

ABSTRACT

Lung inflammatory disease known as pneumonia is often caused by viral and bacterial infections. Adenovirus, Rhinovirus, and Influenza viruses are often associated with pneumonia, while Streptococcus pneumoniae and Mycoplasma pneumoniae are the main microorganisms that cause the disease. As a widespread and potentially serious illness, pneumonia requires rapid and accurate detection to ensure effective patient management. Early diagnosis and precise classification of pneumonia through chest X-ray imaging play a critical role in the treatment process. This study focuses on developing an automatic classification method for pneumonia based on chest X-ray images using a Convolutional Neural Network (CNN). The dataset used in this study consists of thousands of images categorized into two classes: normal and pneumonia. Each image undergoes several stages, including preprocessing, training, validation, and prediction. The results demonstrate that the CNN model achieves a high level of accuracy in classification, with the best performance obtained using a batch size of 32 and 50 epochs reaching 97.09% accuracy, 97.05% precision, 97.04% Recall, and a 97.06% F1-Score. These findings confirm that the implementation of a CNN based on the VGG-16 architecture is effective in classifying pneumonia with high accuracy and can be further adapted for clinical applications or future research. Therefore, the integration of Convolutional Neural Networks in the analysis of chest X-ray images is expected to serve as a valuable decision-support tool for medical practitioners in achieving more accurate and efficient diagnoses.

Keywords: *Pneumonia, chest X-ray, VGG-16, Convolutional Neural Network*