

ABSTRACT

Lung diseases are disorders that can affect respiratory function and need to be detected early. Chest X-ray is a widely used imaging modality; however, the limited number of radiology experts makes manual analysis challenging. Therefore, Computer-Aided Diagnosis (CAD) systems based on deep learning are increasingly being developed to help reduce the workload of medical professionals in the diagnostic process. This study proposes an approach to detect lung disease from X-ray images that combines segmentation using the U-Net architecture and classification using the Convolutional Neural Network (CNN) architecture. The U-Net model is used to extract the Region of Interest (ROI) in the lungs, which is then classified using CNN into four categories: COVID-19, pneumonia, tuberculosis, and normal. The results show that the developed model can effectively detect lung diseases from X-ray images. The U-Net model achieved an Intersection over Union (IoU) value of 91.69% using an initial learning rate of 0.0001 and without employing dropout layer. Meanwhile, the CNN model demonstrated an accuracy of 95.7% using augmentation and a dropout rate of 0.5. These result reflect the model's strong performance in classifying COVID-19, pneumonia, tuberculosis, and normal lungs. The proposed system was then implemented as a web application using the Flask framework.

Keywords: Computer-Aided Diagnosis, deep learning, U-Net, CNN, X-ray, lung disease.