Breast Cancer Detection using Image Processing

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***Abstract* — Breast cancer is regarded as the nemesis that threatens women's health worldwide. This disease was subject to a lot of research to improve the accuracy of its diagnosis and detection. Even the condition is still crown as most life-threatening diseases posting a threat to the life of one out of eight women. The ambiguity of the cause of it make it difficult for handling such a disease and it makes the preventive approach impossible. Therefore, the last resort that the targets of this disease find themselves with is early detection. By image processing techniqur, this paper will help give an accurate method to detect the disease at its infant stage. In this paper , a detailed explanation will be given regarding the steps followed in image processing: image enhancement, segmentation, and feature extraction that is done using a Convolutional Neural Network (CNN).**

I. INTRODUCTION

Breast cancer is one of the frequent diagnose of diseases in women. It can be detected by breast examination, but today al-so the detection rate endures to be very low. And the abnormal areas that cannot be felt can be little bit challenging to check using traditional techniques but can be easily seen on a con- ventional mammogram or with ultrasound. Mammography is current best method for detecting breast cancer in early stage. The problem in mammography images is they are complex. Thus, feature extraction and image processing techniques are used to assist doctors in tumors detection. Features extracted from suspicious area in images can help doctors to find the presence of the tumor in real-time. Detecting breast cancercan be little bit a challenging job. Especially, as cancer is not a onne disease but a collection of multiple diseases. Thus, every cancer is different from every other cancer that exists. Also, the same drug may have different reactions to similar types of cancer. Thus, cancer varies from person to person. Depending on only single technique or one algorithm to find breast cancer may does not give us with the best result. As one cancer differs from another, as, every breast appears differently from another. The mammography image can reduced if the patient has undergone some breast surgery. Breast Cancer is being a wide topic in the field of research for the last 20 years. It has been well medical research topic in the world. Many people have been cured of it, due to early detection. still, the progress in diagnosis and treatment for it remains expensive and time-consuming. Automated detection of mass remains a difficult task, this might be because every cancer is different

like its host and each requires customized medication to

becured. So, a lot of work is still left to be done.[1]

II. LITERATURE SURVEY

Zahra abdolali Kazemi, et.al Breast cancer accounts for 19 percent of deaths caused by cancers and 24 percent of all cases afflicted to cancers in European countries. Approximately 25 percent of breast cancer deaths happen in women between the ages of 40 and 49. Anomaly detection is done by the separation of the initial steps in computer detection systems. In this chapter, while reviewing the different techniques, a qualitative comparison between them will be provided. In this study, two approaches for the presentation of mammography (comparison of previous and current mammography images) are evaluated: together (simultaneously) and alternately on the same screen. In this study, MATLAB is used. image processing algorithms of support vector machine (SVM), convolutional neural networks (CNN), and K-nearest neighbors (KNN) genetic algorithm (GA) are exploitte. In thisregard, the performance of these algorithms will be explained in this section. In this method, it is first essential to conduct training. Training means that a number of features related to class one and class two are given to the function, and the algorithm updates its parameters based on the labeling done. Then, the unlabeled data are given to the algorithm for the classification, and it automatically specifies the corresponding class. the Segmentation is the simplification or modification of image view for more meaningful and easier analysis. this is the process of labeling each pixel in each image, which results in a set of segments that together cover the whole image. By analyzing the resulting images, the physicians can identify cancer cells and offer their diagnostic results. It is possible to expand the MATLAB environment by adding a toolbox for various purposes.For simulation, training and classification need to be done with the classification method.[1]

Saif Ali et.al Cancer, also called malignancy, is an abnormal growth of cells. There are greater 100 types of cancer, including skin cancer, colon cancer, prostate cancer, breast cancer, breast cancer, and lymphoma, lung cancer. Symptoms vary depending on the type. According

to American cancer society America will be encountering 1806950 new cases of cancer in the year caused 606520 deaths. Cancer treatment may include and/or surgery , chemotherapy. Cancer is the leading cause of death in the world. Cancer is the leading cause of death in the world. Cancer can be divided into two main types malignant and benign categories. Early detection of cancer is the key to success cancer treatment. There are different methodologies for detecting some cancers Manual identification is time- consuming and unreliable therefore, computer-aided detection entered the research.Computer-aided detection involves image processing to extract features and classification techniquesto recognize the type and stage of cancer. In this paper several different algorithms such as SVM, KNN, DT, etc. have been discussed classification of different types of cancer. This article also presents a comparative analysis research done in the past.[2]

Mutiullah et.al Since last decade lung cancer has become a sign of fear among people all over the world.As a result, many countries generate funds and invite many scientists overcome this disease. Many researchers have proposed many solutions and problems different stages of a computer-aided system to detect lung cancer in early stages and state the facts about lung cancer. CV (Computer Vision) plays a vital role in prevention lung cancer.

Since image processing is essential for computer vision, further in medical imaging processing there are many technical steps that are necessary to improve performance of medical diagnostic machines. Without these steps, the programmer is unable to achieve the accuracy given by another author using a specific algorithm or technique. in in this article we highlight such steps that many authors use in preprocessing, segmentation and classification methods for lung cancer area detection. If pre -processing and segmentation process have some ambiguity then ultimately it affects on classification process. We discuss such factors briefly so that new researchers can easily understand the situation to work further in which direction.[3]

Yousif M.Y Abdallah et.al Enhancement of mammography images considers as powerful methods in categorization of breast normal tissues and pathologies. Digital imaging soft- ware gives mammographers a chance to improve and enhance their illustrative value. The image processing methods in this paper used contrast enhancement, noise reduction, texture checking and slicing algorithm. The mammograms stored in high quality to maintain quality. These methods aim to to increase and soften the intensity of the image and remove noise from the image. The assortment factor of augmentation depends on the tissues and the type of background breast lesions; therefore, some lesions provided better improvement than others as a result their density. The computational speed investigated used correspondence and matching ratio. The results were 96.3 ± 8.5 (p¿0.05). The results showed thatbreast lesions can be improved by applying the proposed image enhancement and segmentation methods.[4]

Prannoy Giri et.al Breast cancer is one of the major causes of death Breast Cancer is one of the significant reasons for death among ladies. Much research has been done on the diagnosis and detection of breast cancer using various image processing and classification techniques. However, the disease remains one of the deadliest diseases. Count one in six women in it life. Because the cause of breast cancer remains unclear, prevention is impossible. Early detection of breast cancer is therefore the only way to cure breast cancer. The use of CAD (Computer Aided Diagnosis) on mammographic images is the most effective and easiest way to diagnose breast cancer. Accurate detection can effectively reduce mortality from breast cancer use. mass and clusters of microcalcifications are important early signs of possible breast cancer. They can help predict breast cancer in infancy. The image for this work is used from the DDSM database (Digital Database for screening mammography), which contains approximately 3000 cases and is being used worldwide for cancer research. This article quantitatively describes the analysis methods used for texture elements for cancer detection. These texture properties are extracted from mammogram ROIs to characterize microcalcifi-cation as harmless, common or threatening. These features are further reduced using Principle Component Analysis (PCA) for better identification of masses. These properties are further compared and passed A back-propagation (neural network) algorithm for better understanding of cancer pattern in a mammogram.[5]

Arpita Joshi and Dr. Ashish Mehta compared classification results obtained from techniques ie. KNN, SVM,random forest, decision tree (recursive division and conditional inference tree). The dataset used was the Wisconsin Breast Cancer dataset obtained from UCI repository. The simulation results showed that KNN was the best classifier followedSVM, random forest and decision tree.[6]

David A. Omon- diagbe, Shanmugam Veeramani, Amandeep S. Sidhu, investi- gated performance of support vector machine, artificial neural network and native Bayes using the Wisconsin Diagnostic Breast Cancer (WDBC) Dataset by integrating them machine learning techniques with feature selection/feature extraction methods the most suitable one. The simulation results showed that SVM-LDA was selected over all other methods due to their longer computing time.[7]

Kalyani Wadkar, PrashantPathak and Nikhil Wagh , conducted a comparative study on ANN and SVM and integrated different classifiers like CNN, KNN and Inception V3 for better dataset processing. Experimental results and performance analysis concluded that ANN is superior classifier than SVM as ANN has been shown to have higher efficiency.[8]

Anji Reddy Vaka, Badal Soni and Sudheer Reddy K. presented a new method for breast cancer detection using machine learning techniques such as Native Bayes Classifier, SVM classifier, Ada Boost Bi-clustering techniques, RCNN classifier and bidirectional Recurrent Neural Networks (HA-BiRNN).. A comparative analysis was performed between machine learning techniques and proposed methodology (Deep Neural Network with Sup- port Value) and simulated the results concluded that the DNN algorithm was advantageous in both designs, efficiency and image quality are essential in the latest medical systems, whileothers techniques did not work as expected.[9]

Monica Tiwari, Rashi Bharuka, Praditi Shah and Reena Lokare presented a new method for breast cancer detection using machine learning techniques which is logistic regression, random forest, K-Nearest Neighbor, Decision Tree, Support Vector Machine and Native Bayesian Classifier and deep learning techniques, which is an artificial neural network, a convolutional neuron Network and Recurrent Neural Network. A comparative analy- sis between machine learning and deep learning techniques concluded that the accuracy obtained in case of CNN model (97.3 percent) and ANN model (99.3 percent) was more effective than machine learning models.[10]

III. METHODOLOGY

CNN is a complex and complicated classifier that can extract vital features automatically without dependence on pre- processing. It is fitter because it it filters important parametersand is also flexible to work exceptionally well on image data.

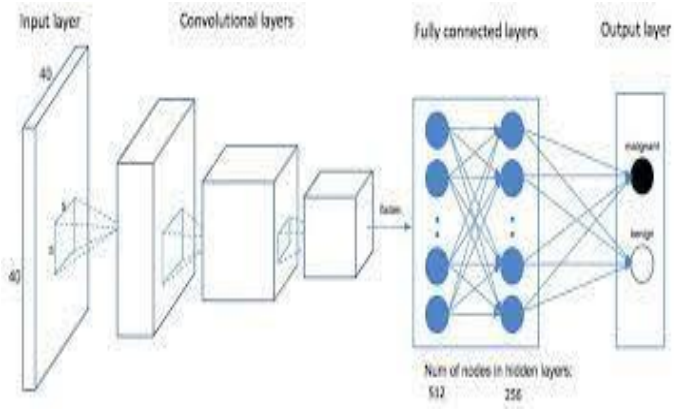


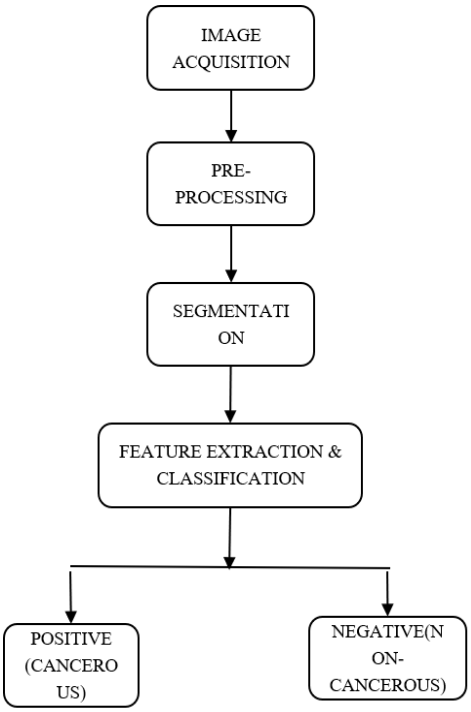
Figura 1. Block diagram

The main focus of our project is to differentiate between malignant and benign tumor using Convolution Neural Net- work with Keras in the backend and then analyze the resultto see how the model can be useful in a practical scenario.

The following steps are performed for model building and evaluation

i. Importing all the essential libraries.
ii. Making a dictionary of images and labels
iii. Labels are based on image category.
iv. Normalization of the image set.
v. Splitting data into training and testing sets.
vi. Building Architecture of the model (CNN).
vii. Testing Model.

ARCHITECTURE DIAGRAM OF BREAST CANCER DETECTION



IMPLEMENTATION

A) Select the image from dataset

Figura 2. Result

B) The below images show that Benign and Malignant breast cancer

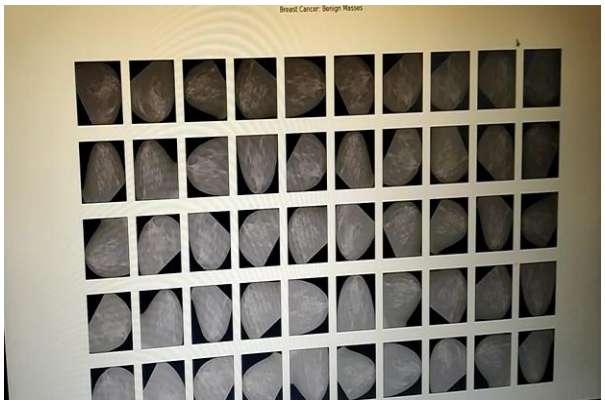


Figura 3. shows that masses of Benign Breast Cancer

Figura 4. shows that masses of Malignant Breast Cancer

IV. CONCLUSION

Breast cancer is one of the leading causes of death in women with type 1 a woman affected by breast cancer out of 8 women. In the process of diagnosis, due to wide range of features associated with breast abnormalities, some abnormalities may be missed or misinterpreted. There are also a number of false positives and therefore, many unnecessary biopsies may be required. Computer-aided detection and diagnosis algorithms have been developed to help radiologists provide an accurate diagnosis and reduce the number of false positives. in In this study, typical steps in image processing algorithms were extensively studied. Techniques in computer- assisted mammography include imaging preprocessing, image segmentation techniques, feature extraction, feature selection, classification techniques and features for mammograms. Texture properties are obtained distinguish between normal cells and cancer cells. Cancer is one of the oldest diseases and a lot of research has been done in this area field. Cancer is not a single disease, but rather a collection of multiple diseases, so a a single drug to cure cancer is not possible. FUTURE SCOPE The plan for the future is

FUTURE SCOPE

The future plan is to validate the model with other datasetsthat include new ultrasound images.

V. REFERENCE

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