

A Study on Enhancement of Mammogram images

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Abstract – Image processing finds its applications in several sectors and has a very important role to play in medical science. Different fields of medical science like mammography, diabetic retinopathy, MRI scans, and ultrasounds. Digital mammography systems permit handling of fine differences in image contrast by means of image processing algorithms. The usefulness of digital mammography in the detection of breast cancer is presently under investigation. This imaging modality splits image acquisition and image display, thus allowing optimization of both. Diverse display algorithms have advantages and disadvantages for the definite tasks necessary in breast imaging—diagnosis and screening. The research paper illustrates the proposed method for enhancing the input mammogram image. The research work has been conducted using Matlab.

Keywords – Image enhancement, Mammography, Mammogram images, medical science.

I. INTRODUCTION

Image processing refers to the convergence of an image into digital form and subsequently accomplishing some mathematical operations on it with the purpose of enhancing the image and mining useful information from it. The input may be an image like a photograph or video frame and the output is an enhanced image or features related to that particular image. Image processing finds its application in different sectors and medical science is the prominent one [1, 2]. The image processing comprises three steps stated as under [11, 12].

- The first step comprises importing the image via means of digital photography.
- Directing suitable operations on the input image like data compression, image enhancement and spotting patterns that are not noticeable to human eyes.
- The last phase is of gaining output in the form of an altered image.

Breast cancer is the second leading cause of cancer affecting females in women, exceeded only by lung cancer [13]. Mammography is among the most challenging inspections in medical imaging which requires high contrast, fine details, minimum noise images, low patient motion, and suitable viewing conditions [3, 4]. The mammography must be accomplished using committed mammographic imaging equipment with low energy output imaging competence like tungsten anode at low kilovoltage of 30kVp or less or rhodium or molybdenum x-ray tube anode [5, 6]. Along with an appropriate emphasis on the use of technology, equal importance shall be laid on correct patient position and breast compression [10]. Quality of image is of utmost importance in mammography and therefore a guarantee of the proper functioning of the entire imaging chain is important [9]. This involves the mammographic x-ray system, the photographic processor, the screens and film, and the view boxes, the viewing area, and digital displays [7, 8].

II. CONTRIBUTION AND IMPLEMENTATION

This section depicts the workflow of the research done in enhancing the input mammogram image. The flowchart shown in Fig. 1 shows the procedural development to obtain an enhanced mammogram image. The flowchart is followed by the relevant algorithm.

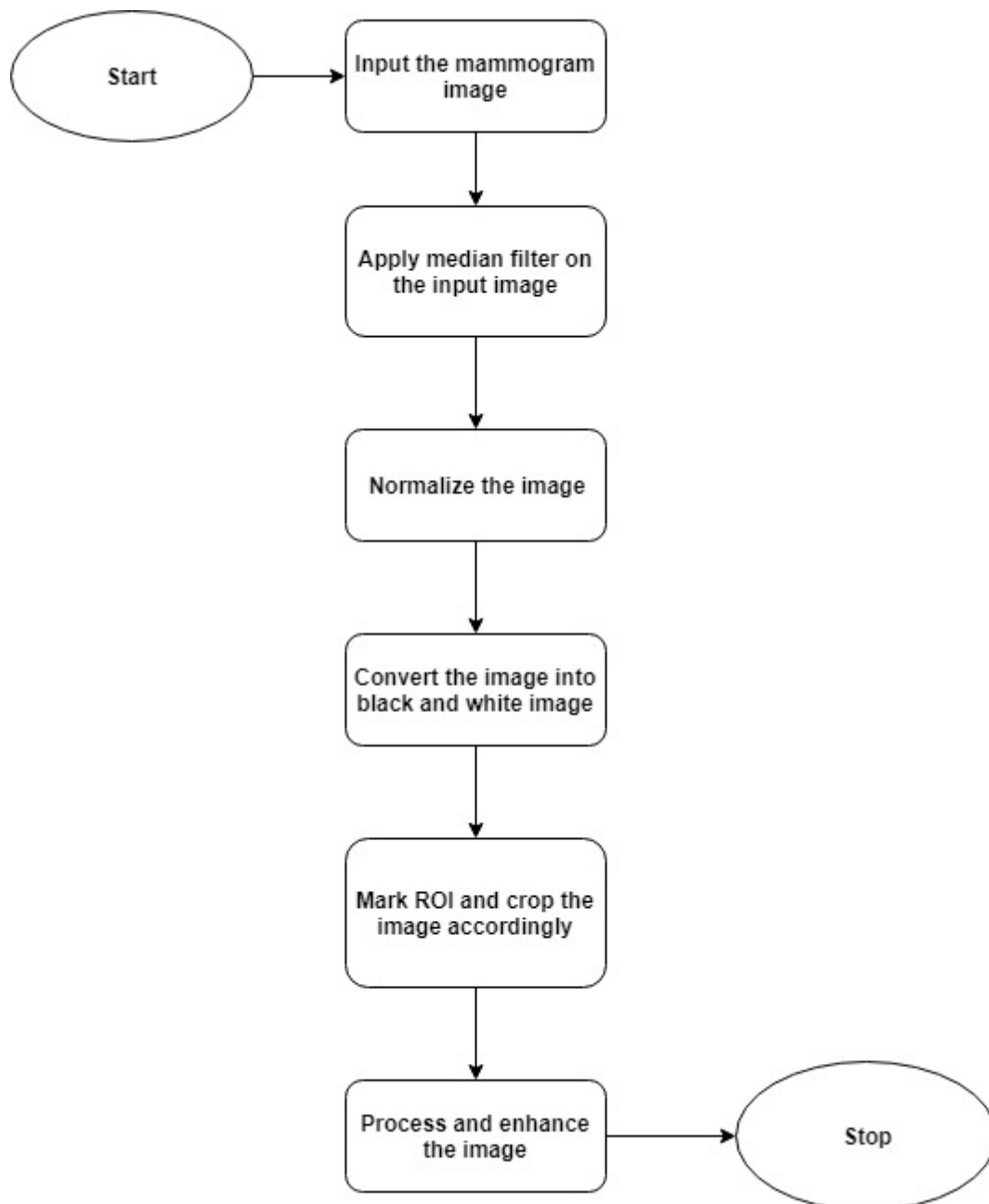


Fig. 1. The figure shows the flowchart showing a proposed method for enhancing mammogram image
Fig. 2 shows the input image under study.

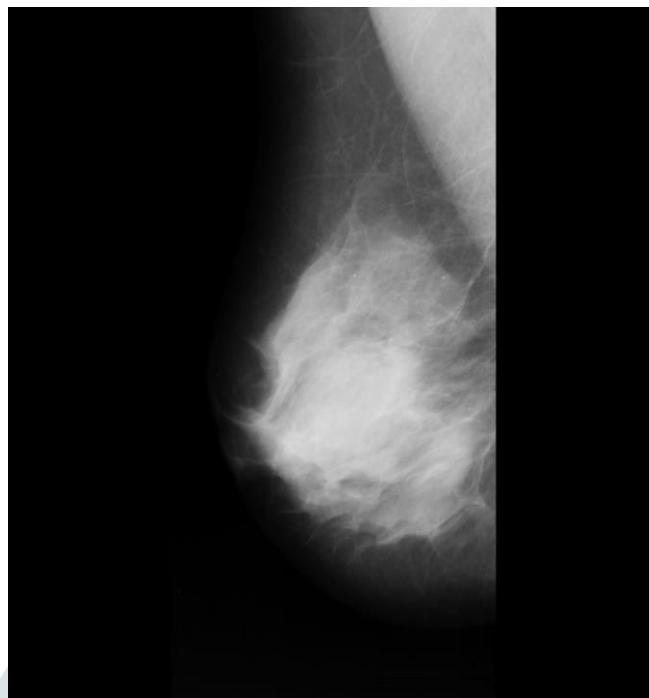


Fig. 2. The figure shows the input image under study

The median filter is applied to the input image and the resultant image is normalized to obtain the image as shown in Fig. 3.

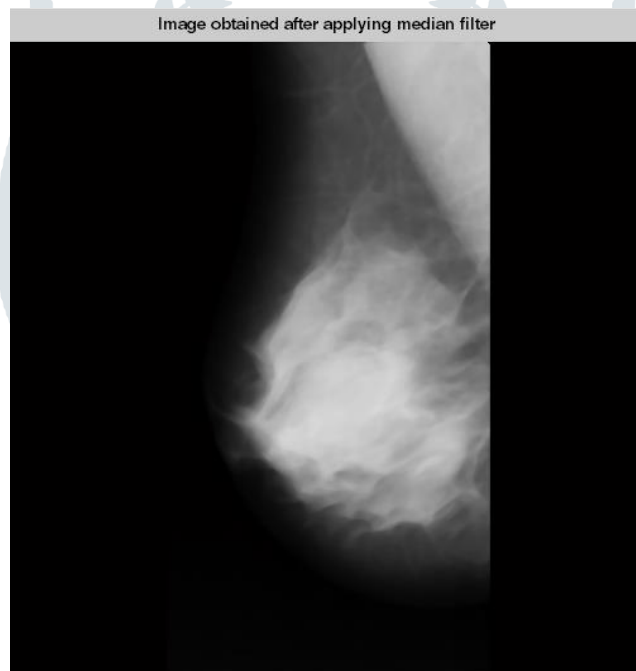


Fig. 3. The figure shows the normalized image obtained after applying the median filter

Fig. 4 shows the black and white image of Fig. 3.



Fig. 4. The figure shows the black and white image of Fig. 3

Fig. 5 shows the marked ROI (region of interest) on which enhancement is to be performed.



Fig. 5. The figure depicts the ROI marked with *

Iteration is performed through the black and white image in Fig. 5 and coordinates of the white portions. Fig. 6 shows the ROI been cropped from Fig. 5 to perform an enhancement.

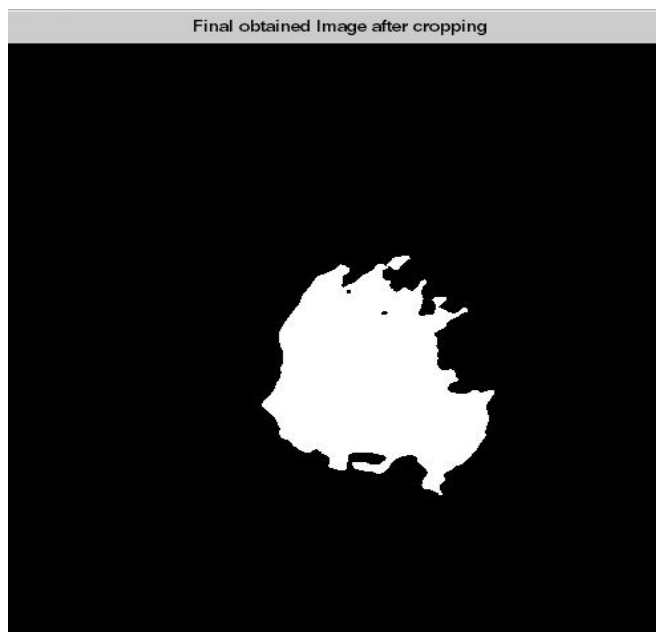


Fig. 6. The figure shows the cropped image of the ROI from the original image.
Fig. 7. shows the processed image obtained from Fig. 6.

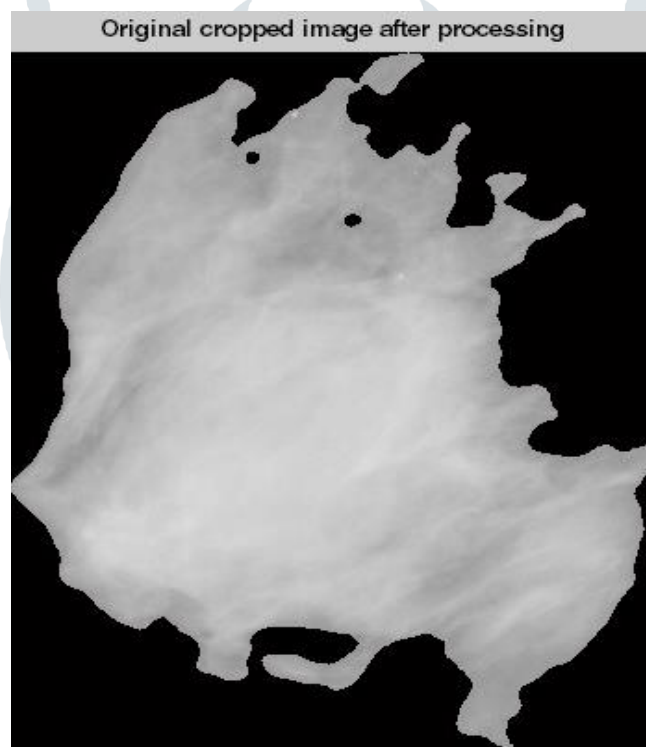


Fig. 7. The figure shows the processed image obtained from Fig. 6.
Fig. 8 shows the final enhanced image obtained after enhancing the figure obtained in Fig. 7

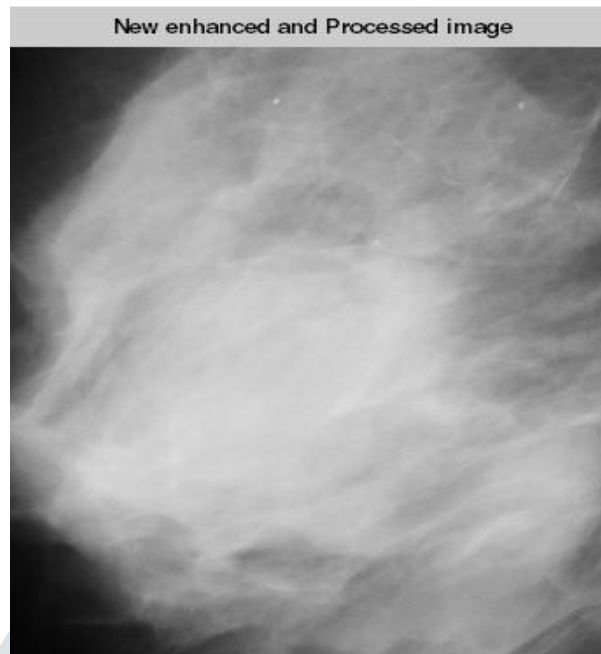


Fig. 8 The figure shows the final enhanced image

III. CONCLUSION AND FUTURE SCOPE

The need for enhancing the mammogram images have been taken into consideration in the research paper. The research paper illustrated the proposed method to perform the enhancement of mammogram images. The proposed method is a kind of hybrid approach which involves filtering, normalization, and cropping of an image. The flowchart shown in the research paper depicts the procedural workflow adopted for performing the enhancement of an image.

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