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Automated Cancer Diagnosis Identification System using Image Segmentation and Threshold Filter

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***Abstract*—** In this postulation, some progress area based division approaches have created to perform picture division for grayscale and shading pictures. PC vision and picture getting applications, picture division is a significant pre-handling step. The fundamental objective of the division procedure is the partition of forefront area from foundation district. In light of the yield of the division result, division can be ordered as worldwide division or neighborhood division. The worldwide division goes for complete detachment of the article from the foundation while the neighborhood division partitions the picture into constituent locales. For accomplishing division, various calculations are created by different specialists. The division approaches are application explicit and don't function admirably for both grayscale and shading picture division. For any picture comprising of frontal area and foundation, some change districts exist between the forefront and foundation areas. Powerful extraction of change district prompts a superior division result. In this manner, the doctoral postulation plans to proficient and viable change area approaches for picture division for both grayscale and shading pictures.

***Keywords:* -** Image Segmentation, ME, FPR, FNR

I. INTRODUCTION

The breast lesion act as the one of the significant problems now a day, the first line diagnosable solution by detecting all lesions of the breast early to help and improving prognosis of cancer and other health problem related to breast [1]. More than one diagnostic modalities are used for breast cancer screening like computed tomography, resonance magnetic imaging and ultrasound. All of these modalities don't enough to detect all lesions of the breast in spite of their characteristics such as high sensitivity of soft tissue detection. This shortening of detecting lead to support the final diagnosis decision by other further examinations like biopsy and unfortunately that may increase the anxiety of the patients [2]. The digital mammography is superior in detecting breast lesions than other diagnostic modalities. American cancer society recommended that MRI breast investigation should be mandatory for women with previous history of ovarian cancer or positive family history. Nowadays, a new method introduces to detect the beast lesions. This method is called digital mammography. Because its ability to link with image processing software [3].

Digital radiography acts as the useful modalities in lesions detection of the breast because its sensitivity and precision that may increase when used by well expert and trained radiologist. Many studies showed that 10-30% lesion of the breast were missing during routine screening [4].

The image processing plays an important role to decrease the cost of screening process by enhancing the result of digital mammography especially in case of small breast lesions. The first significant features of the breast cancer represent as mass with specific site, texture, border and shape, all these characteristics it easy to study under the image processing techniques by using the MATLAB program [5]. The idea of image processing by converting the result image into matrix as the binary image in addition to series of processes until reach to the appropriate result that helps to take a decision of diagnostic breast lesions [6]. There are many types of techniques used for mammography images detection such as edge-based transform, smoothing, noise removal and extraction techniques. Those methods help the physician in breast cancer diagnosis and monitor the treatment process [7].

The procedure of division is a troublesome assignment in picture preparing when the pictures are of non-paltry sort [1]. The accomplishment of division relies upon the different factors, for example, the calculation utilized for the said reason, the nature of "closer view and foundation" in a picture, the lighting conditions in which the picture development happened, the necessity of the client and so forth. The calculation utilized for bio-medicinal picture division varies from that utilized for regular picture division as the pictures produced for biomedical investigation contrast from that of the pictures created from the common landscape.

Likewise, the lighting conditions for normal picture arrangement are not quite the same as that of submerged pictures. However, picture division is connected for different applications, for example, penmanship acknowledgment, biometrics, satellite picture examination for climate guaging, infection grouping and so forth. In this way, various division process are created by different analysts where each is suitable for a specific application. In this way, it stays still a testing issue from picture preparing point of view.

Picture division is a lot of tasks connected to an advanced picture for removing objects from the picture or partitioning the picture into significant areas dependent on certain qualities of the picture, for example, force, shading, surface and so on for extraction of data from the info picture. The division can be nearby division (worried about explicit part or district of the picture) or worldwide division (concerned with division in the entire picture, comprising of countless) [2]. The case of neighborhood division and worldwide division is appeared in Figure 1 and Figure 2 separately. "In worldwide division, the forefront is isolated out from the foundation." Separating the closer view from foundation is a significant pre-preparing in picture investigation. The principle reason for existing is to gain some valuable data in the picture for more elevated amount picture preparing. In this theory, the exploration work is centered on worldwide picture division.

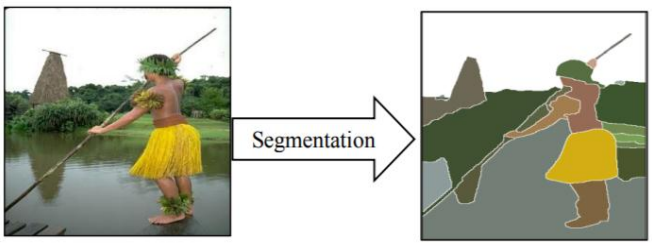

Figure 1: Example of local segmentation

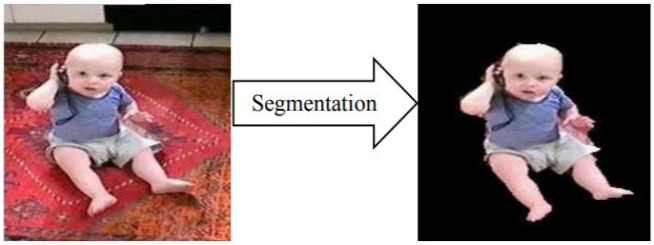

Figure 2: Example of global segmentation.

II. MORPHOLOGICAL OPERATION BASED SEGMENTATION

Morphological picture handling depicts a scope of picture preparing methods that manage the state of highlights in a picture. Scientific morphology is an apparatus of separating picture parts that are valuable in the portrayal and depiction of locale shape, for example, limits, skeletons and so forth. Objective of morphology activities is to improve picture information, save basic shape attributes and dispose of commotion. Enlargement and disintegration are fundamental morphological handling tasks. They are characterized as far as increasingly rudimentary set activities, be that as it may, are utilized as the fundamental components of numerous calculations. Both widening and disintegration are created by the collaboration of a set called an organizing component with a set of pixels of enthusiasm for the picture. The organizing component has both a shape and a root.

Morphological methods are utilized for pre or post preparing, for example, morphological separating, diminishing, and pruning. Morphology plays a significant job in picture handling applications: improvement, pressure, division and commotion. In improvement process we can make lighter bit of a picture darker, darker segment of a picture; lighter, with the goal that deceivability of that picture can be improved.

Two principal Morphological tasks widening and disintegration are joined alongside structure components to acquire progressively complex tasks opening, shutting, Top cap and Bottom cap changes. The morphological tasks utilized in proposed look into work are as per the following

Erosion and Dilation

Disintegration and Dilation are two crude activities in morphological handling. The essential impact of the disintegration administrator on a paired picture is to dissolve away the limits of districts of frontal area pixels .Those territories of closer view pixels shrivel and gaps inside those territories become bigger as appeared Figure 3. In this procedure we increment the dark pixels in the picture, making it look more slender. Disintegration is a morphological sifting task in which picture subtleties littler than the structure component are separated from the picture .Erosion performed the capacity of a "line channel".

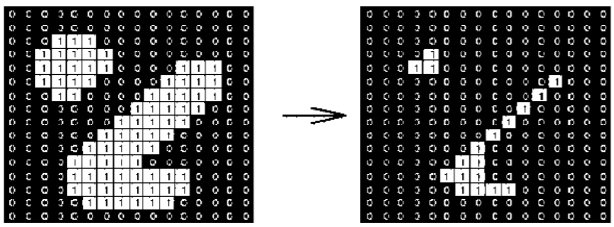

Figure 3: Effect of Erosion using a 3×3 square structuring element

The Opening serves in PC vision and picture preparing as an essential workhorse of morphological clamor expulsion. Opening expels little items from the forefront (normally taken as the dim pixels) of a picture, putting them in the foundation, while Closing evacuates little gaps in the frontal area .These methods can likewise be utilized to discover

explicit shapes in a picture. In opening procedure we right off the bat do Disintegration and afterward Dilation. This technique is utilized to expel the additional white pixels from the pictures. In picture handling, Closing, together with Opening, is the fundamental workhorse of morphological commotion evacuation. Opening expels little items, while Shutting evacuates little openings. Dark dimension shutting comprises of a dim dimension Dilation pursued by dark dimension Erosion. Shutting is the double of opening, for example shutting the frontal area pixels with a specific organizing component is comparable to shutting the foundation with a similar component. Opening can be utilized to make up for non-uniform foundation brightening. Opening the picture can create sensible gauge of the foundation over the picture.

III. PROPOSED ALGORITHM

In gray-level images, edges have been typically modelled as brightness discontinuities. From an intuitive sense, it can be said that an edge is an apparent boundary between two pixels with significantly different brightness values. Here "significantly different" may depend on local pixel brightness statistics for example. This variation usually occurs because an edge usually represents a physical boundary between two objects having different intensities.

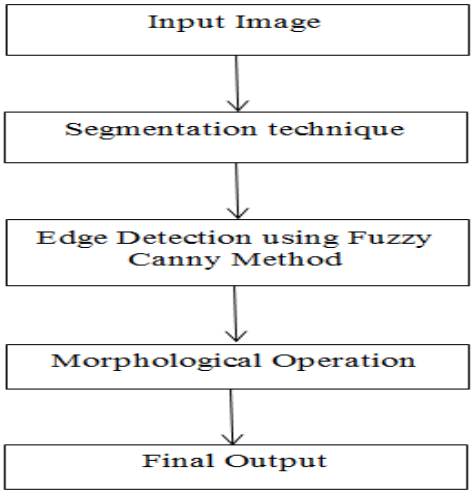

Figure 4: Flow Chart of Proposed System

The word edge is used to refer to a location on the image where the brightness value appears to jump. These jumps are associated with high values of the first derivative and are the kinds of edges that were originally detected by Roberts.

Image segmentation is probably the most important task in image understanding. It is the partitioning of an image into a set of non-overlapping regions whose union is the entire image. The purpose of image segmentation is to decompose the image into parts that are meaningful with respect to a particular application. Without good image segmentation, it is not possible to process the image appropriately and, therefore, to understand what it represents.

It is very difficult to define what constitutes a "meaningful" segmentation of an image within a computer algorithm. Haralick and Shapiro suggest that the following rules are usually obeyed. Segmented regions should be uniform and homogeneous with respect to some characteristic such as gray level or texture. Region interiors should be simple and without many small holes. Adjacent segmented regions should have significantly different values with respect to the characteristic on which they are considered uniform. Boundaries of each segment should be simple, not ragged, and must be spatially accurate.

IV. PERFORMANCE MEASUREMENT

The quantitative presentation of the division consequences of the current methodologies just as the created techniques in our exploration work are looked at through five changed numerical measures. The exhibition of the strategies is assessed by looking at the division covers with the ground facts accessible in various dataset for different pictures. In the division procedure, the yield accomplished before item extraction is called as division cover. The division veil is "a paired picture" where the object areas are set apart as 1 (white) and foundation districts set apart as 0 (dark). The different measures are

- Misclassification error (ME)
- False positive rate (FPR)
- False negative rate (FNR)

V. SIMULATION RESULT

As shown in table 1 the error, smoothness, uniformity and processing time are obtained from the proposed image segmentation using fuzzy canny method algorithm. From the analysis of the results, it is found that the proposed image segmentation using fuzzy canny method algorithm gives a higher SNR for Brain image and it is found that the proposed image segmentation using fuzzy canny method algorithm gives a good smoothness. Many filters were applied such as white and black filter, sharp image and log transformation. In this stage, the noise was removed followed by sharpening of the images and median

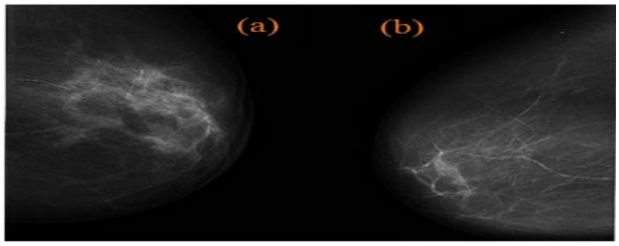

Figure 5: Input image

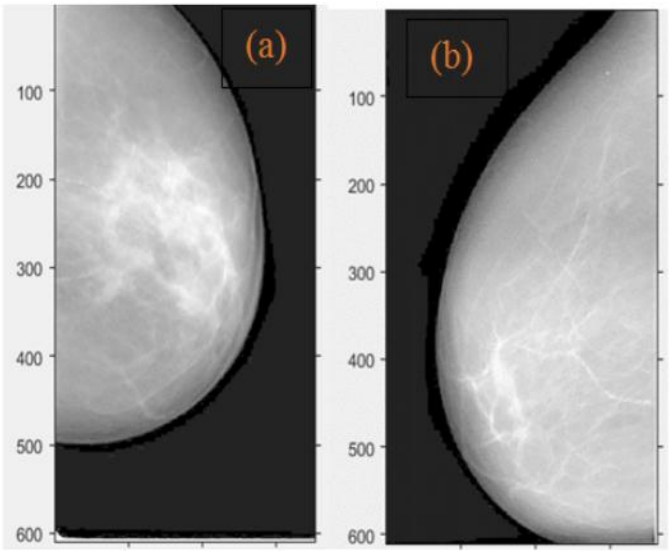

Figure 6: Simple background & simple foreground Original Image

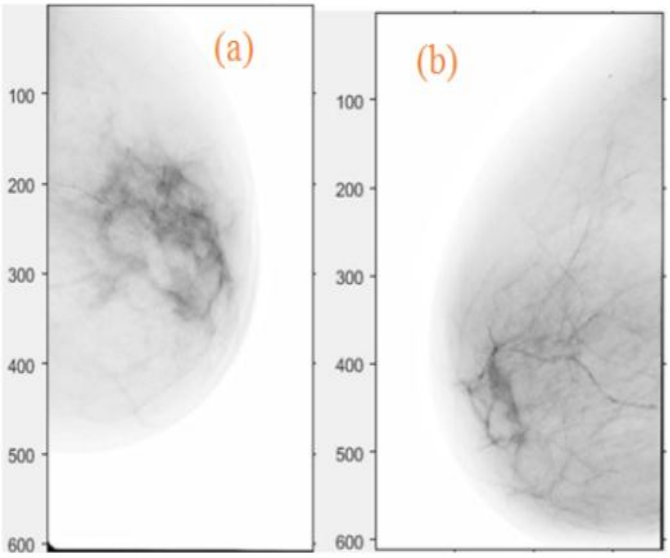

Figure 7: Output Image of simple background & simple foreground

Table 1: Results of simple background & simple foreground Image

Image	ME		FPR		FNR	
	Previous Algorithm	Proposed Algorithm	Previous Algorithm	Proposed Algorithm	Previous Algorithm	Proposed Algorithm
Airplane Image	0.0179	0.0163	0.0089	0.0072	0.1670	0.1503
Eagle Image	0.0065	0.0058	0.0047	0.0043	0.0378	0.0297
Bird Image	0.0274	0.0271	0.0192	0.0185	0.1684	0.1582

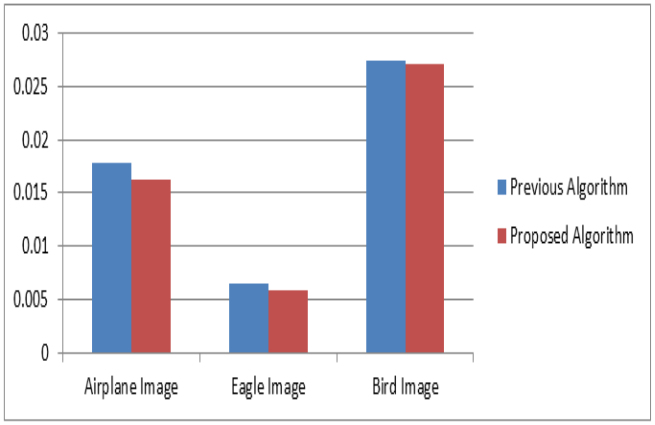

Figure 8: ME of the simple background & simple foreground Image

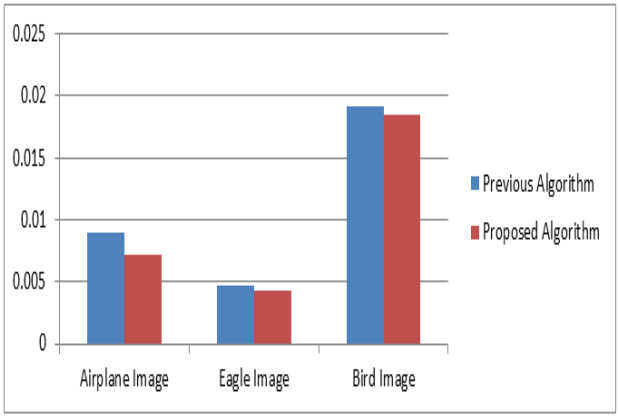

Figure 9: FPR of the simple background & simple foreground Image

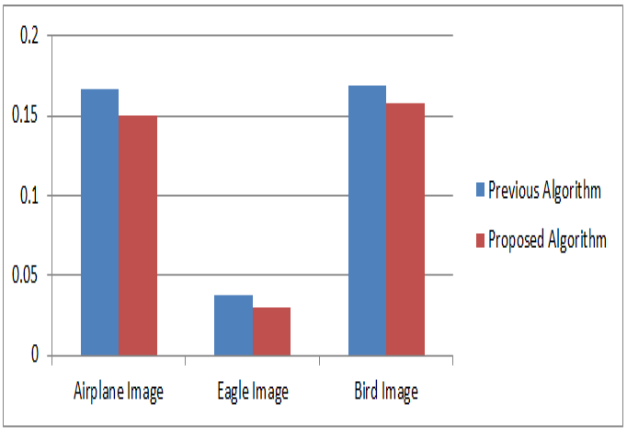

Figure 10: FNR of the simple background & simple foreground Image

From the analysis of the results, it is found that the proposed image segmentation using fuzzy canny method algorithm gives a good smoothness for simple background & simple foreground Image.

VI. CONCLUSION

In this paper a new segmentation technique is review using morphological operations. In first step edge is detected using Fuzzy Canny method which can give better results compared to classical techniques of edge detection and in second stage, after edge detected, basic morphological operators are applied which are dilation and erosion and also flood fill is used to segment the image. The developed image segmentation based morphological operation algorithm is providing improvised SNR, Smoothness, and Uniformity for different images compared with previous algorithm. The overall system performance is improved in terms of error.

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