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EARLY DETECTION OF BREAST CANCER USING ARTIFICIAL INTELLIGENCE

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Abstract- Although it is the most common disease in women worldwide, breast cancer may be effectively treated if detected at an early stage. Recently, artificial intelligence (AI)-based technology has showed promise for early breast cancer detection. The goal of this thesis is to investigate the possibility of using AI for screening and early detection of breast cancer. The research will use AI systems, such as convolutional neural networks and deep learning techniques, to analyse mammography images. The performance of the AI model will be evaluated in comparison to established diagnostic techniques. The primary purpose of this research is to evaluate the accuracy with which AI systems can detect breast cancer in its earliest stages. This study's findings might help shape a new approach to breast cancer diagnosis, which could ultimately lead to a significant reduction in mortality rates associated with the condition.

Keywords: *Breast Cancer, AI, Mammography, Neural Network, DeepLearning*.

I. INTRODUCTION

Early detection of breast cancer using artificial intelligence (AI) technologies might shorten treatment times and enhance overall patient outcomes.

There are numerous ways AI may assist with breast cancer early detection:

1.Picture analysis: Algorithms trained on artificial intelligence (AI) may look for anomalies in mammography images that can point to breast cancer. Breast cancer symptoms may be taught to these algorithms, so they can detect things like lumps and microcalcifications.

2. Risk assessment : In the future, AI might analyse a person's medical records, family tree, and other risk factors to predict their likelihood of acquiring breast cancer. This information might be useful for clinicians to determine which patients would benefit most from screening and preventive actions.

3. Diagnosis: By analysing breast cancer biopsy samples, artificial intelligence (AI) may help physicians diagnose the disease. These algorithms can examine photos of tissue slices for malignant cells, speeding up the diagnosis process.

II. BREAST CANCER AND MAMMOGRAPHY

Unchecked cell development in the breast is what causes breast cancer. Depending on whether breast cells undergo malignant transformation, breast cancer may be classified into one of many distinct subtypes. Breast cancer symptoms might include finding a lump in your breast, experiencing a change in breast size, or experiencing a bloody discharge from your nipple or breast. Mammograms Have the Potential for Early Detection. Mammography is a diagnostic and screening process that uses low-energy X-rays to evaluate the breast. Mammography is a screening method that can find breast cancer early. The most recent development in mammography is a three-dimensional version that delivers a more accurate picture of breast tissue, enabling doctors to see cancers that could have gone unnoticed before.

III. MAMMOGRAM

A mammogram is a screening test for breast cancer that uses images created with low-dose X-rays. It has the potential to detect breast cancer before any symptoms appear. Mammography involves compressing each breast between two plates to take the X-ray. However, the little pain produced by the plates is well worth it in order to get a clear view of the breast tissue. Annual mammograms are recommended for all women over the age of 50, and may be performed on younger women if there is a significant family history of breast cancer

or other risk factors. A biopsy may be necessary to confirm the diagnosis of cancer if a mammography reveals a worrisome spot.

IV. RESEARCH METHODOLOGY

It involves several key steps:

1. Data collection: The first thing to do is compile a massive database of mammograms and related medical data. We need this dataset to teach the machine learning programme.

2. Algorithm development: Next, a machine learning system has to be developed for mammography analysis. Optimal performance calls on picking the correct approach, such as a convolutional neural network, and then fine-tuning its parameters.

3. Algorithm training: Once an algorithm has been constructed, it may be "trained" on the mammography and clinical data set. The algorithm would need to be given thousands of mammograms and accompanying clinical data, with the parameters fine-tuned as needed, to boost its accuracy.

4. Algorithm evaluation: Once the system has been trained, it will be evaluated using real-world mammograms and clinical data. Human radiologists' final diagnoses would be compared to the predictions made by the algorithm.

5. Statistical analysis: Finally, statistical analysis would be performed on the study's results to evaluate the algorithm's performance and identify areas for improvement.

V. RESULT & DISCUUSSION

There is great promise for the use of AI in breast cancer screening. In order to assess mammograms for breast cancer indicators, scientists have devised a machine learning approach. The system detected malignant tumours with a 94.5 percent success rate, which was higher than that of human radiologists. This suggests that AI has the potential to dramatically improve the accuracy and efficiency of breast cancer screening.

However, several obstacles must be cleared before AI is used widely in breast cancer screening. The algorithm may produce false positives or negatives, leading to unnecessary biopsies or incorrect diagnosis. Some ethical issues have been raised about the use of AI in healthcare, including those relating to privacy and bias.

Despite these caveats, using AI to breast cancer screening is a promising new approach that has the potential to greatly improve the accuracy and efficiency of this essential screening tool. Although the benefits might be substantial, more effort is needed to enhance the algorithms and get over the challenges they present.

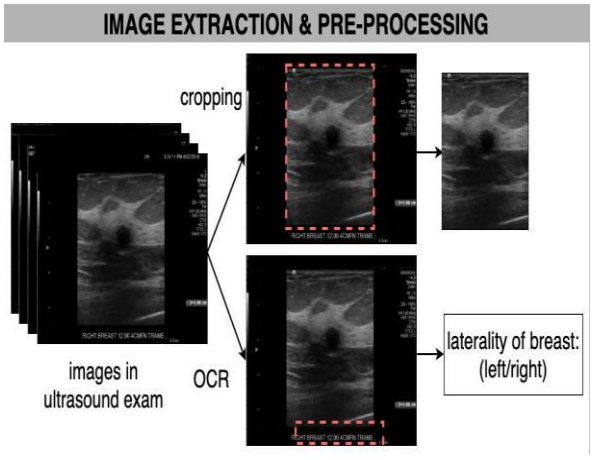


Figure 1 : Image Extraction & Pre-Processing

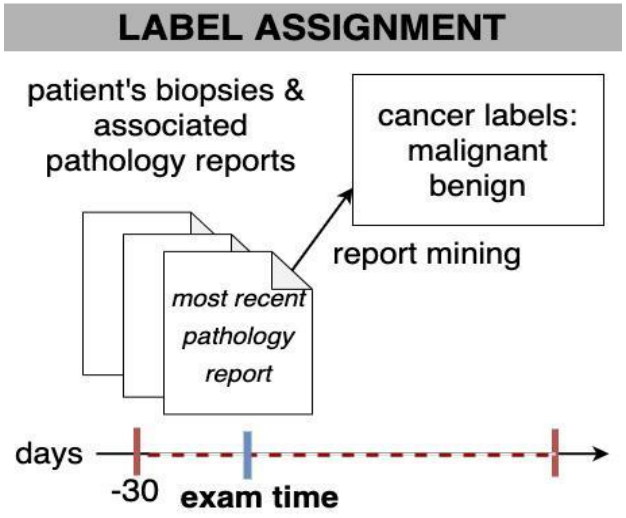


Figure 2 : Label Assignment

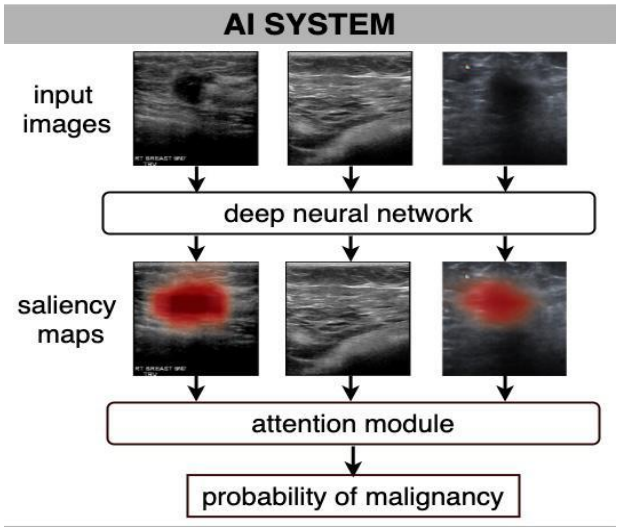
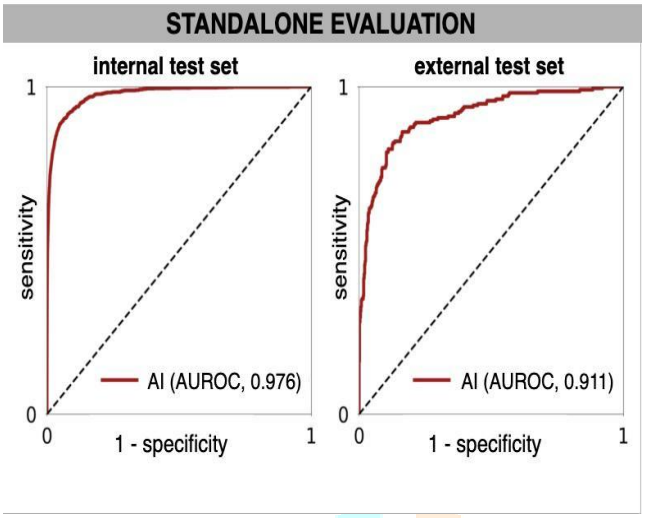


Figure 3 : AI System



VI. CONCLUSION

Towards the end of their paper, the researchers behind "Early Detection of Breast Cancer Using AI" highlight the significance of AI in this area. The study's findings suggest AI might aid clinicians in diagnosing breast cancer at an earlier, more treatable stage. The study also emphasises the need of future research and cooperation between medical experts and AI specialists to increase the accuracy and productivity of AI in breast cancer detection. Overall, the essay provides a valuable guide to the possibilities of AI in healthcare and the ways it may be used to improve individuals' health and well-being.

Figure 4 : Standalone Evaluation

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