OPEN ACCESS INTERNATIONAL JOURNAL OF SCIENCE & ENGINEERING

FEATURES EXTRACTION AND CLASSIFICATION FOR DETECTION OF MALIGNANT IN MAMMOGRAMS

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Abstract: **The best method for early mass Detection is screening mammograms known as mammography. Mammogram analysis processing any kind of mammograms with the aim of finding deficiency presented in the mammogram. The aim of this paper is to elaborate how preprocessing work for mammographic images. The objective of preprocessing is to improve the quality of the image and make it ready for further processing by removing the irrelevant noise and unwanted parts in the background of the mammogram. There are numerous of methods of preprocessing a mammogram image. Their advantages and disadvantages are discussed. In this paper Comparative study of Wavelet Adaptive Windowing method an effective technique for tumor detection in mammilla (bosom) has been done , here we explained various approach suggested by different authors regarding preprocessing. In this paper what is exactly going on in preprocessing is discussed. Then we elaborate preprocessing result. Our preprocessing method show superior results during operation**

I INTRODUCTION

A journey of Cancer begins with cells, after that building block that creates tissues starts. Normal cells grow and divide to form new cells as the body needs them. in case of normal body, regular cells grow old or get damaged, after that they expire, and new cells take their place. Sometimes the process not working properly because of some reason. New cells continue their production when the body doesn't need them, and old cells don't die as they are still in working situation. The continually formation of extra cells often forms a mass of tissue called a tumor. Cancer that forms in the tissues of breast, usually in the pectoral and in the duct is the breast cancer. It occurs women, it may happen in male also but the rate is very rare. Breast cancer is one of the most affected disease in the female specially in India.. The average affected rate varies from 22-28 per 1,00,000 women per year in highly developed area settings to 6 per 1,00,000 women per year in rural areas. Due to rapid changing in lifestyles, there is a rising incidence of breast cancer in India. According to The IARC (International Agency for Research on Cancer), there were randomly calculated 79,000 women per year suffering from breast cancer in India. It is thought that it takes about 10 years for a tumor to become 1 cm in size starting from a single cell. Earlier diagnoses of breast cancer are facility provided by modern medicine. It is the leading cause of death due to cancer in women. Because how to prevent cancer and the proper diagnosis for cancer have not yet been found, Early detection is important. Mammography is a low dose x-ray procedure for the looking inside internal to the breast. Mammography has been proven to be the most reliable method and it is having key feature for the early detection of breast cancer. Mammography is highly correct because manual answer may require too many attempts to get into rid but CAD system never fails to detect suspicious location, but sometimes, it is not perfect [2]. On average, mammography will detect about 85–90% of the breast cancers in women without symptoms. It works very well in the women having age starting from 35 and above and is inexpensive. In a screening mammilla, each breast area is X-rayed in two different sides: from top to bottom and from side to side. When a bosom image is observed, breast tissue appears white and opaque ie curved shape and fatty tissue appears darker and translucent i.e. scattered shape. As shown in figure 1.

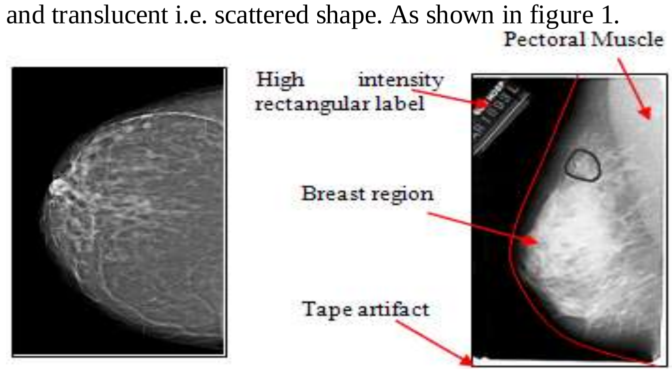


Figure 1.Two basic views of mammographic image: (a) opaque (CC) view and (b) translucent oblique view

A mammogram mainly contains two regions: the exposed breast region and the unexposed non-breast region. It is a need to first recognize the breast region for the reduction of the processing and then to remove the hidden breast region In this paper the reduction of hidden area is done using a very popular stretching Approach. Linear contrast stretching used to remove noise from the image so that the unwanted or dense regions which are not required for further processing is removed very efficiently. In this paper the work is accomplished as follows, Section 2, describes the preprocessing method for breast cancer. Section 3 discussed about the results Section 4 discusses the conclusion, finally section 5 shows references.

II PREPROCESSING METHOD

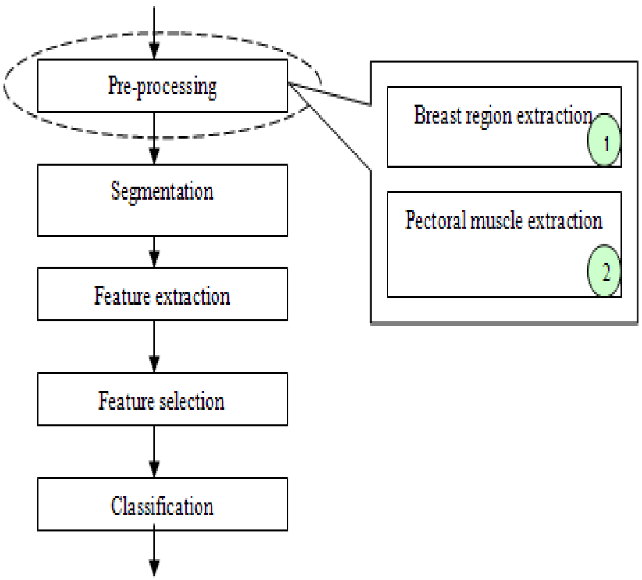


Figure 2.Typical block diagram used by CAD systems

Block diagram or preprocessing using CAD system is shown in fig-2 .Image pre-processing techniques are necessary; in order to find the representation of the mammogram, to remove noise and to modified the quality of the image. Before any image-processing algorithm can be applied on mammogram, pre -processing steps are very important in order to minimize the search for affected without removing influence from background of the mammilla. Digital mammograms are medical images that are difficult to be calculated, thus a preparation stage is needed in order to maximize the image quality and make the segmentation results more accurate. The main objective of this process is to improve the quality of the image to make it ready for further processing by removing the unrelated and unwanted parts in the back ground of the mammogram .The main goal of pre-processing is to improve the image by minimizing the undesired distortions or enhances some image features relevant for further processing and analysis task. In this paper, linear contrast stretching is used as a preprocessing step. Linear contrast enhancement, also known to as a contrast stretching, linearly enhance the original digital values of the data into a new calculated value. By expanding the original input values of the image, the total range of sensitivity of the display device can be utilized. Linear contrast enhancement also makes static changes which are subtle within the data more obvious. These types of modifications are best applied to images with Gaussian or near-Gaussian histograms, meaning, all the brightness values fall within a narrow range of the histogram and only one mode is apparent. There are a methods of linear contrast enhancement i.e. Minimum-Maximum Linear Contrast Stretch. When applying these techniques, the original minimum and maximum values of the data are assigned to a newly specified set of values that utilize the full range of available brightness values. Consider an picture with a minimum brightness value of 60 and a maximum value of 158. When such an image is digitized without enhancements, the values of 0 to 60 and 158 to 255 are not focused. Important spectral differences can be detected by stretching the minimum value of 60 to 0 and the maximum value of 158 to 255. As shown in figure3.

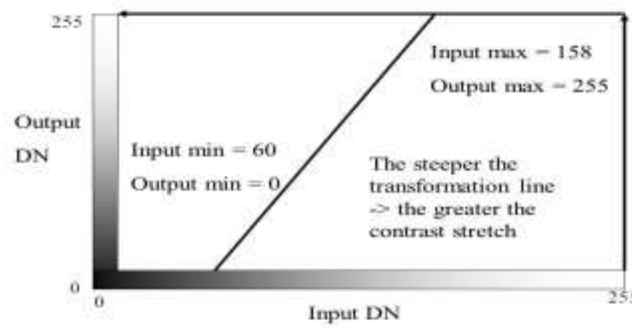


Figure 3 Minimum-Maximum Linear Contrast Stretch

An algorithm can be used that relates the old minimum value to the modified minimum value, and the old maximum value to the modified maximum value. All the old intermediate values are placed exactly between the new minimum and maximum values. Many digital image processing systems have built-in capabilities that automatically expand the minimum and maximum values to optimize the full range of available brightness values. This is the simplest contrast stretch algorithm. The gray values in the original picture and the modified image follow a linear relation in this algorithm. A value in the low range of the original histogram is assigned to extremely black and a value at the high end is assigned to extremely white. noise may be of various type and according to the intensity value the noise can b removed as shown in figure 4 various type of noise.

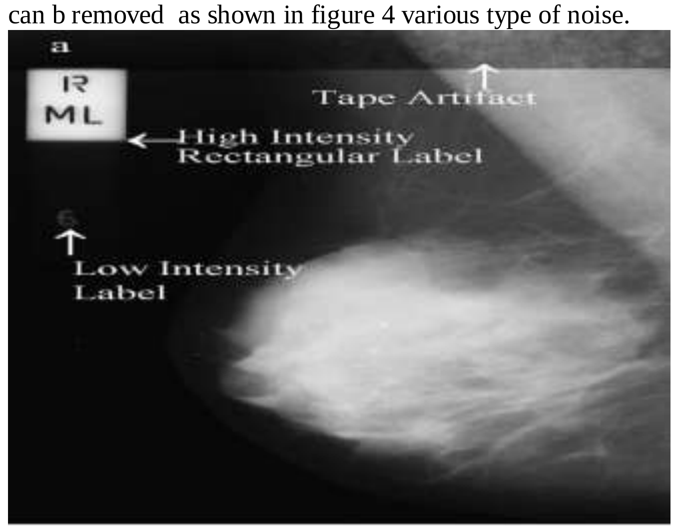


Figure 4: Types of noise observed in mammogram

A Denoising using filters

One of the most popular problems in image processing is denoising. Usually the procedure used for denoising is attached on the features of the image, goal of pre-processing and also post-processing algorithms denoising by low-pass filtering not only removing the noise but also blurs the edges. Spatial and frequency domain filters are widely used as tools for image enhancement. Low pass filters (smoothing the image) smooth the image by blocking enhanced information. Mass detection aims to extract the edge of the tumor from surrounding normal tissues and background, high pass filters (sharpening filters) could be used to enhance the details of images. Partial low and high pass filter when applied to mammogram image leads to best Image Quality. The pre-processing process is based on a segmentation step of the breast region in the mammogram. When translucent mammograms are used, an additional step to identify the pectoral muscle is desirable because this region appears at approximately the same density as the dense tissues of interest in the image of the breast . To achieve the pre-processing step we propose a classical based method shown at figure 5. It is composed of two stages: a breast region extraction approach to 19 separate the breast from the background (first stage), and a pectoral muscle extraction approach (second stage) to eliminate the pectoral muscle from the breast region.

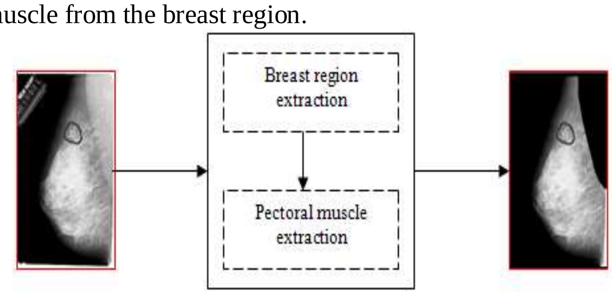


Figure 5 Denoising in preprocessing method for mammogram

III RESULT

As shown in figure 6. we can see that separation of the breast area gave the best result compared to the identification of the muscle. This can be explained by the fact that the arrangement between the breast region and the background is easier than the separation between the pectoral muscle and the breast region.

Figure 6 Breast border identification

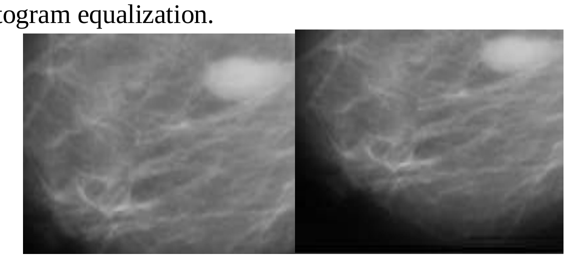
(a) By a radiologist (b) Our preprocessed method

For this reason, the segmentation of the pectoral muscle is more difficult. For evaluating the effectiveness of proposed method for pectoral muscle segmentation, we compared our results by other method, based on Active contour, which is proposed by A. Boucher etal. [16]. As it can be seen in Table 1 our method is better in relation to the other.

TABLE 1. COMPARISION OF RESULT WITH OTHER METHOD.

Pectoral Muscle Extraction	**Our Method**	**Method Presented in [16]**
Percentage	92.5%	91%

The preprocessing method is tested by using the mini-MIAS database of mammograms. All images are digitized at the resolution of 1024 ×1024 pixels and 8-bit accuracy (gray level). The testing images include 209 normal images, 23 images of CIRC (Circumscribed masses), 19 images of SPIC (Speculated masses), 19 original images of MISC (ill-defined masses) and 23 images of CALC (Calcification). The proposed algorithm was implemented in a MATLAB environment. Figure 7 (a) shows the original mammogram images. Then Figure.7 (b) shows the preprocessed output. Therefore, the algorithm obtained a good preprocessing result and figure 8 shows exact preprocessing output using contrast stretched for digitized mammographic image with grey level as well as with histogram equalization.



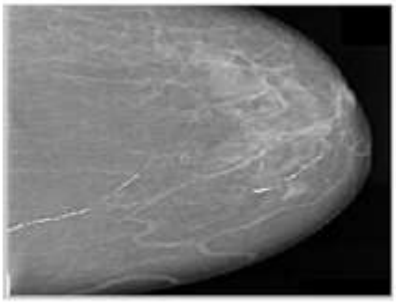
a) Original image b)Preprocessed image

Figure 7 Image mdb025

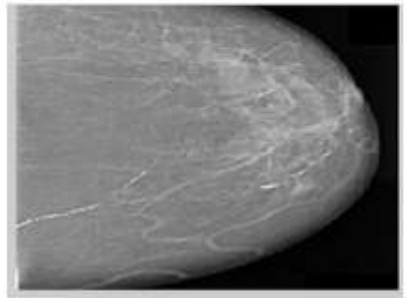
IV CONCLUSION

A pre-processing method for extraction of targeted region and hidden region is presented here in paper. The breast region extraction is based upon automated thresholding method and Labeling algorithm. The pectoral muscle extraction in mammograms, based upon Hough transform and active contour, overcomes the limitation of the straight-line of the representation of the pectoral muscle. Our preprocessed method was evaluated on 80 digitized mammograms obtained from DDSM database: the first stage (breast border extraction) gave a rate of 100% in detecting the correct border while the second stage gave a rate of 92.5% for the correct pectoral muscle segmentation. During this work, we found good results concerning the pre-processing step. Further development, concerns the addition of the Coarse segmentation by using wavelet based histogram thresholding where, the threshold value is chosen by performing 1-Dwavelet based analysis of PDFs of wavelet transformed images at different channels. Final segmented result will be obtained by choosing threshold by using windowing method.

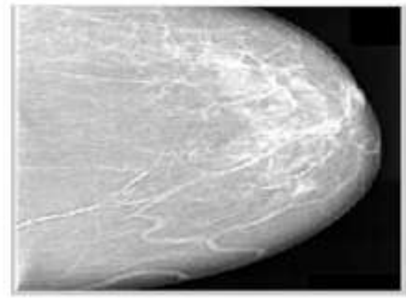
Application of our pre-processing approach in the computer aided analysis (CAD).



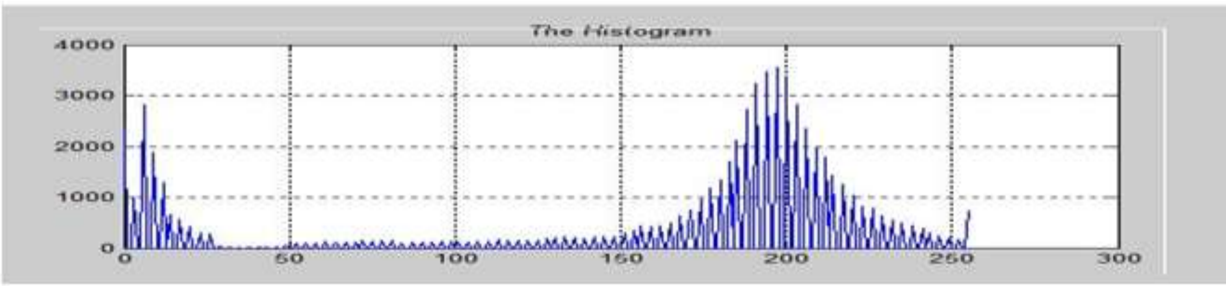
a)Original image



b) Grey scale image



c) Contrast stretched image



d) Histogram for the mammogram

Figure.8 (a-d) final output for preprocessing step

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