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Detection of Breast Cancer Using Texture Method in Mammogram Image

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ABSTRACT: A Mammogram is an X-ray image of the breast. It is used to check for breast cancer in women who have no signs or symptoms of the diseases. It can also be used if you have a lump or other sign of breast cancer. A mammography exam, called a mammogram, aids in early detection and diagnosis of breast diseases in women. Mammogram doesn't prevent breast cancer, but they can save lives by finding breast cancer. As per the survey of World Health Organization (WHO), American Society identified that by the end of 2012, about 2,26,000 cases were diagnosed and 40,000 resulted in death. This proposed system is used to detect and segment the cancer part from the breast. Preprocessing is used to conduct steps that will reduce the complexity and increase the accuracy of applied algorithm by using Median filter, Laplacian filter and Gaussian filter is implemented to reduce noise to reconstruct the image by removing unwanted distortion. Segmentation is done by texture method using texture filter. Feature extraction is performed by using the GLCM technique to extract the features from the segmented image. Classification is performed by using the ANFIS algorithm to improve the accuracy of the cancer detection.

KEYWORDS: Breastcancer ,WHO, Mammogram images, GLCM, ANFISalgorithm

I. INTRODUCTION

Breast cancer is the type of cancer which is formed by an uncontrolled growth of breast cell. Breast cancer is a malignant tumor that has developed from cells in the breast. The noise present in the images are depends on the imaging modalities [1]. Nearly, 1.7 million women are affected by breast cancer. After lungs cancer, breast cancer is second most cancer in women in the united states commonly causes death of women. However, since 1989, no of women are died of breast cancer about 5 percentage of women have metastatic cancer then they are first diagnose with b8reast cancer. Mammographic images are X-ray images of breast region displaying points with high intensities density that are suspected of being potential tumours[2]. American Society identified that by the end of 2012, about 2,26,000 cases were diagnosed and 40,000 resulted in death[3-4]. Breast cancer accounts for 23% of the total cancer cases and 14% of the cancer death in both developed and developing countries [5].

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II. METHODOLOGY

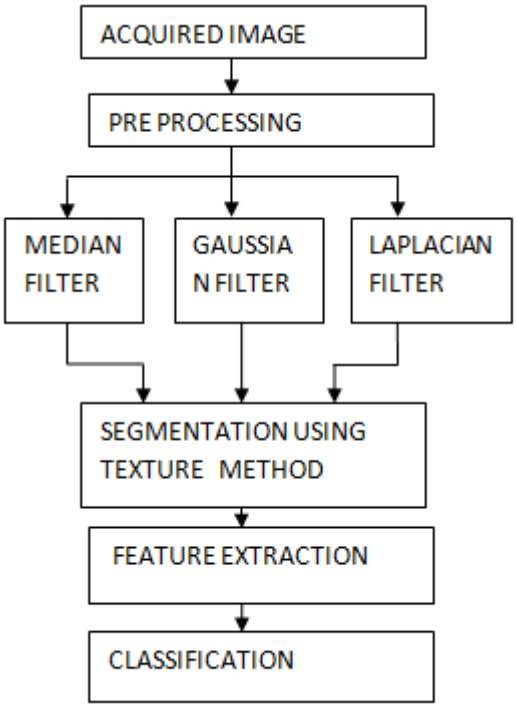

Fig 1: OUTLINE OF THE TEXTURE METHOD

In mammography image, bright region that described as cancer part. Malignant tumors can invade and destroy nearby tissue and spread to other parts of the body. Avoiding benign biopsies would spare women anxiety, discomfort, and expense [6] .Low opposition and noisy in the mammogram image. Normal tissues and malignant tissues are present in some mammogram images. The benign are non-cancerous abnormalities whereas the malignant abnormalities are reported as cancers by the radiologist[7]. Image enhancement approaches can be classified as spatial domain method and frequency domain method. Some example of image pre processing process are contrast pre processing, edge enhancement noise filtering, sharpening, magnifying. Remove the noise with the help of median filter, laplacian filter and Gaussian filter and find PSNR and MSE value for each filter for comparing the performance of filters. Texture segmentation using texture filter for segment the cancer region. Depending on the features like mean, variance and homogeneity, etc.The process and methodology for segmentation and classification for breast cancer is shown in above flow graph which shows that five process of detection and classifications of breast cancer such as collecting acquired image, preprocessing i.e. remove the noise from mammogram image, segment the affected tumor from the normal cells, feature extraction and classification of breast cancer.

III. PRE PROCESSING

Image preprocessing is the process of prominence certain features of interest in an image. It is one of the most interesting and visually attractive areas of image processing. The principle objectives of preprocessing is to process an image so that the results is more suitable than the original image for a specific application. Image preprocessing methods use the considerable redundancy in image. Neighboring pixels corresponding to one object in real images have essentially the same or similar brightness value. Thus, distorted pixel can often be restored as an average value of neighbouring pixels.

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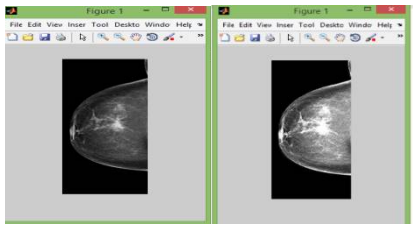
3.1 MEDIAN FILTER

The median filter is a nonlinear filtering technique, often used to remove the noise. The median is defined as the percentile of a ranked set of number median filter prescription has revealed below

G (x,y)=median{f(x-a,y-b),(a,b)€W}

Where W is a selected window

a,b are the constant.



(a) (b)

Fig :2 (a) ORIGINAL IMAGE (b) OUTPUT OF MEDIAN FILTER

we have calculated PSNR and MSE values for individual image for several filter that has shown below

TABLE 1: PSNR AND MSE VALUES FOR MEDIAN FILTER

Image	MSE	PSNR
Img1	0.0392	62.2325
Img2	0.0364	62.5538
Img3	0.1254	57.1802
Img4	0.2496	54.1916
Img5	0.2132	54.8774

3.2 LAPLACIAN FILTER:

The Laplacian of an image highlights regions of rapid intensity change and is therefore often used for edge detection.

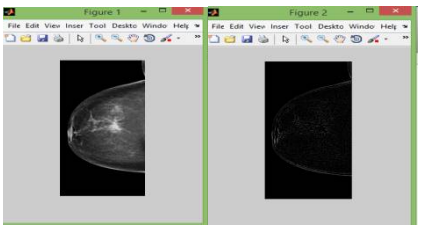
The Laplacian L(x, y) of an image with pixels intensity values I(x, y) is given by

$L(X,Y)=\partial^2F(X,Y)=\partial^2F(X,Y)/\partial X^2+\partial^2F(X,Y)/\partial Y^2$

Where,X and Y are axis of the standard deviation

$Log(X,Y)=1/\pi\sigma^2[1-X^2+Y^2/2\sigma^2]$

σ= standard deviation .The laplacian filter diagram that has shown below



(a) (b)

Fig: 3 (a) ORIGINAL IMAGE (b) OUTPUT OF LAPLACIAN FILTER

The Laplacian is often applied to an image that has first been smoothed with something approximating a Gaussian smoothing filter .In order to reduce its sensitivity to noise, and hence the two variants will be described together here. A single gray level image as input and produces another gray level image as output. we have calculated PSNR and MSE values for individual image for several filter that has shown below

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TABLE 2: PSNR AND MSE VALUES FOR LAPLACIAN FILTER .

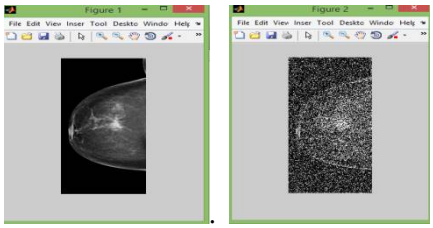
Image	MSE	PSNR
Img1	159.4659	26.1381
Img2	194.4890	25.2758
Img3	211.6170	24.9093
Img4	214.8652	24.8431
Img5	253.6208	24.1230

3.3 GAUSSIAN FILTER

Gaussian filter is a filter whose impulse response is a Gaussian function. It have the properties of having no overshoot to a step function input while minimizing the rise and fall time, Gaussian blur is also called as Gaussian smoothing is the result of blurring an image by the Gaussian function. It is a widely used effects in graphics software,typically to reduce image noise and reduce detail, equation of Gaussian filter is

$$F(x)=ae^{-(x-b)^2/2c^2}$$

Where a, b, c are arbitrary real constants x is the distance from the origin in the horizontal axis, y is the distance from the origin in the vertical axis and σ is the standard deviation of the Gaussian distribution.



(a) (b)

Fig: 4 (a) ORIGINAL IMAGE (b) OUTPUT OF GAUSSIAN FILTER

Gaussian filter image has shown above and calculated PSNR and MSE values for individual image for several filter that has shown below.

TABLE 3: PSNR AND MSE VALUES FOR GAUSSIAN FILTER

Image	MSE	PSNR
Img1	82.0484	29.0241
Img2	95.0498	28.3853
Img3	98.4425	28.2330
Img4	101.2089	28.1126
Img5	119.0234	27.4085

Based on the comparison of three filters, median filter possess the accuracy of 58.20% .median filter is used to remove the noise with the accuracy of 58.20%.

IV. SEGMENTATION

Image segmentation is used to find out the place line and curves in the images. In this paper texture segmentation is used to segment the affected part. There are two types of texture filtering such as magnification filtering and minification filtering. An image texture is a set of metrics calculated in image processing designed to quantify the perceived texture of an image. Image texture gives us information about the spatial arrangement of color or intensities in an image or selected region of an image. Texture is innate property of all surfaces that describes virtual patterns, each having properties of homogeneity. It contains important information about the structural arrangement of the surface, such as clouds, leaves, bricks, fabric, etc. It also describes the relationship of the surface to the surrounding

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environment. In short, it is a feature that describes the distinctive physical composition of the surface Texture method such as texture filter has five steps to segment the cancer image they are

1.read image
2.create texture image
3.create rough mask for the bottom texture
4.use rough mask to segment the top texture
5.display segmentation results.

The five steps involved in image segmentation is shown in below figure.

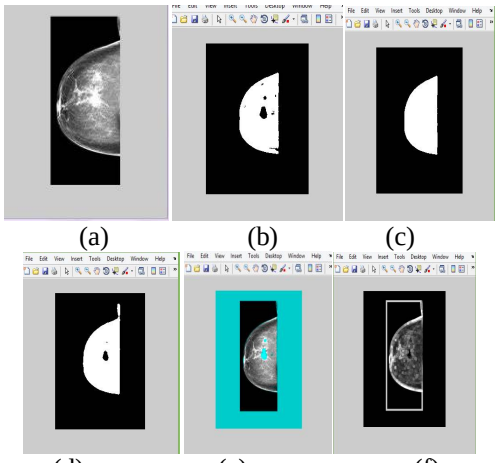

Fig:5 (a)original image(benign) (b) image under implementation (c)create texture image (d) create rough mask to segment the top texture (e)use rough mask to segment the top texture (f)display segmentation results .

Texture is one of the most important defining feature of an image.it is characterized by the spatial distribution of gray levels in the neighbourhood. Texture properties include coarseness, contrast, directionality, line-likeness, regularity, roughness.

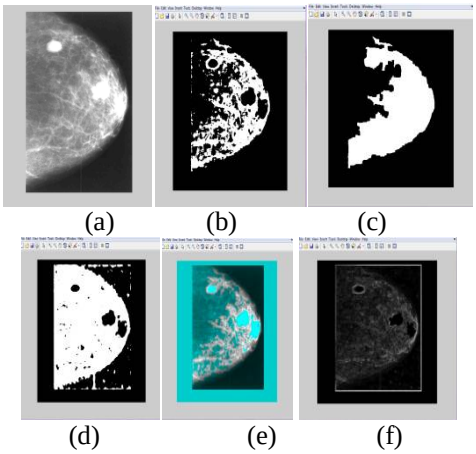

Fig:6 a)original image(malignant) b) image under implementation c) create texture image d) create rough mask to segment the top texture e) display segmentation results f)output

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V. FEATURE EXTRACTION

Using features of an image segmented image is classified into three types such as normal, benign, malignant. The features used to extract the cancer are mean, variance, correlation, contrast,etc., cancer image segmentation using texture method segmentation is done based on the number of pixels. This approach able to identify abnormal mass detection on the clinical database. In future ,we will work to work to diminish the constancy on stricture to make our method adaptive to poles apart images.

FEATURE EXTRACTED FROM GLCM	SUM	VARIANCE
MEAN	366.96	13.52
ENTROPHY	8.4436	0.559
VARIANCE	193.574	190.462
GLCM	453.67	56.33
MEDIAN	371.66	17

MEAN	ENTROPHY	VARIANCE	GLCM	MEDIAN
122.17	6.12	1.7180	255	124
204	2.588	1.4863	255	255
204	4.8028	1.7180	255	204
204	2.56	7.5753	208	204
204	3.113	0.4864	194	164
162.73	6.16	2.06	194	164

VI. CONCLUSION

The texture method on dissimilar mammogram images such as benign and malignant, segmentation is done base on the number of pixels. Image texture easily seems by humans and is believed to be a rich source of visual information about the nature and three dimensional first attempt of the image. This approach able to be acquainted with abnormal mass recognition on the clinical database containing the physiognomies such as regularity, linearity, occurrence and segment directionality. In future work classification of ANFIS algorithm will be used for the better improvement and accuracy.

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