

ABSTRACT

According to the American Cancer Society, breast cancer has the highest incidence rate of any cancer in women and the second highest incidence rate of any cancer in the world. In actual clinical usage, a mammography serves as the gold standard for making the diagnosis. In light of recent advancements in breast cancer technology, mammography has been validated as a reliable means of screening for and diagnosing this disease in female patients. Considering the sheer volume of datasets utilized and mammography pictures produced, this setting may be the most difficult for doctors to interpret and identify cancerous growths in. Automated or computerized methods have been utilized for mammographic analysis to remove the element of doubt. When abnormalities in the breast are detected, the resulting pictures are referred to as mammograms, and they are utilized for diagnostic purposes. In this study, we present a new method for automated breast cancer detection from MIAS data set mammograms utilizing curvelet/wavelet transform-based features and a convolutional neural network.

Pre-processing, curvelet/wavelet transform application, statistical and gray-level co-occurrence matrix-based feature extraction from curvelet/wavelet coefficients, and finally feature selection through statistical p-test are all steps in the process. First, a feature matrix is utilized as input to a Deep convolutional neural network architecture built using VGG16 and VGG19 pre-trained models for classification. Using transfer learning, we can put pretrained models to work in categorization. Researchers in the United Kingdom have come together to form the Mammographic Image Analysis Society (MIAS), which has amassed a digital mammography database. Included as well are "truth" annotations made by radiologists to indicate the possible sites of anomalies. There are 322 mammograms in this data collection, representing 161 people. Fifty-one of the photos are cancerous, whereas the others are not. The dimensions of the images are $1024 * 1024$. In this study, we provide a unique strategy for detecting breast cancer at an early stage. Pre-processing steps include masking the backdrop,

erasing the pectoral muscles, boosting contrast, and getting rid of any noise that may have been captured in the shot. After that, wavelet and curvelet transformations are used. The coefficients of the transform are mined for statistical and GLCM information. The convolutional neural network and pretrained model are fed with this feature matrix as input. The idea of transfer learning is used to investigate pre-trained models like VGG16 and VGG19. There are a total of 14 levels in the framework's construction. The hyper-parameters are adjusted to maximize the classification accuracy. The developed convolutional neural network architecture achieves an optimal level of accuracy of 93%.