ABSTRACT

Breast cancer is the main cause of death in women throughout the world. Early detection using ultrasound is very necessary to reduce cases of breast cancer. However, the ultrasound analysis process requires a lot of time and medical personnel because classification is difficult due to noise, complex texture, and subjective assessment. Previous studies were successful in ultrasound classification of breast cancer but required large computations and complex models. This research aims to overcome these shortcomings by using a lighter but more accurate model. We integrated the CBAM attention module into the MobileNetV2 model to improve breast cancer detection accuracy, speed up diagnosis, and reduce computational requirements. Gradient Weighted Class Activation Mapping (Grad-CAM) is used to improve classification explanations. Ultrasound images from two databases were combined to train, validate, and test this model. The test results show that MobileNetV2-CBAM achieves a test accuracy of 91%, higher than the complex models VGG-16 (79%), VGG-19 (75%), InceptionV3 (84%), and ResNet-50 (84%). CBAM is proven to improve MobileNetV2 performance with an 8% increase in accuracy. Grad-CAM visualization shows that MobileNetV2-CBAM can better focus on localizing important regions in breast cancer images, providing clearer explanations and assisting medical personnel in diagnosis.

Keywords: MobileNetV2, CBAM, image classification, breast cancer, ultrasound