

## ABSTRACT

Early detection of forest fire is a crucial aspect of disaster mitigation efforts. Disaster can cause material losses and fatalities. The development of deep learning, particularly Convolutional Neural Networks (CNN), offers an effective solution for object image classification. This research aims to build a fire classification model using the VGG16 architecture with a transfer learning mechanism and to determine the best hyperparameter combination to achieve optimal performance. The dataset used is the Fire dataset, which consists of 1467 images divided into two classes: fire and non-fire. This study conducted a series of experiments by comparing several hyperparameter values: learning rate (0.001; 0.0001; 0.00001), dropout rate (0.4; 0.5; 0.6), and batch size (8, 16, 32). The results from 27 training scenarios show that the best hyperparameter combination is a learning rate of 0.0001, a dropout rate of 0.6, and a batch size of 16. The model with this optimal configuration successfully achieved an accuracy of 97.96%, a precision of 98.60%, a recall of 97.24%, and an F1-Score of 97.92% on the test data. These results demonstrate that the VGG16 architecture with appropriate hyperparameter tuning is highly effective and reliable for the task of automatic fire image classification.

**Keywords** : Object Classification, Fire, VGG16, Hyperparameter, Transfer Learning.