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Detection of Cancer Cells in Mammogram Using Seeded Region Growing Method and Genetic Algorithm

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ABSTRACT

Breast cancer is one of the most common causes of cancer death in women. We can reduced mortality rate by using early detection. Early detection is efficiently performed on Digital Mammograms. Sometimes manual reading will not give the improper result. Computer Aided detection techniques have been developed to improve the performance rate. One of them is Mammography. Mammography is the best available technique to detect cancer cell in its earlier stages. Normally radiologists will perform the mammogram readings it is difficult to provide accurate diagnosis due to variety of factors such as benign appearance of lesions, poor quality of image, eye fatigue factor, and deviation in brightness of objects in mammogram. To increased the performance of detecting the malignancy region in mammograms we are using the genetic algorithm and Seeded Region Growing Algorithm. Seeded region growing selected the Seeds automatically depending on calculating the pixel intensity. Clustering is applied along with genetic algorithm with various Stages selection, Crossover and mutation are the genetic operations performed on the clustered image to produce required results.
Keywords: Mammography

I. Introduction

Cancer is a class of diseases characterized by out-of-control cell growth. There are over 100 different types of cancer, and each is classified by the type of cell that is initially affected. Cancer harms the body when damaged cells divide uncontrollably to form lumps or masses of tissue called tumors. Cancer is one of the most dangerous disease for which still proper treatment is not available. It also spreads to other parts of the body and destroys the healthy tissue. This process is called as metastasis. Most kind of cancer is named after the part of the body where it started. Breast cancer begins in the breast tissue, it may spread to lungs but still it is breast cancer not lung cancer. Breast cancer is the second most common cause of cancer death particularly for women in all over the world. It is rapidly becoming the number one cancer in females and pushing the cervical cancer to second place. The breast cancer has been diagnosed to occur in 1 woman out of 1000 during 1970's. But today it occurs 1 in 10 which shows the necessity of taking preventive steps against it. If it is detected in its earlier stages. Early detection will improve the survival rate of patient by 95%.

Masses and micro calcification are the confusing signs present in mammogram. Micro calcification is nothing but the collection of calcium cells. Mass will have different shapes and ill defined boundaries than micro calcification. Other confusing terms are benign and malignant. Benign is just the growth of tumor. It is not cancerous. So the main objective in breast cancer study is differentiating these factors. Mammography is the best available technique to detect cancer cell in its earlier stages. MRT, CT, Ultrasonic are some of the secondary methods. But the accordance rate between the above mentioned methods and histopathological feature is low; in the case of mammography the rate is quite high. Mammography is highly accurate and low cost detection method. In Digital mammography the images are displayed on a computer monitor and can be enhanced for efficient diagnosis.

Normally radiologists will perform the mammogram readings. It is difficult to provide accurate diagnosis due to variety of factors such as benign appearance of lesions, poor quality of image, eye fatigued factor, and deviation in brightness of objects in mammogram. To improving this we added the different methodology such as seeded regain growing and genetic algorithm.

II. Literature Review

Implementation of computer aided detection contains various fields such as Isomorphic enhancement the mammogram, Region Growing Method, Seeded Regain Algorithm identifying suspected region, feature extraction from segmented mammogram, classifying the mammograms and so on. Many algorithms have been proposed to improve the efficiency of the CAD system in the above mentioned fields. Some of those methods are discussed in this section.

Region growing method seeks group of the pixels with uniform intensities. Then the Seeded region growing performs segmentation on an image with respect to set of points known as seed. Given the seed the region growing method finds the tessellation of the image into regions with property that each connected component of region meets exactly one.[1] Firstly regions are developed by applying seeded region growing to selected seeds and classified based on the region distance defined by the color spatial and adjacent information. Given method can select the seeds automatically, which is unavailable in traditional ones. So it can avoid over- segmentation [2].

Using this paper we can very adequately describe not only the type of the cancer but also its genealogy and malignancy. They can also foresee the course of cancer development by attributing a predictive factor to it and the stage of cancer depends the malignancy factor that is assigned during an FNA examination. The determination of malignancy is essential [3]

In this paper tumor detection in medical images using genetic algorithm. In the first phase, the brain image is acquired from patient's database. In the next phase, clustering is applied along with genetic algorithm with various stages. Selection, Crossover mutation are the genetic operations performed on the clustered image to produce required results [4].

In this paper genetic algorithm is employed to select the best features. Floating point encoding or real encoding is used in this study. Student's t-test is performed on wavelet coefficients of CWT at scale 3 to select the initialization chromosome. Uniform crossover are performed to create next generations [5]

III. Problem Statement

Segmentation of mammogram images for detection of cancer using Seeded Region Growing and Generic Algorithm performed on the image to produce required results.

IV. Methodology

Digital Mammograms are medical images requires a preparation phase to improve the quality of the image. Our objective during this process is in preparing the image and makes it ready for further processing by removing the irrelevant and unwanted parts in the background of the mammogram.

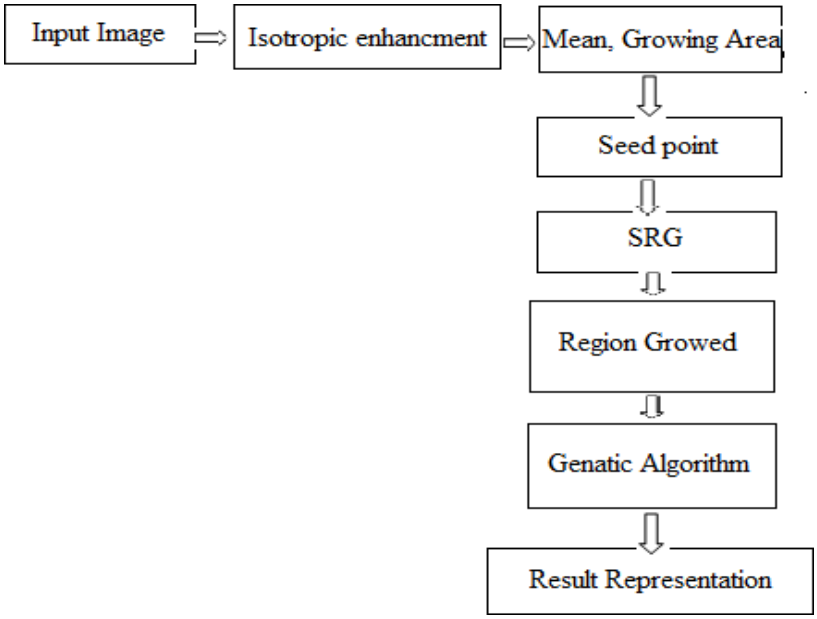

Fig:-Basic Flow Graph

IV.1. Data collection

The data used in the experiments of the proposed work was taken from Mammography Image . From input image we selected the one image that we have to detect that whether this image is benign or malignant image. after this we process that image for image enhancement.

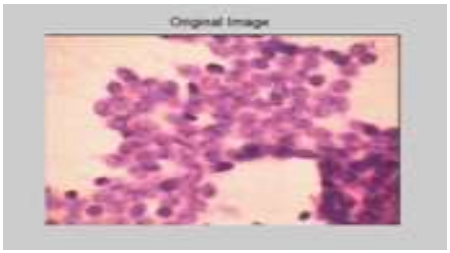

Fig: - Original Images

IV.2. Isomorphic enhancement

Image enhancement is the process of adjusting digital images so that the results are more suitable for display or further image analysis. For example, you can remove noise, sharpen, or brighten an image, making it easier to identify key features.

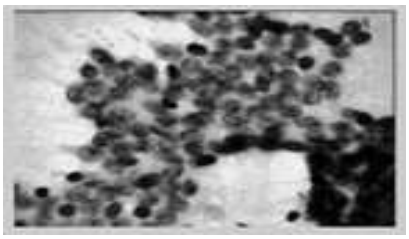

Fig: - Enhancement Images

IV.3. Region Growing

The region is iteratively grown by comparing all unallocated neighboring pixels to the region. The difference between a pixel's intensity value and the region's mean, is used as a measure of similarity. The pixel with the smallest difference measured this way is allocated to the region. This process stops when the intensity difference between region mean and new pixel becomes larger than a certain threshold.

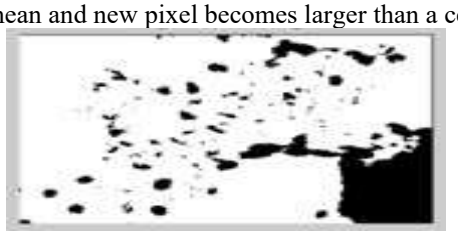

Fig:- Region Growing images

IV.4. Seeded point

Region growing is to select a set of seed points. Selection of Seed point is based on some user criterion. The initial region starts as the exact location of seeds. The regions are then grown from these seed points to adjacent points depending on a region membership criterion.

IV.5. Seeded Regain Algorithm

The segmentation process performed on the edge map differentiates various regions on the breast, depending on their intensity values. Each region has a different intensity value. The fatty tissues, glands, lobules and the ducts display different intensity values and thus can be segregated into different regions. An abnormality such as a mass, tumors or calcifications may be present within the breast has distinctly higher intensity values than the normal tissues of the breast.

To identify, isolate each closed structure and then performing coloring of each structure with their respective Mode values we proposed a new algorithm by modifying the seeded region growing method for

coloring bounded objects. Each region, within the mammogram, is bounded by a single pixel boundary as obtained during the edge detection process followed by the process of anatomical segmentation. During this process we scan the segmented image as obtained after performing the Anatomical Segmentation of Breast.

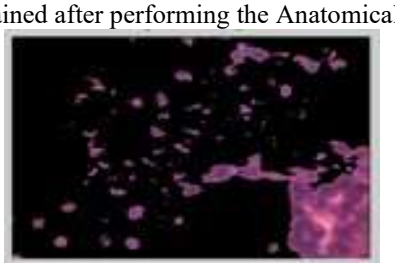

Fig: - segmented image

IV.6. Genetic Algorithm

The genetic is implemented on this population set. The genetic process begins with some input specification in terms of population set and the number of iterations processed by the algorithm. After these all specification, the genetics is initiated and is processed by the algorithm by its continuous stages of selection, crossover, mutation etc. The selection stage is about the selection any two random pixels for the comparative analysis. On this pixels, the crossover is been performed to select the next elected pixel and it is followed by the mutation process as the election or the rejection of the particular pixel. It can also perform some changes if required. As the genetics process is completed, it will return a valid threshold value respective to which the decision regarding the pixel selection as the tumor area is been performed. This selected pixel area is presented as detected tumor in the image.

V. Conclusion

Using mammogram reading difficult to provide accurate result to variety of factors such as benign appearance of lesions, poor quality of image, eye fatigued factor and deviation in brightness of objects in mammogram. To improving this we added the different methodology such as seeded regain growing and genetic algorithm on the image to produce required results.

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