ABSTRACT

Conventional diagnosis of bone fractures through *X-Ray* imagery heavily relies on the visual observation of medical personnel, which requires high precision, is time-consuming, and carries the risk of misdiagnosis due to subjectivity and visual fatigue. This study aims to develop an automatic classification model that is both fast and accu*rate* using the Convolutional Neural Network (CNN) method with the MobileNetV2 architecture. The dataset used in this research was sourced from Kaggle, titled "Fracture Detection Using *X-Ray* Images." The research stages include data preprocessing through image resizing to 224x224 pixels and image augmentation to increase data variation and prevent *overfitting*. The model was built using Transfer Learning and Fine-tuning approaches on the last 30 layers of the MobileNetV2 architecture. *Hyperparameter* optimization was performed using the Random Search method via Keras Tuner to obtain the optimal configuration, which consists of 128 Dense Units, a *Dropout Rate* of 0.2, and a *Learning rate* of 0.001. The results indicate that the model achieved extraordinary performance with a testing accuracy of 99.32%, precision of 98.89%, and recall of 99.77%. The use of the lightweight MobileNetV2 architecture proved to be highly effective and efficient in bone fracture image classification with high accuracy, making it suitable for implementation on resource-constrained devices.

Keywords : Convolutional Neural Network, MobileNetV2, Bone Fracture, *X-Ray*, Transfer Learning, Random Search