International Research Journal of Engineering and Technology (IRJET) e-ISSN: 2395-0056
Volume: 07 Issue: 02 | Feb 2020 www.irjet.net p-ISSN: 2395-0072

Detection and Classification of Breast Cancer from Mammogram Image

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Abstract - *Today we know that the deaths of women in the age group 15-54 are increasing due to breast cancer. It is ecognized as the major reason for the deaths of women. Day by day, the number of patients is increasing. As its major factors have not been identified, it is unable to prevent it. So, the possibility of improvement is only an early diagnosis. The purpose of this study is to review the existing approaches of breast cancer detection and pretreatment in mammographic images. The purpose of pretreatment is to improve the image quality and by removing irrelevant noise and unwanted components in the background of the mammogram, there are various methods to pre-process the mammogram image in that process from now on. Discuss their advantages and disadvantages.*

Key Words: **Breast cancer; Mammogram; Turn count; Classification**

1. INTRODUCTION

Today, the woman's death has been increased because of breast cancer. The abnormal growth of the cell is the main reason for breast cancer. Generally, cancer is difficult to identify with middle-age women. It cannot prevent completely since its cause remains unknown [1]. To decrease the death rate, the need to detect breast cancer at an early stage and better treatment options available to patients. If breast cancer identified in the earlier stage, the cure rate of breast cancer can be increased. The detection of cancer at an earlier stage can be archived by using mammography. It cannot prevent cancer, but they save the life of a cancer patient. They help to detect intangible tumors and increases the survival rate. In biological and medical field preprocessing is a very important concept.

It used for diagnosing abnormal cases, image analyzing, and extraction of useful information [2].

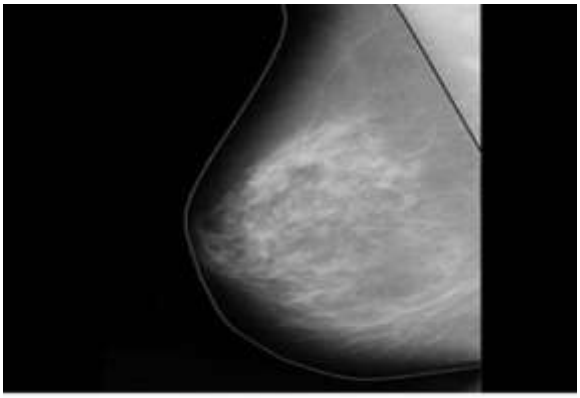

Fig 1: women breast anatomy

This mammogram [3] [4] image examines by radiologists. It detects the abnormalities and to identify whether it is benign or malignant. The radiologist fails many times to differentiate between false positive and false negative. So it's impossible to detect the correct abnormality by a human radiologist. From digitized mammograms automatically detect the suspicious lesion, for increasing the quality of the image some preprocessing steps have been done. The quality of an image can be increased by removing unwanted regions in the background of the mammogram image. Two very important preprocessing steps are the removal of noise and pectoral muscles. The main goal of removing the noise from the image is to get noise-free data for further preprocessing and detect the breast cancer. The pectoral muscle is another important artifact, because of this disturbs the correct detection of breast cancer. From the mammogram image, hence extracting pectoral plays a very important role in the detection of cancer successfully [5].

1.1 Review of Literature

This section discusses the literature review in detail about the women's breast cancer prognosis prediction. In biotechnology and medical filed image processing is an important task. Extracting important features of the images they used a texture-based method. Firstly, they apply discrete wavelet transform on the image and the approximation matrix changed into 1-D using zigzag scanning and finally, non-stationary signal features are extracted. These features are more sensitive to light and edge so that they differ from the abnormal and normal individuals [1]. The clustering classification of breast microcalcification into the Malignant and Benign category is a challenging task for the computerized algorithm. In this paper [2] they used Multi-View Classification for the classification of microcalcification and it is implemented using Logistic Regression Classification. This experiment is conducted on the Digital Database for Screening Mammography (DDSM) this dataset includes demographic data of the patients.

Computerized clustered microcalcifications in mammograms, it suffers from the occurrence of false-positive (FP) results. They investigate the statistical estimation to determine the number of FP that is present in the detected microcalcification. First, they find out a number of true positives by using Poisson-binomial probability distribution of training they used logistic regression models. Three different methods are used for micro calcification (MC) detector namely Context Sensitive Classification Model detector, Support Vector Machine

(SVM) detector and DoG detector [3]. In biotechnology and medical filed image processing is an important task. Extracting important features of the images they used a texture based method. Firstly, they apply discrete wavelet transform on the image and approximation matrix changed into 1-D using zigzag scanning and finally, non-stationary signal features are extracted. These features are more sensitive to light and edge so that they differ from the abnormal and normal individuals. The experiment result shows that the accuracy of better than the previous system [4].

In paper [5] author proposes a prognosis prediction of breast cancer techniques such as multimodal deep neural networks by integrating multi-dimensional. In this, they integrate the multi-dimensional data which includes copy number alternation (CNA) profile, gene expression profile and clinical data. In this they used multi-dimensional data and the performance of multi-dimensional techniques is compared with the single-dimensional data.

An experimental result shows that the proposed system gives a better result than the existing system. In paper [6], the author combines robust outlyingness ratio (ROR) mechanism with the extended NL-Means (ROR-NLM) filters based on the discrete cosine transforms (DCT) for removal and detection of noise. For identified pictorial muscles they used a global threshold, identify the edge of the full breast used edge detection processes. Glioblastoma Multiforme (GBM) is an aggressive type of brain cancer with the lowest median survival rate of patients. In this paper [7] they propose mRMR feature selection method with the Multiple Kernel Learning classification method, for the prediction of GBM prognosis. The survival rate of patients is different for every subtype of glioma. For this experiment, they used the cancer genome atlas (TCGA) dataset of various types of cancers. In this, they improve the prognosis prediction accuracy of GBM and they compare performance with the one kernel method using the same dataset. The advanced technology new possibilities are coming from a scientist to gathering multimodal data in various applications such as Medical Imaging, Body/Brain-Machine Interface, Bioimaging, and Omics. This paper [8] provides a deep survey on usability with different biological data and comparative study of the deep learning techniques, Reinforcement Learning, and the combination of deep learning and reinforcement learning in the mining of biological data. In paper [9] propose techniques for abnormal breast mass classification from the digitized mammography images. In this, they considered as a local binary pattern as a texture feature and this feature is classified using machine learning techniques such as support vector machine (SVM). Mammography a technique is used for takes multiple views and angles of the breast. They classified 'Mediolateral-oblique' views and 'Cranial-Caudal' views separately and finally combines the classification results for an accurate diagnosis. This technique reduces the classification error and it achieves a high reorganization rate.

2. METHODOLOGY

Mammograms perform an important role in the early diagnosis of breast cancer and give better results in controlling it. Figure 2 shows the proposed system architecture.

- ***Dataset:*** System uses MIAS (Mammographic Image Analysis Society) dataset. The dataset contains 322 images of patients.
- ***Preprocessing:*** The medical image may contain unwanted noise. Medical images can be pretreated to enhance their quality and emphasize the agency of the image.
- ***Segmentation:*** The same analysis as the extraction of the Region of interest (ROI) can be done with his step. One of the essential steps to analyze, representation and visualization of objects. There are different types of segmenting-threshold segmentation, edge-based segmentation, regional segmentation, clustering techniques, and mapping-segmentation methods.
- ***Feature Extraction:*** Feature extraction is a very important part of pattern classification. To identify texture in an image, model the texture as a two-dimensional array of gray-level variations. This array is called the gray level co-occurrence matrix.
- ***Classification:*** After the feature extraction system performs the classification on data using Multilayerr Perceptron algorithm. The goal of this process is to find the severity of the tissues and classify the data sets into several classes. It will be classified according to categories such as density, texture, etc. In the object space. Therefore, one of the important steps is classification.
- ***K-fold cross-validation:*** Splitting the data into folds and ensuring that each fold is used as a test set at some point. The goal of K-fold cross-validation is to check how well your model is trained from given data and test it against invisible data. So for this purpose, the system uses K-fold cross-checking to make sure that each data point comes in for testing at least once.

- ***Result:*** Predicted diagnosis of a breast mass. The suspected ROI is classified as a benign or malignant lump based on the selected features.

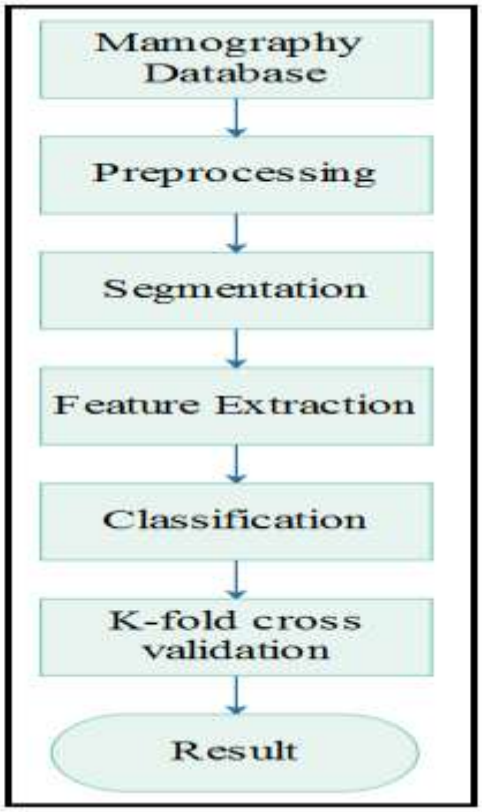

Fig 2: Proposed System Architecture

3. CONCLUSION

The paper discusses breast cancer diagnosis. Here to discuss the preprocessing, segmentation, feature extraction, classification and K fold cross-validation, and its importance. The main goal is to increase the quality of useful information. Tried to minimize the preprocessing step and increase the feature extraction and classification of the process to detect breast cancer. This paper also presents mammography and its importance.

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