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Analysis the Breast Cancer Using Back Propagation with Deep Neural Network

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Abstract: Breast cancer is one of the leading diseases among the worldwide disease; the breast cancer is occur will both gender but it is very rare for man. The breast cancer is an unwanted tissue is growth on the breast. The survival rate has increased above 500,000 around the world. When detected early, the five-year continued existence rate for breast cancer exceeds 80% of cases. Early analysis of breast cancer is serious for the continued existence of the patient. It is formed the multiple cells which may it occur on benign and malignant. The malignant is a cluster of cells and it is irregular shape. The benign tumor is oval shaped and smooth surface. In our approach, the medical microwave imaging technique is an innovative technology for detecting cancer it is avoiding for the patient uncomfortable feelings and screening is very easy. It is analysis the tissue by using the radio-frequencies and differentiates either benign or malignant. The deep learning is an important role for bio-medical images, classification and gains the human approaches. The grey level co-occurrence matrix is a feature extraction to reduce the noise detection and apply the grey color for differentiate the cancerous tissue and non-cancerous tissue . The back propagation algorithm is trained the network randomly and minimized the error rate. For each classifier, the presentation factor such as sensitivity, specificity and accuracy are computed. It is observed that the proposed scheme with classifier outperforms specificity to classify microwave images as normal or abnormal

Keyword: breast cancer, medical microwave images, grey level co-occurrence matrix(GLCM), Back propagation.

I. INTRODUCTION

Cancer is a disease caused by an uncontrolled group of abnormal cell in a part of the body and invades nearby tissues. It can be spread to other parts of the body through the blood and lymph system. Breast cancer occur is an account of the 30% of all new cancer diagnosis the women. In yearly 10 and 20% women are affected the breast cancer among the Indian population. The breast cancer is occurs the normal cells in tissue and developed the uncontrolled manner. It is not a single tissue and may be different rates in various groups. It formed the multiplication of cells which form the malignant and benign tumor. the benign tumor is an early stage of breast cancer it can be a smooth surface developed a tumor without pain and later it will be developed the malignant tumor. The malignant tumor is a group of similar cells that can be spread the adjacent tissue and other parts of the body. The breast cancer us most often detected at menopahase age. In early detection of the breast cancer can increase the chance of the treatment and it will be curable on.

Now days, the clinical breast examination (CBE) and X-ray with mammography techniques are used to screening the breast cancer. The clinical breast examination (CBE) is a physical examination of the breast by a doctor or other health profession. This test is performed by a health care provider a well trained in techniques and recommended a train very carefully. The major disadvantage of this test is find something abnormal cells or something sign of breast cancer. it was unable to find benign and malignant tumor.

X-ray with mammography is the technique for screening the breast cancer. Most of the hospitals are used this technique are used for detect the cancer. Mammography is a process which is little amount x-ray through which we can imagine breast's internal structure. The mammography technique is very easily to detect the cancer at above the age of 40. The major drawbacks are very difficult to read in the young women because their breast tissue is very dense, so the pattern of mammogram is no shown very well. It doesn't show clearly some abnormal cells. And you may not take several of difference. Sometimes it can be missing the cancer parts and analysis the cancer may not be clear.

The new techniques for develop the microwave images was very successful application with optically obscured target where numerous commercial system and in use. It is

relatively low cost and component of height-weight electronics system. It should be a microwave scattering in times and involve high attention with multiple reflection as well as differentiation and refraction. The microwave images with contains both permittivity and conductivity

This paper is organized as follows. Section I contains the introduction about microwave image and analysis the breast cancer, the related work laying the stage for various techniques and approaches is discussed in section II. The proposed work is contains the dataset, feature extraction and back propagation algorithm specified in section III. The feature extraction calculated and validate the result , section IV finally concludes this paper specifies section v..

II. RELATED WORK

A. Thermal Imaging

The thermal image is a test for detect the cancer. The dataset record the temperature changes on the surface of the skin shown upon the infrared image. The automatic classification algorithm is used for classification of breast cancer. There are four texture features are used grey-level. The accuracy is 90% is to get the level of classification. The drawback of the thermal imaging is high positive rate which can be result in the women having the standard mammogram images.[1]

B. Magnetic Resonance Imaging

MRI uses the hydrogen nucleus (single proton) for imaging purposes because this nucleus is abundant in water and fat. The magnetic property of the hydrogen nucleus is used to produce detailed images from any part of the body. The patient who is examined using MRI is placed in a magnetic field and a radio frequency wave is applied to create high contrast images of the breast. In dynamic contrast enhanced-MRI (DCE-MRI, a contrast agent is injected before the images are captured. This technique has been found to be more sensitive than mammography. The limitations of this technique are that it is not good at diagnosing ductal carcinoma in situ (DCIS), may lead to many false positives, is slow (30 min to one hour), more expensive, and may not show all calcifications. Recently, an analysis was conducted to study the correlation between film mammography and MRI in screening breast cancer in high-risk women.[2]

C.CT Images

CT uses X-rays to capture 2D images or slices of the examined body parts. Subsequently, different algorithms are used to generate corresponding 3D images which provide anatomical information such as the location of lesions. Usually CT has low contrast, and hence, iodinated contrast media is injected intravenously to increase the contrast of the CT images. The iodine contrast injection dramatically enhances the visualization of tumors.[3]

III.PROPOSED SYSTEM

To increase the accuracy rate of the microwave breast imaging and identify the breast cancer is either malignant or benign. The multilayer precptron network is solving to diagnosis and positive impact to can detect the cancer. The grey level co-occurrence matrix (GLCM) are used for reduce the noise detection and analysis the boundary of the cancerous region. The confusion matrix is used for getting the accuracy.

A. Dataset:

The UCI repository dataset are used for classification tumor. This dataset contain 10 attribute and 256 instances. The attribute contains size, shape etc.The convolution neural network requires a large number of data to getting a exact accuracy, due to the availability of the dataset is training and testing. Actual size of the image is 1024 X 1024. Architectural alteration an abnormality where abnormal arrangement of tissues appear on the breasts. The dataset contain the benign and malignant tumor and also speculated. The training and testing done by 10 cross fold validation test. The feature extraction is done by grey level co-occurrence matrix

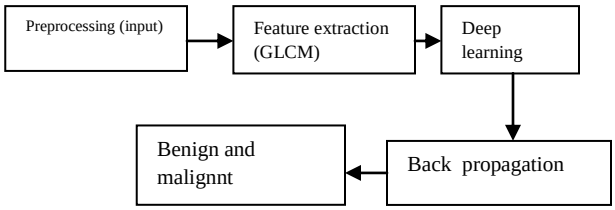

Figure 1. Architecture of the proposed system for classification of tumor type

B.Preprocessing

The preprocessing is the first step of cropped all images. The boundary based method are used to detect the affected tissue and speculated mass. Since the images are considered the many more noise and some artifact. This is 256 done by using the existing coordinates and the fairly accurate radius of every abnormality. Artifacts. In additionally, they typically do not have the preferred contrast to perform exact analyses of the proposed technique. The median filter is applied to remove the noise, the intensity of the image pixel is stretched to the contrast, the median filter is an non- linear operation often used in image processing to reduce the noise of the images.

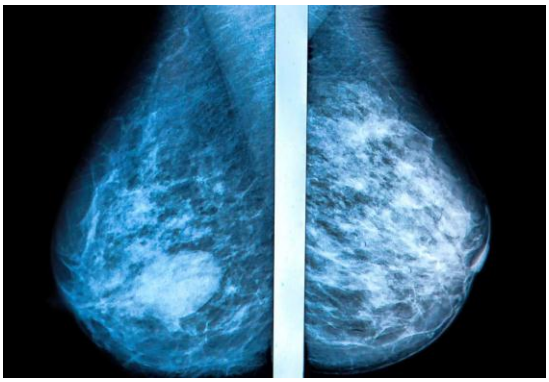

Figure 2. Normal and cancerous tissue

C.3d Breast Tissue *for Microwave Imaging*

We modified the material for 3D breast model. This material is consisting of the high dielectric properties represent the breast tissue, every breast tissue is composed on the several tissue and dense substances. The dielectric properties range is set the value of permittivity. The breast tissue consisted for homogeneous skin as well as normal skin and the skin is fitted to the array of the dielectric properties, we can find the skin thickness is 5mm. the electrical parameters of the skin layer are dispersive at 3GHZ of dielectric constant.

D. Feature *Extraction*

In image processing is process a large amount of data are consuming the time and little bit adequate for classification and reduce the work and set of vector feature. This process is called the feature extraction. The feature extraction starts from initial and build derived values and it's reduce the dimensionality of the images, while still accurately and completely describing the original dataset.

Feature extraction can be classified is depend upon the color texture, shape. The grey level co-occurrence matrix(GLCM) and region on interest(ROI) is an important tool for feature extraction. The GLCM is used for texture analysis is considered the two neighbor pixels and before calculating the GLCM is analysis the level of matrix M_x and N_y, be the row of L={1,2,3……..M_x}, and be the coloumn of L={1,2,3…..N_y}, the wo neighbor pixel are denotes as (N_{ij} – neighboring pixels are related to other pixels), and the angular distance is denoted is Ɵ.

For the image with G is different pixel values the pxp GLCM matrix is defiend as the Mx

$$G_{M,N}(i,j) \sum_{x=1}^{M}\sum_{y=1}^{N}\begin{cases} 1. & if\ l(x,y)=i\ and\ l(x+\Delta x.y+\Delta y)=j \\ 0 & otherwie \end{cases}$$

N images is (M_x, N_y),

E. Algorithm

Multi-layer neural network (MLP) is composed of one or several hidden layers. MLP is trained using a back propagation (BP) algorithm. In this algorithm, the aim is minimizing the error E between the network output and target vectors. (i) Initialize the weights in the neural network randomly

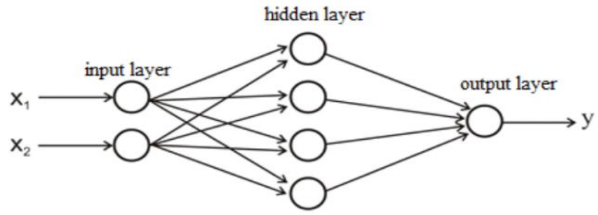

Figure 3. Architecture of multi layer precptron

I. Initialize the weight of the randomly target.
II. repeat
III. For each training sample
IV. Forward propagate x through the network.
V. Backward error E in the network.
End.
VI. Until terminating condition (minimum error E)
VII. End.

Forward propagation:

Calculate the output corresponding to each training sample by passing x through neurons in the network.

Backward propagation:

Produced errors of each neuron in the output and hidden layers

$$\Delta w_{ij} = -\eta \frac{\partial E}{\partial W_{ij}} = -\eta \delta_j 0_j$$

The value of the weight is evaluated

$W_{ij}= W_{ij} + \mu Wij$

II. CLASSIFICATION

The classification process is done by the WEKA tool and used the multilayer perceptron algorithm. The tool contains preprocessing, classification and visualization. The classification is performed using the parameter of standard values of cross fold validation k=10, we can use the following classifier is ANN, KNN, and DCNN. The MLP tools for pattern recognition the values are related the features using the steps given the neural network. The tumor are classified the benign and malignant tumor based on their shape like smooth surface and circumscribed.

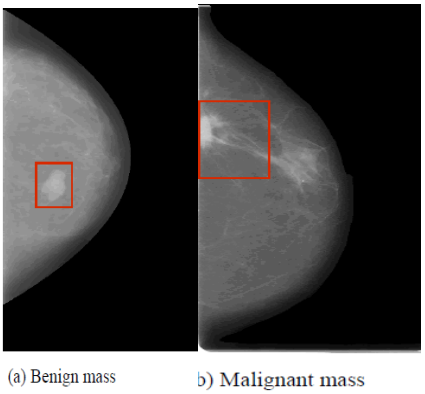

Fig 4s: a) benign b) malignant

IV. EXPERIMENTAL RESULT

To carry out the research, 256 instances are considered which are used as training and testing of the data. The feature extraction is calculated by using the GLCM. To validate the result of benign and malignant of microwave images for we evaluate the accuracy, sensitivity and Specificity. To evaluate consider the metrices of two or more nodes to given the positive or negative cases.

Sensitivity = TP / TP+FN

Specificity = TN/TN+FP

Accuracy= TP + TN / TP + TN +FP +FN

TP: true positive, the classification result is positive in presence of malignancy.

TN: true negative, the classification result is negative in being benign.

FP: false positive, the classification result is positive in being benign.

FN: false negative, the classification result is negative in presence of malignancy.

The confusion matrix is used for analysis the accuracy, specificity and sensitivity. There are many classifier like 'ANN, KNN and SVM are used to getting the best classifier of the benign and malignant to obtain the dataset. SVM with DCNN is the given the good classifier compared with other classifiers.

V. CONCLUSION

The proposed method contributes to get better the segmentation outcome to the best accuracy for all kinds of breasts without loss of any information. The type of diagnosing to find the breast cancer either benign or malignant. This result to notice the cancer at early stage and it's given the proper treatment with circumstance the medical imaging. The deep learning the get better the classification of tumor in simulation to the breast cancer and getting the accuracy is 92%.which outperforms conventional machine learning earlier used on the analyses the dataset. In future work we can use advance classifier to analysis the cancer.

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