A SURVEY ON GRAY LEVEL CO-OCCURRENCE MATRIX FOR MASS DETECTION SYSTEM IN MAMMOGRAM BASED ON REGION OF INTEREST

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Abstract

The identification of Mammogram is a very complicated application in Bio-medical field, It has complicated tissues. Nowadays breast cancer test, Bio-medical field often miss approximately 10% - 30% of tumors because of the ambiguous margins of lesions and visual weakness ensuing from long-time identification. For these reasons, numerous computer-aided recognition systems have been residential to aid Bio-medical in detecting mammographic lesions which may point out the existence of breast cancer This revision presents a repeated Computer detection system that uses limited and isolated quality features for mammographic mass recognition. And system segments some adaptive square regions of interest (ROIs) for apprehensive areas. This revise also proposes two tricky feature withdrawal methods based on co-occurrence environment and visual compactness alteration to illustrate restricted quality uniqueness and the isolated photometric allocation of each ROI. As a final point, this revision uses stepwise linear discriminate examination to grade typical regions by selecting and evaluating the entity presentation of each feature. consequences demonstrate that the projected system achieves acceptable recognition concert.

Keywords: GLCM, Region of Interest, mammogram, cancer detection.

1. Introduction:

Breast Cancer:

The term "breast cancer" refers to a malignant tumor that has developed from cells in the breast. Breast cancer is the most commonly diagnosed cancer apart from the skin cancer. Breast cancer is also the second leading cause of cancer deaths among women after lung cancer. "Simply Breast Cancer means

cancer affected in the humans especially in women". Breast cancer is currently the most common cancer affecting women worldwide. The Mammographic (calcium deposits) is one of the most reliable and effective methods for detecting breast cancer. Micro calcifications (small calcium deposits in breast soft tissue) are small deposits of calcium salts within breast tissue that appear as small bright spots in mammograms. The presence of micro calcification clusters is a primary sign of breast cancer. The radiological definition of a micro calcification cluster is an area of 1 cm2 that contains, in general, no fewer than three microcalcifications. The spatial resolution of mammography is very high (normally in the range of 40–100 μm per pixel), the first column of two mammographic images patches taken from the mammographic images analysis society (MIAS). The radiologists(it interprets medical images on modern pictures archiving and communications system(PACS)interpreting micro calcifications in mammograms, computer-aided diagnosis (CAD) systems have been applied to reduce the false positive rate (FPR) while maintaining sensitivity.

Like in other term medical diagnosis systems, X- rays are used as diagnostic tool in mammography for the examination of the human breast. These examinations are recorded as specialized images which are then observed by radiologists for any possible abnormality. In the following lines, few techniques are discussed that use mammography for early detection of breast cancer. Mammography cannot detect every kind of breast cancer but still, it is the world widely used for breast cancer detection due to its low complexity. The mammograms algorithm will only identify abnormal masses of the investigation.

Mammogram images can be classified in to two types based on their tissue type such as fatty glandular and dense type. Depending upon the type of abnormality arise it can be classified as benign or malignant. The data used in the experiments consist of three datasets, which are composed of image patches of different cases (taken from different mammograms). The first dataset was taken from the MIAS database containing 20 image patches with the same size of 512 × 512 pixels. Initially sample images used for this work would be collected from the mini Mammogram image analysis society (MIAS) database. In an image textual property plays an important role in carrying out useful information along with image analysis, and for identifying image into benign or malignant .In breast cancer detection feature extraction was the initial step. The mammograms were digitized to 50 μm per pixel with a linear optical density in the range 0–3.2. The second dataset was extracted from the digital database for screening mammography (DDSM) database containing 300 image patches with varied sizes (the average size of these image

patches is 482 × 450 pixels). The mammograms in the DDSM database were digitized by one of four different scanners: DBA M2100 Image Clear (42 μm per pixel, 16 bits), Howtek 960 (43.5 μm per pixel, 12 bits), Lumisys 200 Laser (50 μm per pixel, 12 bits), and Howtek MultiRad850 (43.5 μm per pixel, 12 bits). In contrast to the first two datasets, the third dataset contains 25 full-field digital image patches extracted from a nonpublic mammographic database. Histogram of oriented gradients (HoG), Grey level co_occurence matrix (GLCM) were used. Using different machine learning methods such as neural networks, support vector machines (SVM) accuracy percentage can be measured on a set of mammogram images. Among them support vector machines is an optimal choice for learning of mammogram data which works effectively on mammogram classification. Implementation of the methods mentioned in this work will be done using MATLAB software. Next to mammogram computer aided diagnosis (CAD) can be defined as a best optimal method for detection of breast cancer. Breast cancer continues to be a significant public health problem among women around the world. It has become the number one cause of cancer deaths amongst Malaysian women. The key to improving the breast cancer prognosis is by early detection. The important sign for the breast cancer detection is the presence of lesion such as micro calcification clusters (MCCS). In this review paper, the mammogram-based approach will be focused, as it is particularly suitable for detecting this type of lesion. To date, mammography remains the most effective diagnostic techniques for early breast cancer detection. However, due of some limitations, not all breast cancer can be detected by mammograms. The main objective of this paper is to discuss the computer-aided detection and diagnosis systems that have been proposed, designed and developed by previous researchers in order to overcome the drawbacks of mammograms by assisting the radiologists in detecting the specific abnormalities and improving the diagnostic accuracy in **making the diagnostic decisions.**

Mammography:

Like in other term medical diagnosis systems, X- rays are used as diagnostic tool in mammography for the examination of the human breast. These examinations are recorded as specialized images which are then observed by radiologists for any possible abnormality. In the following lines, few techniques are discussed that use mammography for early detection of breast cancer. Mammography cannot detect every kind of breast cancer but still, it is the world widely used for breast cancer detection due to its low complexity. The mammograms algorithm will only identify abnormal masses of the investigation.

The mammography method detects around 75%-85% of breast cancer problem. There are two methods in mammograms they are "Preprocessing and Post processing".

Preprocessing:

Mammogram images are difficult to interpret. These mammograms also include the removal of the unwanted areas and to make the more prominent area of interest by increasing the contrast, this is done by the setting a threshold value. The main aim of the Preprocessing is to improve the image data.

Mammographic images with and masses micro calcifications are usually small and have low contrast thus making the abnormalities hard to be detected. Pre Processing block involves enhancing the image, removal of noises, blood vessels and glandular tissues which become a cause of many False Positives during detection stage. mammogram containing a mass in mediolateral-oblique (MLO) view and the pre-processing method is described below. The contrast adjustment was first applied to adjust the contrast of the mammogram by linearly scaling the pixel values between upper and lower limits. The pixel values that lie in this range are saturated to the upper or lower limit value, respectively.

2. MODEL FOR MASSES CLASSIFICATION

A. **micro calcification:** Microcalcifications are small calcium deposits that look like white specks on a mammogram. Micro calcifications are usually not a result of cancer. But if they appear in certain patterns and are clustered together, they may be a sign of precancerous cells or early breast cancer.

B. **breast calcifications**:

Breast calcifications are very common and usually develop naturally as a common age.They are usually benign (not cancer) having benign breast calcification does not increase your risk of developing breast cancer.

Many methods for CAD of micro calcifications in mammograms have been proposed. A variety of features have been studied in the literature to characterize microcalcifications and classify these abnormalities into malignant and benign, such as shape, morphological, cluster, intensity-based, and texture features. Early research showed how the morphological characteristics of micro calcifications could be used to differentiate between malignant and benign cases. The shape and morphological features are mainly extracted from individual micro calcifications and describe the morphological characteristics of individual micro calcifications, such as roughness, size, and

shape. The morphology of microcalcification clusters such as cluster area, cluster perimeter, cluster diameter, cluster circularity, cluster eccentriecity and cluster elongation. We presented to reconstruct and analyze micro calcification clusters in 3-D from two mammographic views.

C.microcalcification clusters:

we explore a mathematical model to characterize the clustered micro calcifications on mammograms for predicting the pathological classification and grading. Our database consists of both retrospective cases (78 cases) and prospective cases (31 cases) with pathologically diagnosed clusters of micro calcifications on mammograms.

D. mammographic imaging:

In mammographic imaging, the presence of micro calcifications, small deposits of calcium in the breast, is a primary indicator of breast cancer. However, not all micro calcifications are malignant and their distribution within the breast can be used to indicate whether clusters of micro calcifications are benign or malignant.

3. GLCM FEATURES CLASSIFICATION:

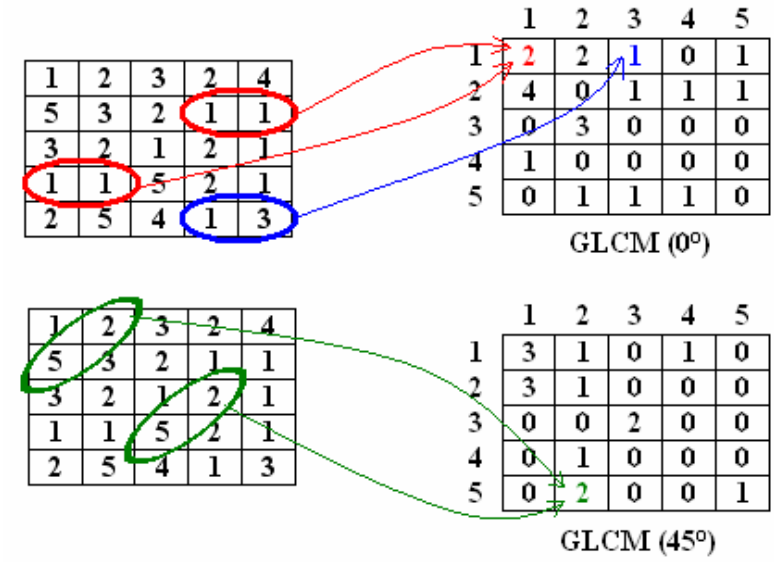
Classification of normal and abnormal patterns:

Breast biopsy:

A breast biopsy is the removal of a sample of breast tissue or cells to be tested for breast cancer. The doctor may recommend a biopsy if the patient has an abnormal mammogram or a lump in the breast.

The multiresolution frame capacities were contrasted and regular un resolution shape highlights for his or her class separating capacities. The watch concerned 60 digitized mammographic photos. The majority had been fragmented physically with the guide of radiologists, before prologue to the order machine. The unit resolution and multiresolution frame capacities have been ascertained utilizing the spiral separation measure of the mass obstructions. The separating power of the shape abilities has been investigated through straight discriminate examination (LDA). The class device connected a simple Euclidean metric to choose style club. The device wound up plainly tried the use of the plain and leave one-out investigate methodologies. The characterization machine when utilizing the multiresolution and unit resolution shape abilities prompted sort expenses of 83% and eighty% for the undeniable and leave one out investigate strategies, separately. In the assessment, while best the unit resolution shape highlights had been utilized, the class charges were 72 and sixty-eight% for the undeniable and forget one investigate methodologies, separately.

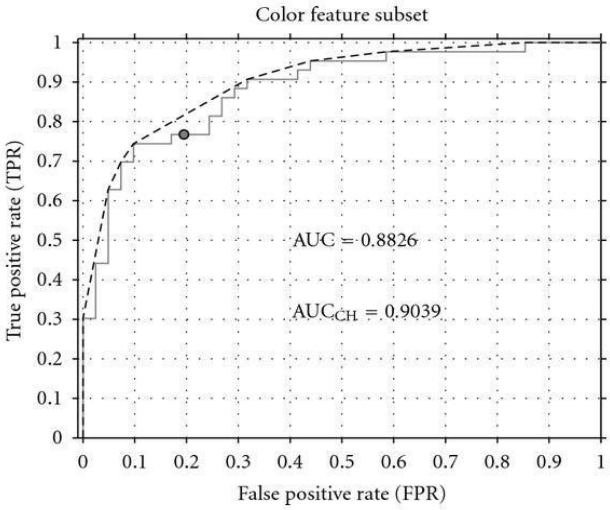
Proposes about classifications of normal and abnormal images from digital mammograms. Method used in this work was Grey level co_occurence matrix (GLCM) classical method for classification of patterns in an image. In This GLCM method features were modeled as the grey level two dimensional matrix. Statistical features analyzed in this GLCM method have been used successfully for segmentation of an image. This method is accurate in breast cancer detection but one disadvantage was that here by using GLCM matrix small elements cannot be extracted from the details of a given image particularly region of interest (ROI). Even though GLCM is an old extraction method but now days it was used along with the combination of other methods. Hence requirements of this model can be advanced in the next models. Classification work in this model was done by using neural network classifier based on statistical measures. Neural networks contains x inputs y hidden units and one output unit. Here extracted features from the statistical parameters are fed as inputs to these neural networks which have connected set of input and output units for every assigned weight. Depending upon the accuracy of training data here classification method can be performed approximately. Five statistical features were calculated using this model such as correlation, energy, homogeneity, sum of square variance and entropy.



ROI ESTIMATION:

In this paper, a near look at of surface investigation strategies ended up noticeably improved the situation the enclosing area reliance strategy, which have been proposed by method for the creators, and regular surface assessment techniques, together with the spatial dim stage reliance

approach, the dark stage run-span approach, and the dim stage distinction approach. Textural capacities separated by means of those strategies have been abused to group regions of leisure activity (ROI's) into superb ROI's containing bunched Mcs and awful ROI's containing general tissues. A 3-layer returned proliferation neural group ended up plainly utilized as a classifier. The outcomes of the neural system for the surface assessment techniques were assessed through utilizing a beneficiary working qualities (ROC) examination. The encompassing area reliance approach winds up noticeably turned out to be better than the customary surface assessment systems regarding class exactness and computational multifaceted nature.



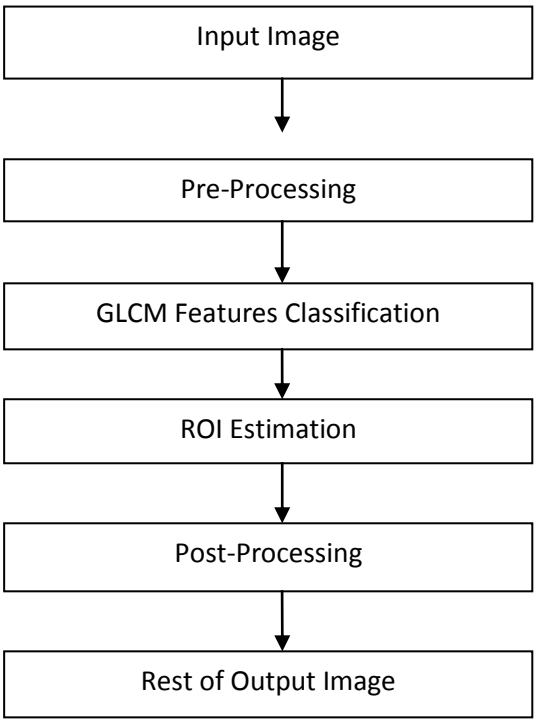
4. METHODOLOGY:

Tumor Detection in Mammogram images is divided into three stages. The stage-1 involves the enhancing the image, the stage-2 involves the tumor segmentation and the stage-3 involves the feature extraction. The noise removed using speckle noise removal method. The tumor area is segmented using the Modified GLCM method and binary operations. Finally, the features of tumor area are extracted using GLCM feature extractor and it is used to measure the properties of images. The potential correlation between the topology of micro calcification clusters and their pathological type. We construct a series of microcalcification graphs to describe the topological structure of microcalcification clusters at different scales. A set of graph theoretical features are extracted from these graphs for modeling and classifying micro calcification clusters. The proposed methodology consists of four main phases: estimating the connectivity between micro calcifications within a cluster using morphological dilation(is one of the basic operations in mathematical morphology)at multiple scales; generating a

microcalcification graph at each scale based on the spatial connectivity relationship between micro calcifications; extracting multistage topological features from these microcalcification graphs; and using the extracted features to build classifier models of malignant and benign micro calcification clusters. The framework of our methodology is image analysis development work.

1. Connectivity estimation using morphological dilation.
2. Microcalcification graph generation.
3. Classification of micro calcification clusters.

Block Diagram



Post processing:

In this stage the preprocessed mammogram image is divided into pixels of small blocks of 2x2 after which all pixels values of the block are scanned and the value having maximum occurrence within the block is assigned to all pixels of that block i.e., this value is propagated to remaining pixels of that block. It means that now the whole block pixels consist of the same value.

The main goal of the pre-processing is to improve the image quality to make it ready to further processing by removing or reducing the unrelated and surplus parts in the background of the mammogram images. Mammograms are medical images that complicated to interpret. Hence pre-processing is essential to improve the quality. It will prepare the mammogram for the next two-process segmentation and feature extraction. The noise and high-frequency components removed by filters.

Mammographic images with and masses micro calcifications are usually small and have low contrast thus making the abnormalities hard to be detected. Pre Processing block involves enhancing the image, removal of noises, blood vessels and glandular tissues which become a cause of many False Positives during detection stage. mammogram containing a mass in mediolateral-oblique (MLO) view and the pre-processing method is described below. The contrast adjustment was first applied to adjust the contrast of the mammogram by linearly scaling the pixel values between upper and lower limits. The pixel values that lie in this range are saturated to the upper or lower limit value, respectively.

5.CONCLUSION:

In view of research results and exchanges, it reasons that: 1. Surface elements in view of GLRLM can be utilized to recognize harmful masses and kind masses on ultrasound pictures, with precision levels that are generally lower than surface elements in light of GLCM and surface elements in light of joined GLRLM and GLCM. 2. Surface elements in view of GLCM can be utilized to recognize harmful masses and kind-hearted masses on mammogram pictures, with exactness levels higher than surface components in light of GLRLM, yet at the same time lower than surface elements in light of consolidated GLRLM and GLCM. 3. Critical surface elements to recognize dangerous masses and generous masses on mammograms are SRE, LRE, GLN, RLN, LGRE, HGRE, and SRLGE.

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