

Image Enhancement of Breast Cancer Medical Images

Deeksha Singh¹, Sohit Agarwal²

¹M.Tech. Student, ²Assistant Professor

Department of computer Science & Engineering, Suresh Gyan Vihar University, Jaipur, India

Abstract- *Breast cancer is the recurrent cause of female death and is the second leading cause of global cancer death. Ultrasound and mammography are the primary tests which are used to detect breast cancer. In traditional medical images, when the image is smudged or the entity is not clearly identified, we cannot do anything about that smudged image, and we know that it is requisite to identify the object. To overcome this trouble, we use image processing techniques. In image processing technique the blurry or unidentified image is made clear by many image processing techniques like image enhancement, noise removal, image extraction etc.*

Now our goal is to work on image enhancement technique in which we take some breast cancer ultrasound images and then detect the tumor. In this research, we are proposing an approach to enhance the visibility of tumor. So that it can contribute in the detection of breast cancer in early stage.

To enhance the visibility of the tumor in the proposed system the region growing algorithm is used. To work on image enhancement of ultrasound medical imaging, we need ultrasound medical images. A huge amount of ultrasound images is taken so that we can research on many types of images. Before applying region growing approach preprocessing of the image is done. In preprocessing of Image we filter the image and remove the noise from the image so that we can work on a better image. Now the region growing approach is applied to get the enhanced image of the tumor.

Keywords— Image enhancement, Region growing algorithm.

I. INTRODUCTION

Image processing is a mechanism in which we transform an image into a digital form and implement some functions on it to procure an improved image or take out an unidentified object or data from it. This is a kind of signal assignment. In this mechanism an input is an image, such as a video or a picture, and the generated output can be a picture or characteristic integrated with the picture. The generated output of the image processing technique would be a picture or a set of attributes associated with the image. Almost all image processing techniques include processing images into two-dimensional signals and then implement principle signal processing methodologies in two-dimensional signals. Then the picture is also operated in a three-dimensional signal, and here the third dimension denotes the time i.e. z-axis. Image processing generally concerns with digital image processing, but optical and analog image processing techniques are also possible. Our work is about applying to all types of image processing techniques. Image acquisition (first generating an input image) is called imaging. [1, 5-6]

Digital image processing (DIP) includes modifying the digital data to improve image quality by a computer. The treatment helps to ensure maximum clarity, definition and detail of characteristics of interest in data extraction and moreover study.

Medical images refer to many different technologies used by the human body to diagnose, treat, or treat diseases. Each type of technology provides a variety of information about the area of the body, which must be studied for possible disease, injury, or efficacy of the treatment. Medical imaging technology for physicians sees the internal parts of the body easy to diagnose. It helped the doctors to perform the keyhole surgery so that the inner parts do not have too much body. There are many types of medical imaging like Mammography,

Radiography, Ultrasonography, MRI (Magnetic Resonance Imaging), CT Scan, etc. but in our research we have used Ultrasound medical images for image processing.

Screening and detection rates using ultrasound

The frequency at which the lesions discovered by screening result in malignant breast cancer is actually very small. The rate of detection of malignant mammogram tumors (X-rays) is about five cancers per one thousand women examined. When the sonogram is used alone to diagnose malignancy, the speed is a bit lower. This often shows that mammography is one more reliable. However, it must be emphasized that even if it is Ultrasound, and even mammography combined with MRI can not Completely rule out the possibility of breast cancer. up Three percent of women have mammograms and negatives Suspicious lesions may have breast cancer ultrasound. Ultrasound is no more expensive than mammography, It is cheaper in many ways. The problem is almost everything suspect ultrasound results are indeterminate and come to an end anyway, come from a biopsy. This should be weighed against the cost and effectiveness of mammographic screening as a whole, which tends to provide a better guarantee of the nature of an injury than the need for a biopsy.

What can an ultrasound reveal about a potential breast cancer lesion?

The sonogram indicates the fluid or solid nature of the injury or perhaps a combination. liquid masses (cysts) are darker and homogeneous. The experienced radiologist acquires the "sensation" represented by the different "textures" of the ultrasound. The shape of the injury and the "margins" ("edges") are also well-perceived in the sonograms. This will help determine whether the injury is cancerous or benign (cancerous lesions are prone to split edges). Breast cancer lesions tend to be random, but not always. Benign fibroid adenoma is usually round or oval. Ultrasound is, however, not

a definitive test and tissue analysis are usually required by biopsy. Even if the ultrasound refers to the presence of a fibrous knot or a complex cyst, a biopsy is still justified. Up to fifteen percent of this type of growth is ultimately malignant. Examination of solid nodules in breast cancer sonograms requires significant experience and provides greater purity in the benign or malignant nature of the injury.

Now on the Filtered ultrasound image we apply the region growing algorithm to enhance the region of the breast cancer.

There are many types of image processing like Image restoration, Image compression, Image segmentation, Image is recognizing, Image smoothening.

Image enhancement

Image enhancement, is a method of providing the results to make the image clearer, by improving the image of the source in such a way that the results are more appropriate for visualization or further analysis of the picture. This helps to remove noise, sharpness, or brightness of the image increases, which makes it easier to identify key features. The process of improving the image quality of the original image by removing noise, provide enhanced image by sharpening the original image and increase the contrast of the image. [2, 7-10]

Image restoration

Restoring a clear image of the degraded or damaged image is provided by a method known as image reconstruction. Damaged / motion blur caused by noise or blur misfocus camera. Blurring occurs due to the formation of an ideal image reduction of bandwidth caused by the imperfect image forming process. Thus, the image will be restored to its original quality by reducing physical degradation.

Image compression

Image compression minimizes the size of the image file bytes without compromising image quality to get the image with greater clarity. In reduce file size we can save more images on a given volume of disk or storage space. As well as reducing the time, while sending the images via a web page or download networks.

Image segmentation

Segmentation or division of the original image with some specific number of pixels in the region to analyze the images shows features that are hidden in the normal image recognition and object, undefined boundary assessment, texture and movement. It is based on the region and the edges of the image segmentation is performed.

Cancer

Cancer is a disease associated with the cells of the body. The body is made up of billions of cells. Normal cells grow and divide (divided into two parts). The died old cells are replaced by new ones. Sometimes something is wrong with some cells and they will not die. They are separated out of control and can be converted into a rupture (tumor) is a cancer. There are many different types of cancer.

Breast cancer

Breast cancer occurs in the breast tissue, particularly in the ductal canal (ductal carcinoma) or glands (lobular carcinoma). is still known as cancer breast cancer, even when the cells are first moved to other parts of the body. In these cases, the cancer is called metastatic or advanced breast cancer.

Breast cancer usually begins to form a small confined tumor (mass) or calcium deposits (microlime), then spreads through the canal in the breast to the lymph nodes or through the blood stream to other organs. The tumor can grow and enter the tissue around the breasts, for example, on the wall of the skin or chest. Different types of breast cancer develop and spread at different speeds, while others require several years to expand the breast, while other species develop and spread rapidly.

Although the exact cause of breast cancer is not clear, but we know what are the main risk factors. However, most women who are considered to have the highest risk of developing breast cancer do not understand. On the other hand, 75% of women who develop breast cancer have no known risk factors. The most important factor is age and family history. In women, where there was breast cancer or endometrial cancer, ovarian or colon cancer, there is a slightly increased risk of a woman with a benign breast.

II. PAST WORK ON BREAST CANCER MEDICAL IMAGING

Content-Aware Dark Image Enhancement through Channel Division

Adin Ramirez Rivera, Pyongyang Ryu Jae Ok Sam, "Content-Aware Image Enhancement Dark Division Through The Canal" 2012 has offered a Content-Aware algorithm that amplifies dark images, sharpens edges reveals details in texture regions and maintains smoothness of flat regions. This algorithm produces a special transformation of each image adjustment function to show the characteristics of each image to gain maximum gain. They analyzed the contrast of the image in delimited and structured areas as well as a group of information with common features. These groups are modeled relationships within the image, from which conversion functions have been extracted. The results were combined in an adaptive manner, based on the characteristics of the human vision system to improve image detail

Fusion Based Multi Scale RETINEX with Color Restoration for Image Enhancement

Sudharsan Parthasarathy, Praveen Sankaran, "Fusion based on several Retinex stairs with color restoration for better picture quality," 2012 suggests that a multi-merged retinate color retention approach (MSRCR) will improve the image. The lower dynamic range of the human visual system is that camera images taken depend largely on lighting conditions. The MSRCR algorithm refines shots made in a wide range of nonlinear lighting states to a level that the user perceives in real time. One of the methods to increase, which is trying to achieve color stability is Retinex. The Multi Scale Retinex (MSR), on average, are several SSR (Single Scale Retinex) images to generate a better image cleaner.

III. PROBLEM IDENTIFICATION

Feature Extraction describes the relevant information contained in the template module so that pattern classification activity is simplified with the help of a formal procedure.

In pattern recognition and image processing, extraction is a special form of downsizing. The main purpose of feature extraction is to obtain the most relevant information from the original data and represent the information in a smaller dimension space. When the input data to the algorithm is too large to be managed and it is suspected that it is excessive (too much data, but not too much information), the input data will become a small representation of features (also called functions). Vector). Convert input data into a series of features called feature extraction. [3, 11-14]

Our goal is to clarify the image of breast cancer and extract tumor cell images to improve the accuracy of laboratory tests. Breast cancer is the most common cause of death in women and the second leading cause of cancer death worldwide. Primary prevention in the early stages of the disease becomes difficult because the causes are almost unknown. However, some typical signatures of this disease, such as masses and microcalcifications appearing in ultrasound images, can be used to improve early diagnosis methods, which is extremely important for women's quality of life. Ultrasound is the main method of screening and early diagnosis, the analysis and treatment is the key to improve the prognosis of breast cancer. Since benign glandular tissues and tissues often appear in low contrast and are often not clear, several diagnostic protocols have been developed to support the radiologist and therapist's diagnosis. An effective screening method of breast ultrasound based on texture segmentation is proposed to detect early tumors. Quality images are not clear, noisy, and low contrast, so identifying lumps in ultrasound mammals is very difficult, so we need to use image enhancement techniques to create better mammograms to identify cancer cells more accurately. [4] Whether it is ultrasound, mammography, elastography, magnetic resonance imaging, etc., image enhancement is very important in all aspects of medical images. As almost all medical imaging techniques are a common problem with poor image quality, improving image quality is critical to improving the accuracy of your laboratory tests. We can use image enhancement algorithms to improve the quality of each medical image and get better results.

IV. IMPLEMENTATION

Proposed algorithm

1. Collect the image database
2. Preprocessing of the image
3. Select the Ultrasound image of the breast cancer from the image database.
4. Apply the region growing algorithm for getting the tumor area in the image
5. Labeling the area of tumor image
6. Generate the tumor area in a breast cancer image
7. Take the output of the image

To work on image enhancement of ultrasound medical imaging, we need ultrasound medical images. So for ultrasound medical images we go to path lab and collect the ultrasound images of breast cancer. We take a huge amount of ultrasound images so that we can research on many types of images.

In image preprocessing, the image is filtered and the noise in the image removed to obtain a better image.

Now, apply a median filter to eliminate the noise. In median filtering, neighbouring pixels are ranked according to their brightness (intensity), and the median becomes the new central pixel value.

Median filters are good at suppressing some types of noise, especially "noise" or impulse noise with extreme values on a single pixel.

In the intermediate filter, the pixel values in the neighborhood window are arranged in intensity and the median (median) becomes the output value of the pixel being evaluated. Ultrasound is particularly useful for distinguishing solid masses from liquid-filled cysts, which is a major feature of breast lesions. Ultrasound can also be used to detect very small lesions that appear too small during a clinical examination. Ultrasound imaging uses high-frequency sound waves to form an image called a "spectrogram." The sound waves they use are harmless, piercing the chest, jumping back, or echoing from various tissues to form an image of the internal structure. An unexpected "echo" means that there is a solid node in the organization. Ultrasound imaging does not involve radiation.

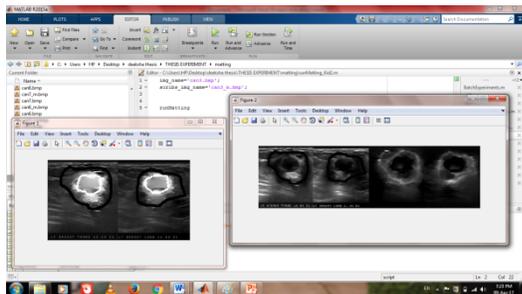
Region Growing Segmentation

This is a well-developed image segmentation technology. This is a technique for extracting image regions that are connected based on predefined criteria. These criteria can be based on information about the intensity or edge of the image. This requires that the operator manually select the seed point and extract all the pixels connected to the original seed based on the predefined criteria. The possible standard may be to add areas until the edges in the image are satisfied. Noise in the image may cause the seeds not to be properly placed. The disadvantage is that it requires human interaction to get seed points. Therefore, for each area to be extracted, seeds must be planted.

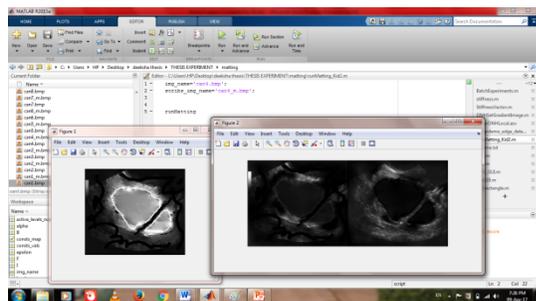
Labeling the area of tumor image

In this step, we mark the area of quality. The area is highlighted in white and black. The surface of the tumor in breast cancer images is now calculated by applying the growth algorithm in this area

Now we take the output of the ultrasound image resulting the enhanced mass.



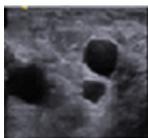
(i)



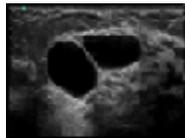
(ii)

V. RESULT

A. Input images of breast cancer

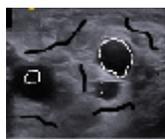


(i)

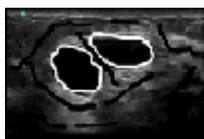


(ii)

B. Images with highlighted area

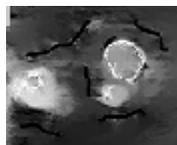


(i)

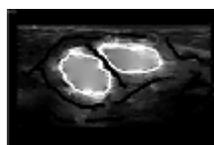


(ii)

C. Output



(i)



(ii)

technique is to solve the problem of clinical ultrasound analysis of breast cancer. The proposed technique is based on fuzzy logic and has been successfully tested on ultrasound imaging data. The algorithm developed was used to understand the area of cancer with better visualization. Experiments have shown that the proposed algorithm provides an improved quality image compared to the original ultrasound image

REFERENCES

- [1] Zaheeruddin , Z. A. Jaffery and Laxman Singh, "Detection and Shape Feature Extraction of Breast Tumor in Mammograms", Proceedings of the World Congress on Engineering 2012 Vol II WCE 2012, July 4 - 6, 2012, London, U..
- [2] Minavathi, Murali. , M.S. Dinesh, "Classification of Mass in Breast Ultrasound Images using Image Processing Techniques", International Journal of Computer Applications (0975 – 8887) Volume 42– No.10, March 2012
- [3] Ajay Kumar Boyat,Brijendra Kumar Joshi, "A REVIEW PAPER: NOISE MODELS IN DIGITAL IMAGE PROCESSING", Signal & Image Processing : An International Journal (SIPIJ) Vol.6, No.2, April 2015
- [4] Pouya Derakhshan-Barjoei , Mojdeh Bahadorzadeh, "Enhancement in Medical Image Processing for Breast Calcifications and Tumor Detection", Research Journal of Applied Sciences, Engineering and Technology 4(12): 1696-1700, 2012 ISSN: 2040-7467, © Maxwell Scientific Organization, 2012.
- [5] MK Sharma, Adaptive Steganographic Algorithm using Cryptographic Encryption RSA Algorithms, Journal of Engineering, Computers & Applied Sciences (JEC& AS) 2 (1), 1-3, 2013.
- [6] MK Sharma, An efficient segmentation technique for Devanagari offline handwritten scripts using the Feedforward Neural Network, Neural Computing and Applications 26 (2), 1-13, 2015.
- [7] MK Sharma, Classification of image using a genetic general neural decision tree, Int. J. Applied Pattern Recognition 2 (1), 76, 2015.
- [8] MK Sharma, Pixel plot and trace based segmentation method for bilingual handwritten scripts using feedforward neural network, Neural Computing and Applications 27 (7), 1817-1829, 2016.
- [9] MK Sharma, Segmentation of english Offline handwritten cursive scripts using a feedforward neural network, Neural Computing and Applications, 1-11, 2015.
- [10] MK Sharma, Offline scripting-free author identification based on speeded-up robust features, International Journal on Document Analysis and Recognition (IJDAR) 18 (4), 303-316, 2015.
- [11] MK Sharma, Character Recognition of Offline Handwritten English Scripts: A Review, International Journal of Advanced Networking and Applications (IJANA), 94-103, 2014.
- [12] MK Shama, A Survey of Thresholding Techniques over Images, INROADS 2 (2), 461-478, 2014.
- [13] MK Shama, Offline Handwritten English Script Recognition: A Survey, International Journal of Advanced Networking and Applications (IJANA), 114-124, 2014.
- [14] MK Sharma, Offline Language-free Writer Identification Based on Speeded-up Robust Features, International Journal of Engineering (IJE), IJE TRANSACTIONS A: Basics 28 (7), 2015.

VI. CONCLUSION

Evolving methods in the area are effective in detecting and improving cancer mass in breast cancer images. The proposed