Breast Tissue Identification in Digital Mammogram Using Edge Detection Techniques

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Abstract - Breast tissue identification is the task of finding and identifying breast tissues in digital mammograms. This paper presents a different type of edge detection methods that use digital image processing techniques, which is to detect and identifies the breast tissue from digital mammograms. Basically to identify and detect the tissue here we use two important steps are image enhancement and edge detection. To identify a breast tissue from digital image is a major task in digital image processing.

Keywords - Edge Detection, Digital Mammogram, shape detection, Image enhancement

I. INTRODUCTION

Digital Mammogram is low energy x-ray for detecting the breast cancer earlier. Object detection, especially tissue detection is the very important and difficult task, which is used to finding and identifying objects in digital mammogram images [1]. Human vision system recognize a multitude of masses or tissue in digital mammogram images with effort, despite the fact that the digital mammogram of the breast objects may vary somewhat in different dimension, shape, position and sizes [2].This paper presents *a* method that use to detect the masses from digital mammogram images. The two major steps are image enhancement and edge detection [3]. To detect a mass from digital mammogram images is a major task in medical image processing. It is very difficult to all over the India to detect and classify the shape based on image processing technology [4].
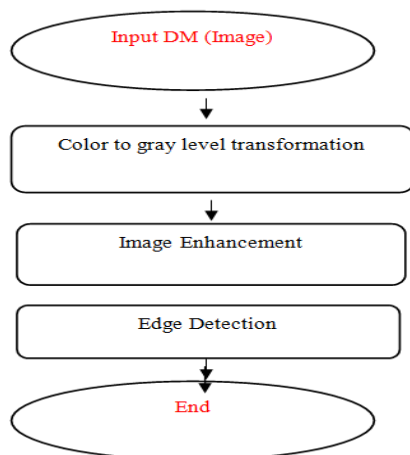

Fig1: Proposed methodology

Image enhancement approaches fall into two categories
- Spatial Domain enhancement
- Frequency domain enhancement

The spatial Domain enhancement refers to the digital mammogram plane itself, and approaches in this category are based on direct manipulation of a Digital mammogram image. When a digital mammogram images are processed for visual Interpretation, the viewer is the important task of how well a particular method is working [5]. Morphology is the efficient study methods of the shape and form of masses. Morphological opening is erosion followed by dilation using the same structuring elements for both operations. The opening operation has the effect of removing objects that cannot completely contain the structuring elements. The digital mammography is the process of X-ray the breast and low cost efficient method which compare to the other screening methods [6].

II. IMAGE ENHANCEMENT

Image enhancement is the essential required task before segmentation and the brightness is added in the digital mammogram. Image enhancement is the very efficient process of adjusting the digital mammogram images [7].
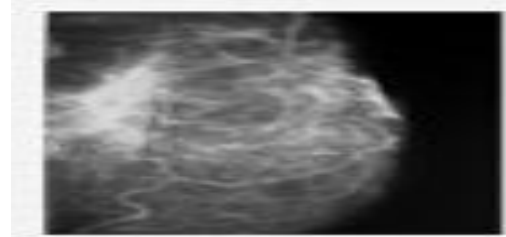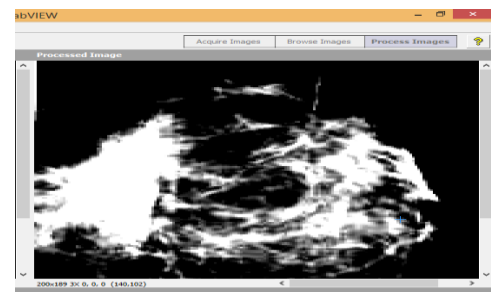

Fig: 2 Input image Digital mammogram (DM)

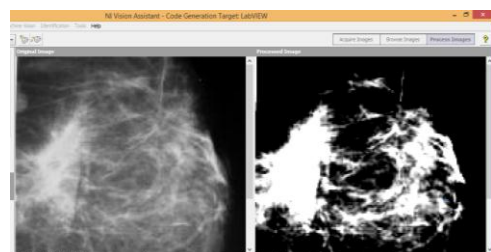

Fig 3: Enhanced image Digital mammogram (DM)

Fig 4: Representation of enhanced image

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Morphology is the best way of study of the shape and form of masses in the Digital mammogram. Morphological image analysis can be used to perform the following important operations like,

- Object extraction.
- Image enhancement operations.
- Edge detectors, shape description.

The two important Morphological operations are I) Erosion II) Dilation. Erosion followed by dilation, using the same articular structuring element for both operations. The opening operation has the effect of removing objects that cannot completely contain the structuring element.

III. BREAST TISSUE SHAPE DETECTION

After the text edit has been completed, the paper is ready for the template. Duplicate the template file by using the Save As command, and use the naming convention prescribed by your conference for the name of your paper. In this newly created file, highlight all of the contents and import your prepared text file. You are now ready to style your paper; use the scroll down window on the left of the MS Word Formatting toolbar. Shape is the most important property that is perceived about breast masses. It allows predicting more facts about a mass than other features, thus recognizing shape is crucial for object recognition. In some other applications, it may be the only feature present, e.g. company logo recognition. Tissue Shape is not only perceived by visual means it is tactical sensors can also provide shape based information that are processed in a similar way. To detect the Tissue shape is the major problem. "Edge detection" is one of the important techniques to identify the shape of the abnormal tissue. The points at which image brightness changes sharply are typically organized into a set of curved line or angle segments termed edges. Edge detection is the fundamental task on digital mammogram image processing to identify the breast tissue. Different types of edge detection techniques are available. Canny edge detection and Sobel-edge detection are most common edge detection techniques.
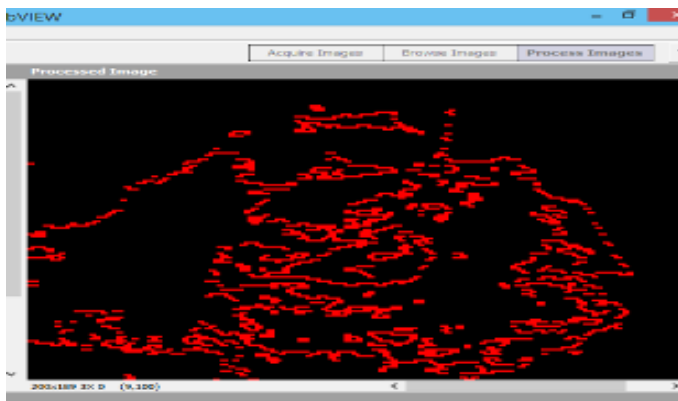

Fig 5: Representation of enhanced tissues.

- Roberts operator

The Robert cross operator performs a simple, efficient, quick to compute, 2-D spatial gradient measurement on the digital mammogram. Representation of pixel values at each particular points in the points in the output representing the estimated absolute magnitude of the spatial gradients of the output digital mammogram at that point.

+1	0
0	-1

0	+1
-1	0

- Roberts mask

The operation consists of a pair of 2x2 convolution kernels as shown in fig 6.
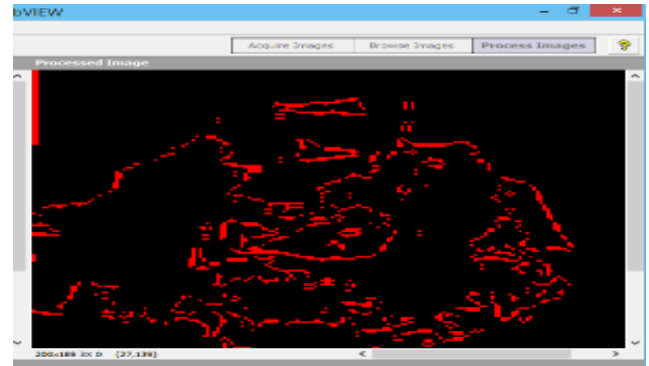

Fig 6: Representation of Robert operator

- Canny operator:

The canny edge detection techniques are one of the efficient standard edge detection techniques. To find the edges by separating noise before finds the edges of the digital mammogram, the carny is the important methods for detecting the edge in digital mammograms. Canny methods without distributing the features of the edges in the image afterwards it applies the tendency to find the edges in the image afterwards it applying the tendency to find the edges and the serious value for thresholding.
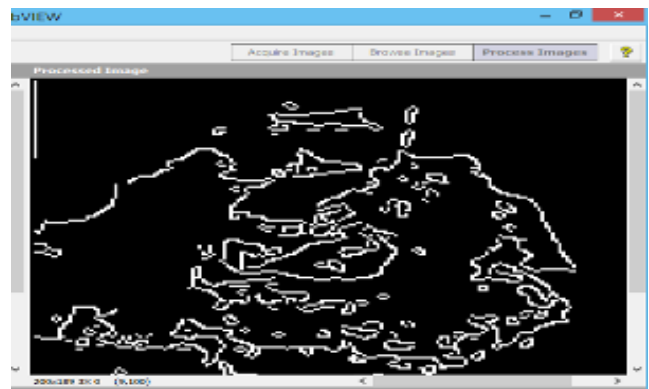

Fig 7: Representation of canny operator

- Sobel operator:

The Sobel operator consists of a pair of 3x3 convolution kernels as shown figure One kernel is simple the other rotated by 90.

-1	0	+1
2	0	+2
-1	0	+1

+1	+2	+1
0	0	0
-1	-2	-1

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- Sobel mask

The kernels can be applied separately to the input digital mammogram, to produce a separate measurement of the gradient components in each orientation.
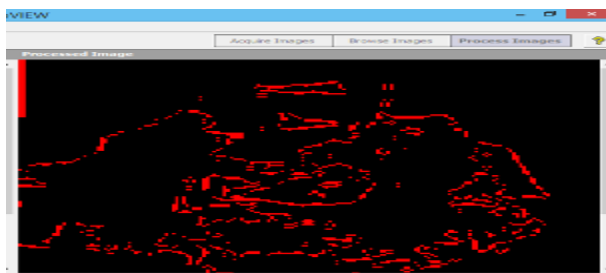

Fig 8: Representation of Sobel operator

- Prewitt operator:

Prewitt operator is similar to the sobel operator and it used for detecting vertical and horizontal edges in the digital mammogram. The operator consist of a pair of 3x3 convolution kernels as shown in fig 8
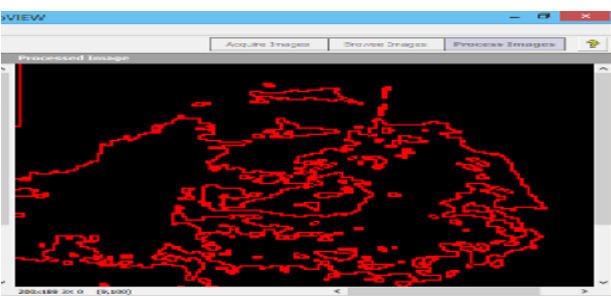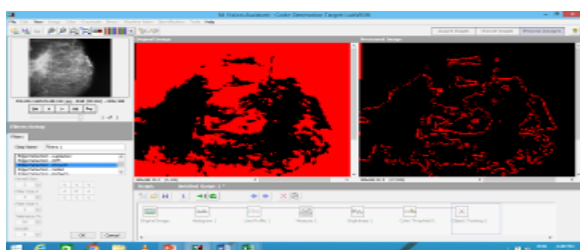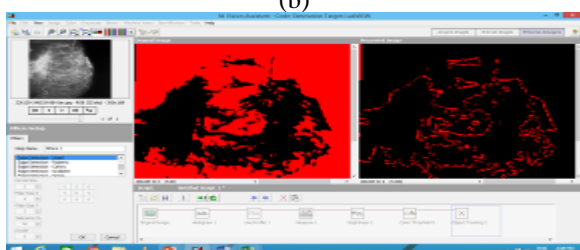

Fig 9: Representation of prewitt operator

IV. EXPERIMENTATION RESULT

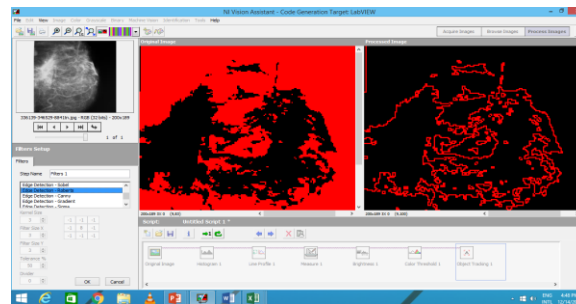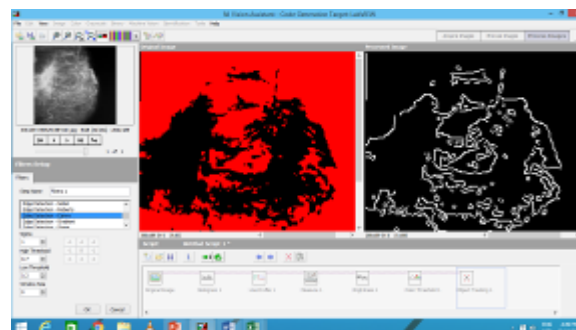

(a)

(b)

(c)

(d)

(e)

Figures: (a) Input Image, (b) sobel image,(c) prewitt image, (d) Robert image ,(e)canny image,

V. CONCLUSION

To compare canny, Robert, prewitt, sobel edge detection algorithm, and the canny edge detection operator is able to detect maximum number of edges in the digital mammogram. Digital mammogram is the basic and important screening tool to detect the breast cancer Canny's edge detector gives very good results for identifies the vertical and horizontal edges in digital mammogram images.

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