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CLASSIFYING BREAST CANCER TUMOUR TYPE USING CONVOLUTION NEURAL NETWORK(CNN-DEEP LEARNING)

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Abstract - *Cancer is the uncontrolled growth of abnormal cells anywhere in a body. These abnormal cells are termed cancer cells, malignant cells, or tumor cells. These cells can infiltrate normal body tissues. There are over 200 types of cancers. Of these types of cancers, breast cancer is one major disease, often encountered by women. One in eight women (about 12%) in the US is projected to develop invasive breast cancer in her lifetime, it is clearly a healthcare-related challenge against the human race. Detecting the presence and type of the tumour earlier is the key to save the majority of life-threatening situations from arising. In this project, we have trained a model for determining the type of tumour based on its ultrasonic image by using a data set of ultrasonic grayscale images, of which, some are of benign and remaining are malignant. The high-risk women and those showing symptoms of breast cancer development can get their "ultrasonic images" captured of the breast area. An experienced "oncologist" is expected to be able to look at the sample of such images and determine whether and what type of tumour is present.*

Key Words: Tumor, Breast cancer, Malignant, Benign.

1. INTRODUCTION

Breast cancer occurs when a malignant (cancerous) tumor originates in the breast. As breast cancer tumors mature, they may metastasize (spread) to other parts of the body. The primary route of metastasis is the lymphatic system which, ironically enough, is also the body's primary system for producing and transporting white blood cells and other cancer-fighting immune system cells throughout the body. Metastasized cancer cells that aren't destroyed by the lymphatic system's white blood cells move through the lymphatic vessels and settle in remote body locations, forming new tumors and perpetuating the disease process.

Breast cancer is fairly common. Because of its well-publicized nature, and potential for lethality, breast cancer is arguably the most frightening type of cancer diagnosis someone can receive. However, it is important to keep in mind that, if identified and properly treated while still in its early stages, breast cancer can be cured.

Breast cancer is not just a woman's disease. It is quite possible for men to get breast cancer, although it occurs less frequently in men than in women. Our discussion will focus primarily on breast cancer as it relates to women but it should be noted that much of the information is also applicable for men.

2. LITERATURE REVIEW

There are many approaches in have been used to diagnose breast cancer using data mining techniques. Some of these are presented here. Data mining is been applied to medical data of the past and current research papers. A thorough study is done on various base reports.

Jacob et al. [1] have compared various classifier algorithms on the Wisconsin Breast Cancer diagnosis dataset. They came across that Random Tree and SVM classification algorithm produce the best result i.e. 100% accuracy. However they mainly worked on the 'Time' feature along with other parameters to predict the outcome of non-recurrence or recurrence of breast cancer among patients. In this paper, the "Time" feature has not been relied upon for the prediction of recurrence of the disease. Here, the prediction is based on the "Diagnosis" feature of the WBCD dataset.

Chih-Lin Chi et al. [2] used the ANN model for Breast Cancer Prognosis on two datasets. They predicted recurrence and non-recurrence based on the probability of breast cancer and grouped patients with bad (5 years) prognoses.

Delen et al. [3] used the SEER dataset of breast cancer to predict the survivability of a patient using a 10-fold cross-validation method. The result indicated that the decision tree is the best predictor with 93.6% accuracy on the dataset as compared to ANN and logistic regression model.

K. Rajendra Prasad, C. Raghavendra, K Sai Saranya [4], has examined application on the classification of breast cancer detection using feature extraction technique. This

approach, using the extracted features for the cancer dataset and gives results on the Support Vector Machine Algorithm.

Suganthi Jeyasingha, Malathy Veluchamy [5], developed an application of Logistic Regression Based Random Forest Classifier for breast cancer diagnosis technique. They presents an approach for random forest technique to train the datasets and predict the results.

Manish Shukla and Sonali Agarwal [6] examined the application of classification technique and Data clustering a machine learning approach. They present a 6 approach for centroid selection in the k-mean algorithm for health datasets which gives better clustering results in comparison to the traditional k-mean algorithm.

Desta Mulatu, Rupali R. Gangarde [7], used a Data Mining Techniques for Prediction of Breast Cancer Recurrence Approach. In this they have used classification, association rules, method and formed the result.

Elouedi, Hind, et al. [8] proposed a hybrid diagnosis approach of breast cancer based on decision trees and clustering. First they have done the Extraction of the malignant instances and apply the K-means algorithm to split the malignant instances. After that they apply the decision tree algorithm (C4.5) to every cluster and compare the different accuracies calculated in each case. Combined results of benign and malignant are applied to the C4.5 algorithm to find out the results based on the confusion matrix and the global and detailed accuracy values.

Lavanya D. and K. Usha Rani [9] studied a hybrid approach: CART decision tree classifier with feature selection and boosting ensemble method has been considered to evaluate the performance of classifier. They applied the CART algorithm, CART with Feature Selection Method and CART with Feature selection and boosting on different Breast cancer data sets and compared the Accuracy.

3. EXISTING SYSTEMS

Treatment of breast cancer is highly complex and is predominantly dependent on how early the cancer is diagnosed, and at what stage it is detected. Different combinations of treatment involving the following may be performed: Surgery Hormone therapy, Chemotherapy, Radiotherapy, Biological therapy. These methods of treatment may be applied as a combination or individually. Determining if a single type of treatment or a combination is necessary depends on how the cancer is detected and its stage. If the cancer is discovered during routine examinations, and the stage is not determined, then the treatment is different. In order to decide how cancer should be treated, a physician considers the following factors: The stage of development of cancer, The current condition of the patient's health, Whether or not the patient is menopausal 8 It could occur that the breast cancer that has developed is secondary cancer (a metastasis from primary cancer in another part of the body). This happens in a small proportion of patients that may have other metastases in the body. In this case, treatment is entirely different. Depending on different protocols, chemotherapy may be conducted before surgery, or only chemotherapy may be conducted if the cancer is inoperable.

Surgery is usually the first step of treatment before the onset of chemotherapy and hormone therapy. Surgery consists of: Removing the cancer mass, and this is called a partial mastectomy, Total removal of the breast. This is called total radical mastectomy. If during previous examinations infected axillary nodes have been detected they are emptied out during surgery.

Radiotherapy is used to kill cancer cells, and by means of controlling the dosage one can control the effects of the therapy. If the patient has undergone surgery or chemotherapy, radiotherapy usually starts approximately a month later. This therapy is conducted for three or five days a week for three to six weeks. Following radiotherapy, the patient may experience the following: Irritation of the skin over the breasts, or darkening of the skin, Fatigue, Swelling in the arm (this occurs due to the blockage of the lymph vessels)

Chemotherapy involves the usage of chemicals which harm and kill cancer cells. Chemotherapy may be used in cases when the cancer is inoperable in order to reduce the size of the cancer mass and to minimize the chances of cancer cells rapidly spreading to other tissues.

Hormone therapy At different stages in the development of a female, the hormone balance undergoes several important changes.

Biological therapy facilitates the halt of the production of HER2, which aids in the strengthening of the immune system in order to fight cancer. This medication is called Herceptin or trastuzumab

4. PROPOSED SYSTEM

The tumors are classified into two types based on their characteristics and cell-level behavior: benign and malignant. Person detected with a malignant tumor, it is recommended to undergo treatment to cure those cancerous cells. If the type of cancer is judged wrong i.e benign as malign or malign as benign the patient has to go through emotional drama or dead respectively.

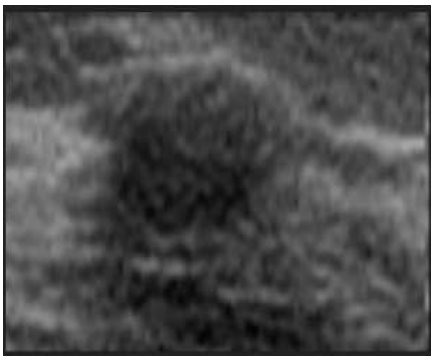

Fig (a) - Malign

Fig (b) - Benign

Breast cancer is one of the most prevalent conditions of the modern world with most women diagnosed with breast cancer are over 50, but younger women can also get breast cancer. There is a good chance of recovery if it's detected in its early stages. For this reason, we use convolution neural networks (CNN-deep learning) and train the algorithm using a data set and can precisely identify the type of tumor. we use Keras and the data image generator library in python. we use the pixels of the ultrasonic image and calculate different parameters and compare them in graphs to predict its accuracy.

So by precise detection of the type of tumour better treatment can be given by the doctors without making type -1 or type – 2 error by misjudging benign by malign or malign by the benign tumour.

5. CONCLUSION

In the past, our dependency on macro-scale information like cancer types, patient, population, environment factor, behavioral factor, and disease factor generally kept the number of variables is enough so that the standard statistical methods or even a physician's own intuition could be used to predict cancer risk. Four basic components of cancer control–prevention, early detection, diagnosis, treatment and painkilling care–thus avoid and cure many cancers, as well as palliative the suffered patients. Cancer control aims to reduce the incidence or instance, morbidity, and mortality of cancer and to improve the quality of life of cancer patients in a defined population, through the systematic implementation of evidence. An implementation of our new system to expose the cancer risk factors and to ensure that people are provided with the information and support they need to adapt to healthy lifestyles.

6. FUTURE SCOPE

AI is set to change the medical industry in the coming decades, it wouldn't make sense for pathology to not be disrupted too. Currently, ML models are still in the testing and experimentation phase for cancer prognoses. As datasets are getting larger and of higher quality, researchers are building increasingly accurate models. Similar models can be developed to study life diseases like, Diabetes, Obesity, Cardiac problems, gynecological disorders, etc.

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