

Breast Cancer detection using Deep learning techniques

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Abstract—

I. INTRODUCTION

Human body is made up of hundred thousands of cells. They provide structure for the body. When these cells get old or abnormal they die. Cancer develops in a human body when this process gets disrupted and also due to multiple changes in the genes. These cells start growing uncontrollably and form a mass called tumor. This cancerous tumor is again of two types malignant and benign. A benign cancerous tumor is a type of tumor which does not spread to other parts of body and a malignant tumor is which spreads to other parts of body is sometimes not curable. Carcinoma is a type of cancer that starts in cells that is made up of the skin or tissue lining organs. Breast cancer is a carcinoma type of cancer. It starts in the breast. It can be either one of the breasts. It most probably occurs in women and rarely men. Majority of the time breast cancer is not malignant. About 1 in 8 U.S. women will develop invasive breast cancer over the course of her lifetime. In 2022, an estimated 287,850 new cases of invasive breast cancer are expected to be diagnosed in women in the U.S. These occur due to genetic mutations that happen as a result of the aging process and life in general, rather than inherited mutations.[1] Many methods also available such as mammography, ultrasound, CT and MRI. Mammography is the most widely used screening method[2]. Since, a lot of women are diagnosed with breast cancer our main motive is to develop a method which can efficiently detect breast cancer at an early stage. We intend to do this using Computer-aided detection using various deep learning techniques.

Screening Mammography:

The process of using low energy X- rays to examine the human breast for screening and for discovery of Breast cancer at an early stage through mass characteristics is called mammography screening. For creation of images mammograms uses doses of Ionizing Radiation [13]. It uses low energy x-rays like Mo and Rh than the rays which are using in some of the methods like Radiography, Ductography, Positron emission mammography, Magnetic resonance imaging [13] and ultrasounds [13]. But ultrasound imaging is further used in mammography for the detection of palpable masses which can't be found by mammograms.

There are different image screening techniques are being using for the detection of cancer like Digital breast tomosynthesis [14] which is reliable and used to provide higher diagnostic accuracy [14] and Diffuse optical mammography [5] which is used to investigate breast composition through spectral analysis. The radiologists who examined the mammography chooses the best category that describes the breast density. The breasts are almost entirely flatty and are extremely dense which makes hard to see the tumors during the mammograms [15].

Computer Aided detection for screening mammograms:

Radiologists are looking for computer algorithms which not only increase detection rates of different medical conditions, but which are also cost effective and efficient. One specific way of detecting breast cancer is by using Computer-aided detection (CAD).CAD can double check,thus replacing traditional double reading by a second radiologist[4]. CAD is used for scanning digital mammograms and marking all the areas that indicate cancerous features. Radiologists generally review these marks after making their own interpretations and compare the two to reach a final assessment of the image [3]. Even-though such a technology might seem appealing, but the output obtained by using CAD can sometimes be controversial too. A large clinical trial in the United Kingdom has shown that single reading with CAD assistance has similar performance to double reading [8]. However, in the last decade multiple studies concluded that currently used CAD technologies do not improve the performance of radiologists in everyday practice in the United States [16-18]. From the above cases, we can conclude that CAD systems need to be improved before using them in everyday practice.[7].

Currently used CAD approaches are based on describing the X-ray image with meticulously designed hand-crafted features, and machine learning for classification on top of these features [5,6,7]. However, the Deep learning CNN models can solve problems which might be harder to solve using the traditional CAD systems. These models learn from complex data, perform image recognition, image enhancements and medical diagnosis. Hence, using these techniques might help radiologists get accurate results and predictions. Several studies have attempted to apply Deep Learning to analyze mammograms [9-12], but the problem is still far from being solved [7].

II. EASE OF USE

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III. PREPARE YOUR PAPER BEFORE STYLING

A. *Abbreviations and Acronyms*

B. *Units*

C. *Equations*

D. *LaTeX-Specific Advice*

E. *Some Common Mistakes*

F. *Authors and Affiliations*

G. *Identify the Headings*

H. *Figures and Tables*

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