A NEW APPROACH FOR BASED BREAST CANCER DETECTION TECHNIQUE USING MAMMOGRAPHY IMAGES

P.SURYANARAYANA,M.Tech[1]

P. PremAravind[2], R. HariKiran[3], N. Mohandeep[4], Y. SolmonRaj[5]

1AssistantProfessor, Department of ECE, ELURU COLLEGE OF ENGINEERING AND TECHNOLOGY, A.P.,India.

2,3,4,5Student, Department of ECE, ELURU COLLEGE OF ENGINEERING AND TECHNOLOGY, A.P.,India.

ABSTRACT: Breast cancer (BC) is the leading cause of mortality among women across the world. Earlier screening of BC can significantly reduce the mortality rate and assist the diagnostic process to increase the survival rate. During late decade breast cancer is recognized as major cause of death among women and the number of breast cancer patients is increasing. There is more evidence that women in 15-54 years old are died by breast cancer.Breast cancer cannot be prevented because its major factors have not been identified. Therefore, earlier diagnosis can increase the possibility of improvement. Theaim of this study was to extract the feature without removing pectoral muscle in preprocessing stage using a new and efficient method.

We assemble a retrospective dataset involving 1,487 cases of mammogramsin which 644 cases have confirmed malignant mass lesions and 843 have benign lesions. A CAD scheme is first applied to segment mass regions and initially compute 181features.Then, support vector machine (SVM) models embedded with several feature dimensionality reduction methods are built to predict likelihood of lesions being malignant. All SVM models are trained and tested using a leave-one-case-out cross-validation method. SVM generates a likelihood score of each segmented mass region depicting on one-view mammogram. By fusion of two scores of the same mass depicting on two-view mammograms, a case-based likelihood score is also evaluated.

INTRODUCTION

BC is a neoplastic condition characterized by the formation of a malignant tumor originating from the breast cells. It is the most prevalent form of cancer observed in women, with a lesser incidence in men across the globe.

In 2020, the International Agency for Research on Cancer reported more than 2.26 million new cases and about 685,000 mortalities globally. The incidence of BC has increased over time . After leukemia, BC is the leading cause of mortality in Saudi Arabia. Globally, more than 100 million mammograms are performed annually to detect breast cancer . Each mammography necessitates a minimum of two evaluations by expert radiologists to detect abnormalities and provide a detailed analysis of the mammographic image. These factors render BC screening increasingly expensive and resource-intensive. One out of eight women in the United States (US) will develop breast cancer at some stage during her life time according to *National Cancer Institute* Accordingto*WorldHealth Organization* (WHO) in 2004, cancer accounted13%ofalldeathsintheworld.

Breast cancer cases and deaths estimated by *American Cancer Society* (ACS), year wise of US are mentioned theradiologistuses X-ray mammography as a screening and diagnosis tool, for detection of breast cancer at preliminary stage. This is the most reliable technique for early detection of breast cancer, reducing the mortality rates up to 25%. Screening mammography is not easy task for radiologists; 10%-30% of lesions are missed during routine screening.

The double screening of mammogramscanincreasetheaccuracy, but expertise limitations and intraobservervariability limits its usedue to huge number of mammograms. The accuracy and speed can beimproved using computerized analysis. Also, it reduces the work of radiologists anddiscrepancies due to inter-observer.

The region emerges triangular area across the upper posteriorperiphery of the image on a proper Medio-Lateral Oblique (MLO) as ahigh intensity connecting to the chest is called pectora In the Computer-Aided Detection (CAD), three anatomical landmarks i.e. pectoral region, breast frontiers and nipple are extracted automatically.

The current work is mainly concentrated on emphasizing the accuracy of pectoral muscle segmentation. Because, mammographic parenchyma and pectoral muscle has similar texture characteristics, which can be a source for misdiagnosis and cause high FP rate of breast cancer.

PROPOSEDSYSTEM

Existing system Drawbacks

1) Computer-aided detection and diagnosis (CAD) schemes of medical images have been attracting broad research interest in order to detect suspicious diseased regions, classify between malignantand benignlesions,

quantify disease severity, and predict disease prognosis or monitor treatment efficacy. Some CAD schemes have been used as “a second reader” or quantitative image marker assessment tools in clinical practice to assist clinicians (i.e., radiologists) aiming to improve image reading accuracy and reduce the inter-reader variability. Despite of extensive research effort and progress made in the CAD field, researchers still face many challenges in developing CAD schemes for clinical applications.

One of most important steps for diagnosis is preprocessing. During this step, it is tried to apply different algorithms in order to remove noise from images and extract the region of interest (ROI) so that the feature extraction is performed better. The Mammographic Image Analysis Society (MIAS) is an organization of UK research groups interested in the understanding of mammograms and has generated a database of digital mammograms that is used in this study. The database contains 322 digitized films and is available on 2.3GB 8mm(Exabyte)tape.

The database has been reduced to a200-micron pixel edge and padded/clipped so that all the images are 1024x1024.The nine typical images in the database are showninFig.1. One of the important steps for preprocessing mammographic images in some researches is to remove pectoral muscle from images.

LITERATURESURVEY

The research works done in breast cancer detection which follows either image processing and image segmentation techniques used with machine learning algorithms on the extracted features to classify the images as breast cancerous or non-breast cancerous. Some of the existing breast cancer ousdetection method is described in this section. The X-ray mammography is the main test used for screening and early diagnosis, and its analysis and processing are the keys to improve breast cancer diagnosis. R. GuzmánCabrera et al., [25], also provides an effective analysis of digital mammograms based on texture segmentation for the detection of early- stage tumors.

Pavel Kral and Ladislav Lenc , suggest sanovel method for breast cancer detection using mammographic images based on Local Binary Patterns (LBP).

The proposed approach successfully uses LBP based features with a classifier and thresholding. It is shown that, it is evaluated on a set composed of images extracted from MIAS and DDSM databases and it is experimentally producing 84% accuracy.

Anuj Kumar Singh and

Bhupendra Gupta, offered the detection phase followed by segmentation of the tumor region in a mammogram image by using simple image processing techniques such as averaging and thresholding methods.

As per the study a Max-Mean and Least-Variance technique for tumor detection is also provided. In a study conducted by Leonardo de Oliveira Martins et al.,[19], suggested that masses detection on digitized mammograms using the K-means algorithm for image segmentation and co-occurrence matrix

RELATEDWORK

1. Stages of Breast Cancer

Breast cancer is a progressive disease that advances through many stages. Doctors use astaging system to determine the extent of the cancer and the best treatment options.

- **Stage 0.** Stage 0 is sometimes called noninvasive carcinoma or ductalcarcinomainsitu.In stage0, the cancer hasn't spread from the duct into the surrounding breast tissues.
- **Stage I.** In stage I, the cancer cells haven't spread beyond the breast and the tumor is no more than 2 centimeters in size.
- **StageII.** In stage II, the cancer is 2 centimeters or smaller and has spread to underarmlymphnodes, or the tumor in the breast is larger than 2 centimeters but smaller than 5 centimeters and hasn't spread to lymph nodes under the arm.
- **Stage III.** Stage III, or locally advanced cancer, means the tumor in the breast is larger than 5 centimeters and cancer has more considerably involved the axillary lymph nodes, causing them to be attached to each other or to other structures, orhas spread to the other lymph nodes near the breastbone or other tissues such as the skin of the breast or chest wall.
- **Stage IV.** Stage IV cancer means the tumor has spread from the breast to other parts of the body, such as the brain, lungs, bones and liver.
- **Recurrent Cancer.** Recurrent cancer means that the disease reappears after the initial treatment, even though treatment was at first successful. This is either because undetected cancer cells remained in the body or the disease spread before treatment began.

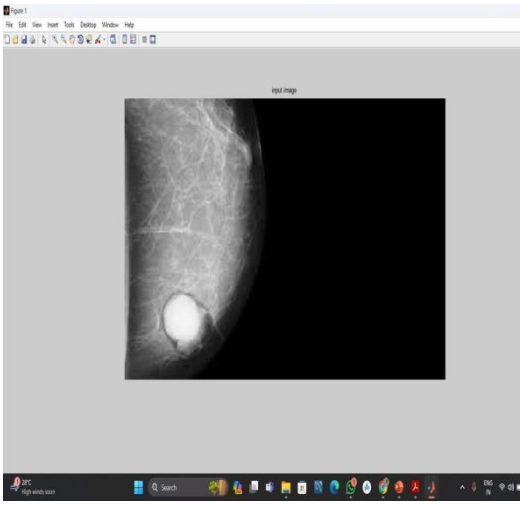
There are many types of breast cancer. Some are more common than others, and there are also combinations of cancers. Some of the most common

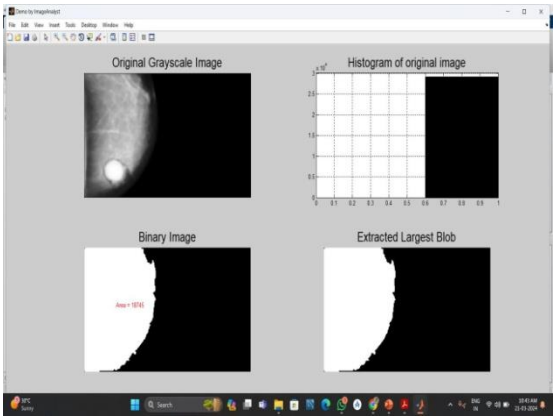
types of cancer are as follows:

Ductal carcinoma in situ: The most common type of non-invasive breast cancer is ductal carcinoma in situ(DCIS). This early-stage breast cancer has not spread and therefore usually has a very high cure rate. Invasive ductal carcinoma: This cancer starts in the milkducts of the breast and grows in to other parts of the surrounding tissue. It is the most common form of breast cancer. About 80% of invasive breast cancers are invasive ductal carcinoma.

- Invasivelobularcarcinoma:This breast cancer starts in the milk-producing glands of the breast. Approximately 10% of invasive breast cancers are invasive lobular carcinoma.
- The remainder of breast cancers are much less common and include the following:
- Mucinous carcinoma are formed from mucus-producing cancer cells. Mixed tumors contain a variety of cell types.
- Medullary carcinoma is an infiltrating breast cancer that presents with well-defined boundaries between the cancerous and noncancerous tissue.
    - Inflammatory breast cancer: This cancer makes the skin of the breast appear red and feel warm (giving it the appearance of an infection). These changes are due to the blockage of lymph vessels by cancer cells.
- Triple-negative breast cancers: This is a subtype of invasive cancer with cells that lack estrogen and progesteronereceptors and have no excess of a specific protein (HER2) on their surface. Ittends to appear more often in younger women and African-American women.

SAMPLERESULTS





CONCLUSION

Processing image is the important concept in medical and biotechnology fields. The aim of this mechanism is to increase the relative quality of information to be interpreted by physician. Therefore, it was tried to minimize preprocessing computations and extract the efficient features so that the ability to diagnose can be increased.

In present study a method was presentedtopreprocesswithoutremoving the pectoral muscle. Preprocessing was done based on a blockdiagramthatintroducedinsecond section. In addition, texture-based feature was used to extract features. For this purpose, discrete wavelettransforms were performed on images and approximation matrices changed to 1-D by using zigzagscanning and then non-stationary signal features are extracted from them. These features are sensitive to edge and light so that they can differentiate between normal and abnormal individuals. Although accuracy of the proposed method for diagnosis normal and abnormal individuals is acceptable, additional extraction of features can increase the accuracy for diagnosis individuals with benign and malignant cancer

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