

## ABSTRACT

Pneumonia is an infection of the respiratory tract that causes inflammation of the lung alveolus. Detection of pneumonia is done through chest x-ray images, but the analysis takes a long time and depends on the expertise of the radiologist, making it prone to errors. This study aims to develop a classification model using Convolutional Neural Networks (CNN) combined with Histogram of Oriented Gradients (HOG) feature extraction. The dataset used consists of primary and secondary datasets totaling 5876 with normal and pneumonia categories. This data is processed through preprocessing, k-fold technique, CNN model building, and model evaluation. The test results show that the combination of CNN and HOG using PCA hyperparameters, block size 8x8, cell size 2x2, RMSprop optimizer, and dropout 0.3 provides the best performance. This model achieved 95.98% accuracy and f1-score with an improvement of +0.40% for accuracy and +0.36% for f1-score compared to CNN without HOG. With better performance, this model can be used as a more accurate pneumonia diagnosis tool.

**Keywords** : Classification, Pneumonia, CNN, HOG, PCA, RMSprop