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Detection of Doubtful Lesions in Breast using Mammogram Technique by K-Means Algorithm

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ABSTRACT: *One of the most incurable disease, which increases the death of women is breast cancer. An early stage of tumor detection can be done with a popular technique called mammography but in some cases, mammogram fails to diagnose tiny tumors because of noises and blurred images. So it needs improvement in PSNR for better visual perception of medical image . In this paper, K-means algorithm is used to identify the doubtful lesions in a mammogram. Watershed algorithm is used for segmentation process. Finally, classification is done with the help of SVM classifier. To accomplish the aim of this work, MIAS (Mammographic Image Analysis Society) databases are used, which contain 200 images of the breast. When compared to existing method ,K means algorithm reduces the average classification error and increases the accuracy by 7%.*

KEYWORDS–Mammography, MIAS, Segmentation, Kmeans Algorithm, SVM Classifier, PSNR.

I.INTRODUCTION

Breast cancer is the most common cancer among the Indian women and ranges from 25 to 31% of all cancers in India. The average age of the occurrence of breast cancer is 30-50 years and previously it was 50-70. In the U.S., breast cancer is the second most common cancer in women after skin cancer. It can occur in both men and women, but it is rare in men. Each year there are about 100 times more new cases of breast cancer in women than in men. Breast cancer starts when cells in the breast begin to grow out of control. These cells usually form a tumor that can often be seen on an x-ray or felt as a lump. It is one of the major dangerous disease that causes death.[1]FCM algorithm is used to detect the suspicious lesions in a mammogram. [2]Spiculated lesions detection can be done with the help of multiresolution scheme. The first step to reduce the mortality rate is detection of breast cancer. Initial detection of breast cancer reduces the mortality rate and it is found that mammography is the best technique for precise detection of breast cancer. The death count of breast cancer patients in India is 70,218 and stood first in the death rate. China ranked second with the death count of 47,984 and United States ranked third with 43,909 deaths. Mammography using texture features is the best reliable technique for the detection of breast cancer[3]. From a report[4], Early stage detection of breast cancer increases chances of survival from 24% to 99%.Several techniques are available to diagnose initial stage breast cancer but mammography is the one of the best among them. A mammogram is an x-ray picture of the breast. It can be used to check for breast cancer in women who have no signs or symptoms of the disease. It can also be used if you have a lump or other sign of breast cancer. Mammography technique uses low-energy X-rays to examine the human breast for diagnosis and screening. American Cancer Society(ACS) authorized that mammography is the gold technique for initial stage detection of breast cancer[6]. [7]X-ray mammography does not provide consistent result every time due to noises and poor PSNR. computer-aided diagnosis schemes have been developed to improve the primary sign of this disease , here low-level pre-processing techniques and image segmentation, are used to detect breast cancer. Reddy[8]preferred automatic image segmentation method for tumor detection. For Successful detection and localization of tumors as small as 2.5 mm in diameter Curvelet transform is used. it is a multi scale transform that can represent the edges along curves much more efficiently. Styliani Petroudi[9] proffered Amplitude Modulation Frequency-Modulation (AM-FM)

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multi-scale feature sets for characterization to find breast density. After the study of paper[10],we know that speculated lesions are detected with the help of novel multiresolution scheme. it involves 2D wavelet transform to obtain original mammogram. Fuzzy algorithm based on Tsallis entropy helps to increase the contrast of micro calcifications in mammogram[11]contrast is increased by suppressing the background noises. Enhancing the image is the main problem in mammography. To solve it improved PSO(Particle Swarm Optimization) is used. To detect masses in mammogram texture features are used in[12]. root process of medical image processing applications are Filtering and Image Enhancement. In these techniques noises in images are reduced with the help of filters.Further improvement of contrast of medical image can be achieved through fuzzy C-means algorithm.FCM increases the MSE and PSNR in effective manner.But it is difficult to extract the tumor from the image. To overcome this issue proposed method uses K-means algorithm to reduce the noise and blurring in each part of the image by tumor segmentation .When compared to C-means algorithm, proposed method increases PSNR value up to 7%.

II. WORKING MODEL:

C-means algorithm fails to extract the tumor from the image. Proposed method uses tumor segmentation to extract the tumor accurately and it has four modules: Pre-processing is done by filtering. Segmentation is carried out by a K-means algorithms. Feature extraction is by threshold and finally, Approximate reasoning method to recognize the tumor shape and position using classification method.

Flow Diagram:

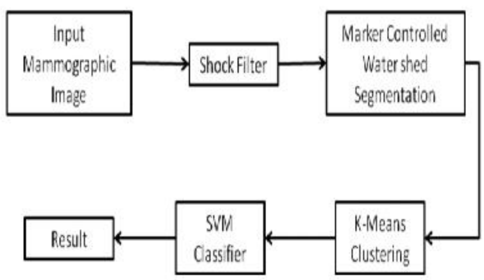

Fig.1 Flow diagram of proposed system

MODULES :

1.Pre-processing

2.Segmentation

3.Classification

4.Simulation results

1.PRE-PROCESSING

According to the need of the next level the pre-processing step convert the image. It performs filtering of noise and other artifacts in the image and sharpening the edges in the image. RGB to SYSTEM DESIGN grey conversion and Reshaping also takes place here. It includes shock filter for noise removal. Problems during Image Pre-Processing has been solved by using feature descriptor method .Raw image data directly from a camera may have a variety of problems so it is not likely to produce the best computer vision results. This is why careful consideration of image pre-processing is fundamental. For example, a local binary descriptor using gray scale data will require different pre-processing than will a color SIFT algorithm additionally, some exploratory work is required to fine-tune the image pre-processing stage for best results. During image pre-processing, there may be artifacts in the images that should be corrected prior to feature measurement and analysis. Here are various parameters are available for correction. If the entire scene is rotated or taken from the wrong perspective, it may be valuable to correct the geometry prior to feature description. Some features are more robust to geometric variation than others .Color corrections can be helpful to redistribute color saturation or correct for illumination artifacts in the intensity channel. Typically color hue is one of the more difficult attributes to correct, and it may not be possible to correct using simple gamma curves and the RGB color space. Enhancements are used to optimize for specific feature measurement methods, rather than fix problems. Familiar image processing enhancements include sharpening and color balancing. Many well-known filtering methods for sharpening and blurring may be employed at the pre-processing stage. For example, to compensate for pixel aliasing artifacts introduced by rotation that may manifest as blurred pixels which obscure fine detail, sharpen filters can be used to enhance the edge features prior to gradient computations. Or, conversely, the rotation artifacts may be too strong and can be removed by blurring. In any case, the pre-processing enhancements or corrections are dependent on the descriptor using the images, and the application.

1.1 Shock Filter

The basic idea behind shock filters is the process of applying either erosion or dilation in a much localized manner, in order to create a “shock” between two influence zones, one belonging to a maximum and the other to a minimum of the signal.

2.SEGMENTATION

Segmentation is carried out by advanced K-means algorithms. The feature extraction is extracting the cluster which shows the predicted tumor at the FCM output. The extracted cluster is given to the threshold process. It applies binary mask over the entire image. In the approximate reasoning step the tumor area is calculated using the binarization method. Segmentation is the process of partitioning an image into different segments. In medical imaging, these segments often correspond to different tissue classes, organs, pathologies, or other biologically relevant structures. Medical image segmentation is made difficult by low contrast, noise, and other imaging ambiguities.

2.1 Watershed Segmentation Process

Watershed algorithm is used in image processing primarily for segmentation purposes. Segmentation using the watershed transform works better if to identify, or "mark, “foreground objects and background locations. watershed is a transformation defined on a gray scale image. Marker-controlled watershed segmentation follows this basic procedure:

Step1:Compute a segmentation function. This is an image whose dark regions are the objects you are trying to segment

Step2:Compute foreground markers. These are connected blobs of pixels within each of the objects.

Step3:Compute background markers. These are pixels that are not part of any object.

Step4:Modify the segmentation function so that it only has minima at the foreground and background marker locations.

Step5:Compute the watershed transform of the modified segmentation function

2.2 K-Means Algorithm

The K-means algorithm is an iterative technique that is used to partition an image into K clusters. The basic algorithm is

Step1:Pick K cluster centers, either randomly or based on some heuristic method, for example K-means++.

Step2:Assign each pixel in the image to the cluster that minimizes the distance between the pixel and the cluster center.

Step:3 Re-compute the cluster centers by averaging all of the pixels in the cluster

Step4:Repeat steps 2 and 3 until convergence is attained (i.e. no pixels change clusters)

Step5:In this case, distance is the squared or absolute difference between a pixel and a cluster center. The difference is typically based on pixel color, intensity, texture, and location, or a weighted combination of these factors. K can be selected manually, randomly, or by a heuristic. This algorithm is guaranteed to converge, but it may not return the optimal solution. The quality of the solution depends on the initial set of clusters and the value of K.

3.CLASSIFICATION

In each segmented part is given to the SVM classifier recognized .Here SVM classifier in order to gain a clear understanding of the relationship between the inputs and the outputs of the models and to facilitate a comparison of the classification performance. The intent of the classification process is to categorize all pixels in a digital image into one of several land cover classes, or “themes”. This categorized data may then be used to produce thematic maps of land cover present in the image in an image. Normally, multispectral data are used to perform the classification and ,indeed, the spectral pattern present within the data for each pixel is used as the numerical basis for categorization. The objective of image classification is to identify and portray, as a unique gray level, the features occurring in an image in terms of the object or type of land cover these features actually represent on the ground.

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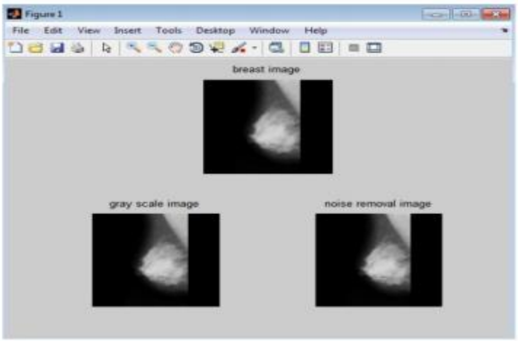
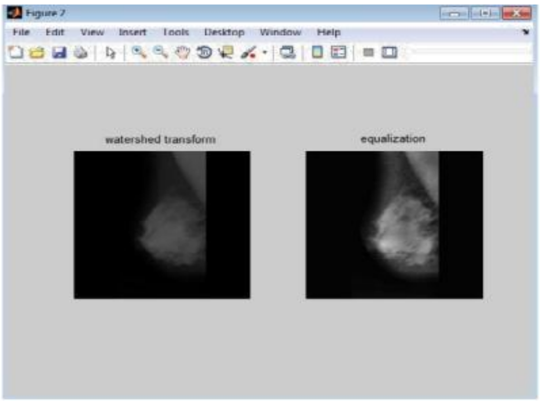
IV.SIMULATION RESULTS

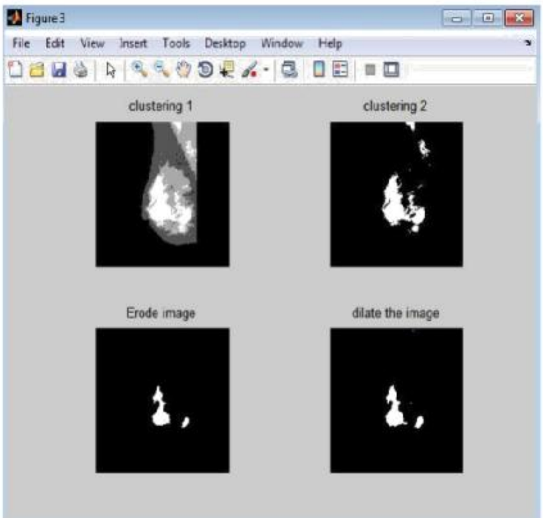
A)Pre-Processing - Noise removal in mammogram image using shock filter.



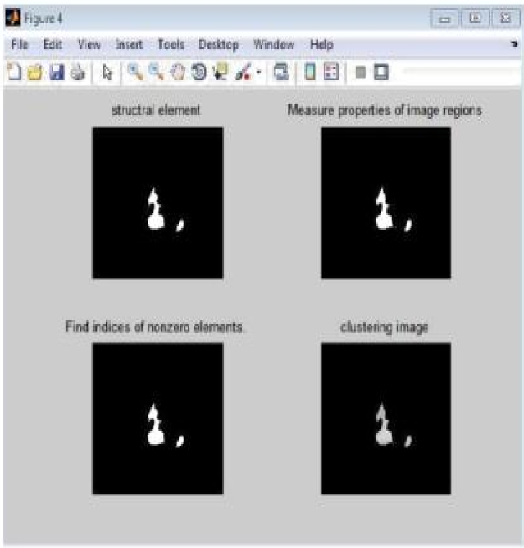
B)Histogram Equalization- Equalization is done in the filtered image



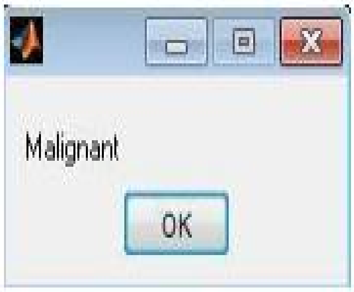
C)Segmentation-Using watershed segmentation process tumor part is detected



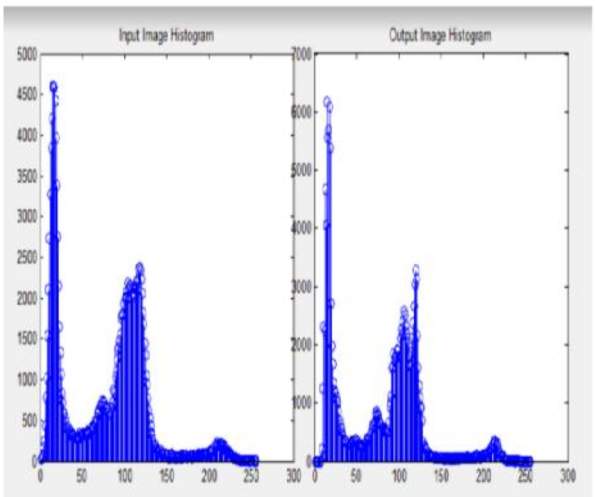
D)Classification-Features are extracted and intensity is marked in the tumor part.



E)Message Box: Message box to display the tumor condition whether it is benign, normal or malignant.



F)Histogram Equalization of the image:



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G)Comparison Of Existing And Proposed System

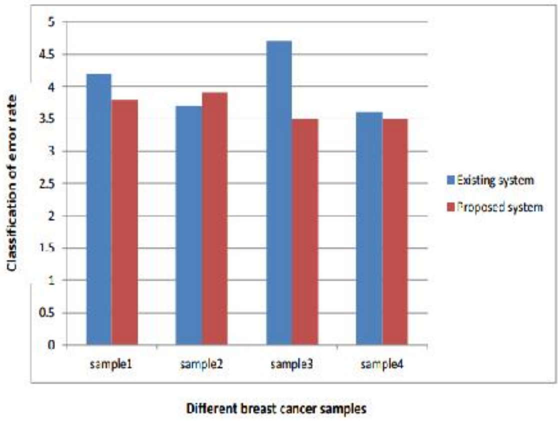

Fig:2 Comparison between Existing and proposed System

Fig.2 shows that the average classification error for the proposed system is less than that of the existing system. So, the accuracy of proposed system is increased by 7%. This is detected by give various mammogram image sample from the database available and finally concluded.

Table.1 shows the corresponding classification error rate of the given sample image

List	Existing system	Proposed system
sample1	4.2	3.8
sample2	3.7	3.9
sample3	4.7	3.5
sample4	3.6	3.5

Above table gives the classification error rate for both existing and proposed system which is obtained from the input image given from the database.

V.CONCLUSION

In this paper a new algorithm is presented for the detection of suspicious lesions in mammograms. Experimental results using MIAS image database have shown that the proposed detection system is capable of detecting suspicious lesions of different types at low false positive rates with low complexity and in minimum time. Furthermore, the detection results for some types of lesions mainly characterized by texture feature can be improved if other combinations of lesion features are taken into account in the proposed method. So this method can be used in the hospitals for detection of breast cancer in the earlier stages. we have used k-Means algorithm, which gives segmented image with pectoral muscle and to remove the pectoral muscle, we have applied morphological operation, which detected the lesion from the mammographic images more accurate. The future work will be focused on detection of tumor in various parts of Body like lungs, abdomen, throat etc., with three dimensional reconstruction and Volume calculation. It is better to get the 3D view of the tumour for more accuracy and it is more useful for the treatment.

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