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Implementation of Morphological Image Processing Algorithm using Mammograms

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ABSTRACT

The objective of the work is to use morphology technique for detection of cancer with use of mammography images and also to detect locations where malignant tissue is present. This paper have used a technique of morphological opening in combination with linear filters and then eliminating the non-uniform contextual illumination. Contextual estimate have been booked as the standards to limit the close immediacy to the non-uniform contextual abstraction consuming several practices such as median filtering. However the technique comprises of morphological processes, consecutive dilation and erosion surveyed by divergence improvement for the accurate particle extraction for lateral image processing in concatenation with median filter. The rudimentary morphological operators are erosion and dilation. Morphology is initially advanced aimed at binary images, and protracted to grayscale purposes and images.

KEY WORDS: Dilation, Erosion, Filtering, Binarization, Morphology.

1. INTRODUCTION

The thought and agony of breast cancer mount when a lump is felt in the breast and subsequently screened in the mammogram. This results in an abnormal mammogram; however all mammographic findings does not indicate cancer. In order to confirm the presence of cancer and to determine the need for tissue sampling, the next step is to have magnified views, spot compression views and targeted ultrasonography. It has been observed that, in few cases interval cancer appears within the interval of last screened and currently shaded mammograms (Chowdhary, 2015; Chowdhary and Acharjya, 2016).

In medical images, the whole structures is being magnified with no prejudice; however, for effective detection (Bethanney, 2015) of lesions, it is necessary to enhance only specific target lesions and not the surrounding tissue. This problem could be handled by image processing techniques based on mathematical morphology. This is a nonlinear method which works on the principle of set theory and involves extraction of shape characteristics from an image, typically for shape representation and description. Furthermore, knowledge about dimension in the image is acquired by using the granulomere which is an approach to measure a size distribution of objects. Several morphological contrast enhancement methods (Alfonso and Asoken, 2008) have been applied to medical image. These methods facilitates spotting of lesions of various dimensions, including complex shapes. Traditional approaches for image are good at solving enhancement problem because they are from linear system (Das, 2016). The growth of cancer and its stage is assessed by the malignancy which is characterized by anaplasia and metastasis. Malignancy of the tissue and existence of quasi-linear structures (spicules) originating from the central mass are closely related. Hence, the hybrid approach is followed for assessing malignancy. A set of features (Haralick, 1987; Goar, 2011) enriching already existing pool of features for classification of masses. These features (Chowdhary, 2011) are based on simple mathematical morphology (MM) operations, pixel counting, and some basic algebra (Das and Achajya, 2014).

In MM, set theoretic operations, like union, difference, intersection are performed by images by means of morphological operations such as dilation and erosion (Gonzalez, 2016). Specifically, we perform a series of dilation over a given contour of a cancerous mass and record pixel counts on the inner and the outer contour in each dilation. The pixel counts are plotted against the size of structuring element. Thereafter, we calculate MM features from the plot via simple algebraic operations. Morphological image processing was originally defined for binary images. Later on it is being extended to grayscale images, and also to complete lattices. Dilation takes each binary object pixels that are C-connected to that object pixel the value "1" while erosion takes each binary object pixel that is C-connected to a background pixel and set the object pixel value to "0". This paper is organized into four sections as System Architecture, Experimental Verification and Discussion

System Architecture: Fig. 1 shows the steps of the architecture diagram of proposed system. Initial step is about choosing medical images (Singh and Asuntha, 2016) from repository database of mammograms, second step is about detecting boundary of breast portion from medical image, third step for detection and removal of pectoral muscles and further step is about segmentation of fibro angular disk. The other execution of image processing evaluation is required for supplementary dispensation are median filtering, dilation, erosion and binarization.

Median Filtering: Median filtering stands a non-linear method to eradicate noise (Mohideen, 211) form images. The working of median filters (Gonzalez, 2016) is based on pixel by pixel movement of the image by substituting a piece worth with the median value of neighbouring pixels.

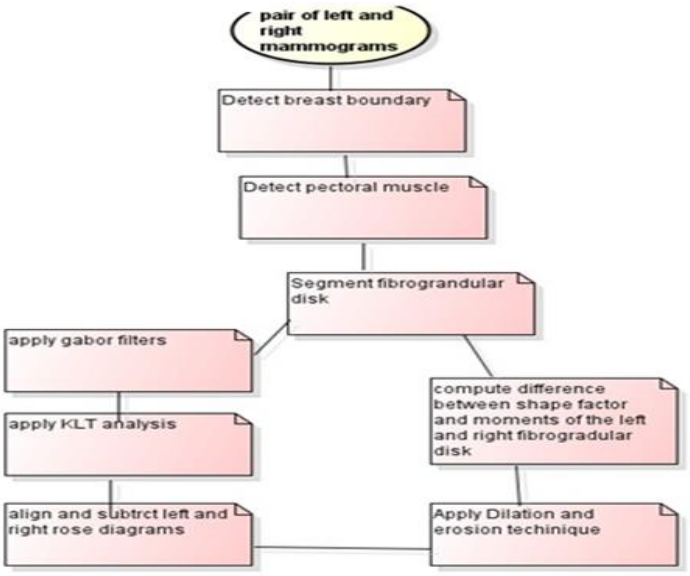

Figure.1. Steps of Morphology on Medical Images

Dilation: Dilation (Gonzalez, 2016) expands the connected set of 1s of the binary image. It can be used for expanding the spaces and filling the holes, gaps, gulfs. The principle of the operation is the worth of the yield pixel is the extreme worth of completely the pixels in the contribution pixels neighbourhood.

Erosion: Erosion (Gonzalez, 2016) is fundamental operator of measured morphology, a theory for the analysis of spatial the methods of mathematical morphology make possible a bulky amount of actual influential image examination and therefore these operators and there implementation are of great theoretical and practical interest to many involve in image processing and analysing them. The belief of erosion operation is that the charge of the production pixels is the cost of all the pixel in the participation pixel neighbourhood.

Binarization: Threshold (Gonzalez, 2016) is a technique to adapt a grace measure image in to binary image, so that object of interest are separated from the background. For binarization fixed global threshold is used to convert an image into black and white. Binary technique directly affect the recognition.it is also classified in to global and local methods. The binary image would altogether of the vital info around the position and shape of the item of forefront.

2. EXPERIMENTAL TESTING AND RESULTS

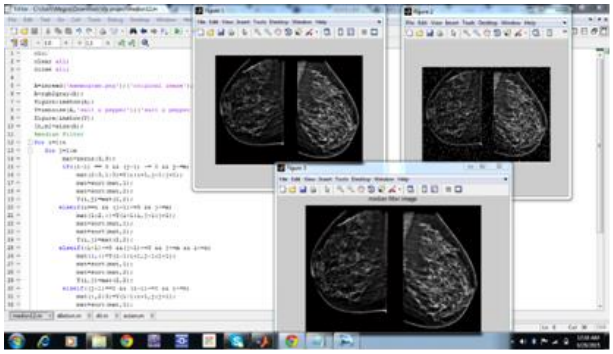

Figure 2. Median Filtered Mammogram Images

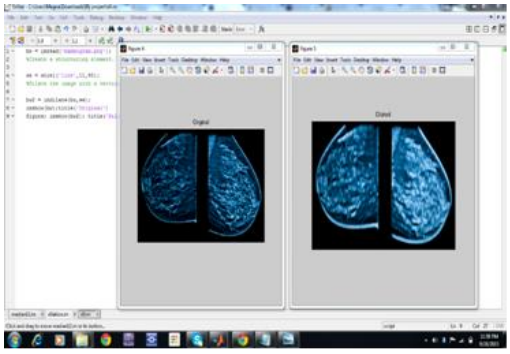

Figure 3. Mammogram Images after Dilation

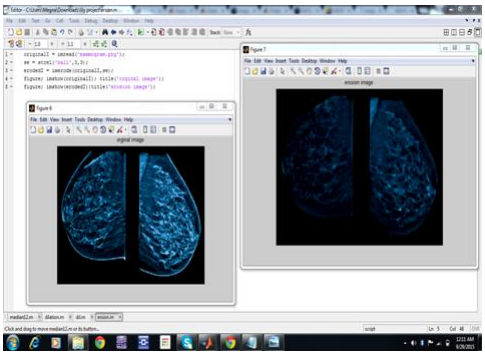

Figure 4. Mammogram Images after Erosion

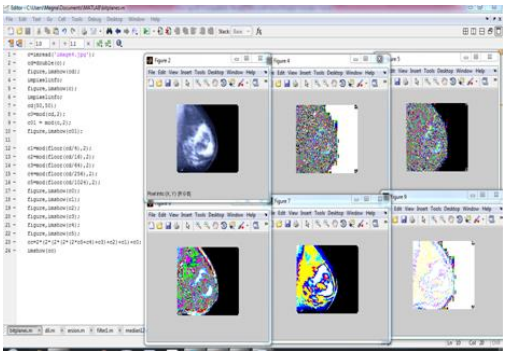

Figure.5. Binarization Mammogram Images

3. DISCUSSION AND CONCLUSIONS

A methodology has been introduced to compute an approximation to the background using blocks analysis. This proposal is afterward protracted by means of mathematical morphology operatives. In this paper we proposed an algorithm for mammographic image based on two main morphological operation dilation and erosion. The proposed algorithm can perform well to restore structures and textures in a damaged image. However, the method still has many drawbacks. The most visible weakness is in restoring long horizontal line damage. The projected system unmoving needs to be improved in region filling strategy. In the close future, we plan to add more rules for region fill strategy to overcome the problems.

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