by the system and false negative is the no: of abnormal mass incorrectly classified by the system.
The sensitivity of the proposed system is: Sensitivity= 82 / (82 + 7) = 92.13% Proposed detection and classification result is shown in Figure 3. And Table 2 shows sensitivity of proposed system and ATD system [1]. In Table 3, sensitivity of normal, benign and malignant images for proposed system is shown.



(A) **(B)**

Figure 3 Proposed Detection and Classification Results (A) Input Image (B) Classified Image

Table 2: Performance Comparison

Class	Sensitivity of Proposed Method	Sensitivity of ATD method
Abnormal	92.13%	91.3%

Performance comparison is shown in Figure 4. In Figure 5, sensitivity of normal images for varying test sets is shown, while in Figure 6, benign images sensitivity for different test images is shown. Sensitivity of malignant images for varying test images is shown in Figure 7.

Table 3: Sensitivity of normal, benign and malignant images

c) Class	(1) Sensitivity
Normal	95.06%
Benign	84.7%
Malignant	83.33%

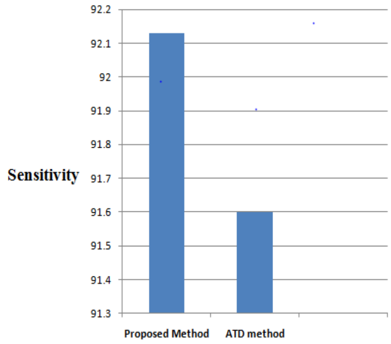


Figure 4 Performance Comparison by Proposed Method and ATD method

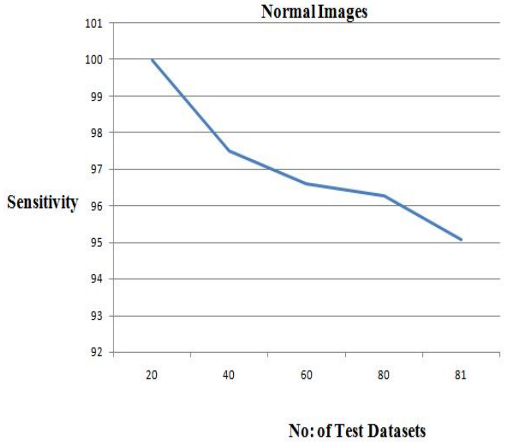


Figure 5 Sensitivity of normal images for varying number of test sets

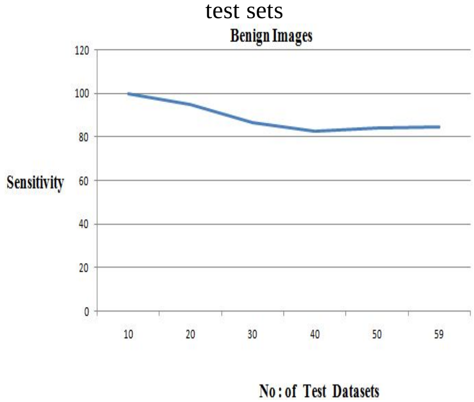


Figure 6 Sensitivity of benign images for varying number of test sets.

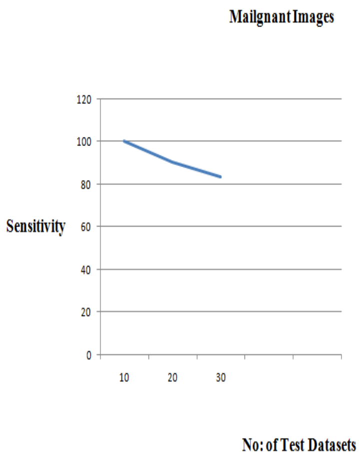


Figure 7 Sensitivity of malignant images for varying number of test sets.

5. CONCLUSIONS

The proposed work will explore a novel CAD based scheme for breast tumour detection and classification. A new general method is presented for the classification of bright targets in an image. Here, AI based Training and Classification approach using BNN classifier and edge enhancement based on sharpening filter are proposed. These classification techniques find even the minute area of suspicion which can be either cancerous or fatty and this area is used for classification. The Sharpening process boosts the image so that it will be suitable for further processing. A combination of adaptive global thresholding segmentation and adaptive local thresholding segmentation is used to segment the multi-resolution sub images of the original mammogram. Wavelet transforms are used in the new method for the segmentation problem. Experiment results shows that this proposed wok will obtain the better detection and classification results. As a future work, Region boundary based detection on total area will be performed. If the area calculation is matches with this, then this concept is concrete. This method can be extended for other diseases such as lung cancer.

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