

ABSTRACT

As time progresses in the midst of modern society, technology continues to be continuously developed, including in the medical field. One such advancement is the use of X-ray or radiography, a technique that utilizes X-rays, generally employed to examine the condition of bones and joints. One of the outcomes of X-ray examinations is the ability to indicate the condition of the human lungs, whether they are in a normal state or infected with a virus. Therefore, the use of image classification methods employing Convolutional Neural Networks (CNN) can facilitate the work of humans, especially medical professionals.

In this final project, the classification of images obtained from lung X-rays is conducted, where the dataset is divided into four classes: normal lungs, Bacterial Pneumonia, COVID-19, Tuberculosis, and Viral Pneumonia. Subsequently, a comparison is made among three DenseNet architectures: DenseNet-121, DenseNet-169, and DenseNet-201. In the selected model with the best performance, testing will be conducted to optimize the model's performance. The results of this system include the predicted class and accuracy of the identified objects.

The testing results indicate that the DenseNet-169 model outperforms the other two models. However, the model still experiences overfitting with a difference in accuracy between training and validation of 10.56%. To address this issue, adjustments are made to several training parameters. Consequently, an optimal model is obtained with a dropout parameter of 0.5, 25 epochs, and a learning rate of 0.0001. This reduces the level of overfitting, as indicated by a training accuracy of 89.54% and a validation accuracy of 89.43%, with a difference of 0.11%. However, after evaluating metrics such as precision, recall, and F1-score, it is observed that there is an imbalance. The classes Bacterial Pneumonia and Viral Pneumonia yield suboptimal results, while the other classes show optimal outcomes.

Key Word: Lung disease, X-Ray, CNN, DenseNet