

ABSTRACT

COVID-19, a disease caused by SARS-CoV-2, has been a significant concern in global health, particularly in developing rapid and accurate diagnostic methods. This study proposed the implementation of a Prototypical Network model with a DenseNet169 backbone architecture for classifying Posterior-Anterior chest X-ray images into four main categories: Normal, Pneumonia-Bacterial, Pneumonia-Viral, and COVID-19. The approach utilized Few-Shot Learning (FSL), designed to address the limitations of high-quality data, and optimized performance through hyperparameter tuning using Optuna. Experiments conducted yielded promising results, achieving an accuracy of 92%, precision of 92%, recall of 91%, and F1-score of 90%, confirming the effectiveness of combining Prototypical Network and DenseNet169 in medical image classification tasks. Additionally, data augmentation techniques were applied to expand image variations, improve model stability, and enhance generalization. This study successfully contributed to the advancement of deep learning-based technology, particularly in supporting efficient, rapid, and accurate COVID-19 diagnoses in resource-limited settings. The findings reinforced the potential application of deep learning-based models in medical image classification to facilitate more precise medical decision-making.

Keywords: Backbone Architecture, Chest X-ray Imaging, Classification, COVID-19, Prototypical Network