

## ABSTRACT

Fire is one of the disasters that can cause significant losses, making fast and accurate fire detection systems highly essential. Previous studies have shown that computer vision-based methods can be an effective solution for detecting fire through color and texture analysis, yet a knowledge gap remains regarding their relative contributions. This study aims to compare the effectiveness of texture-based extraction methods (Gray Level Co-Occurrence Matrix/GLCM, Local Binary Pattern/LBP) with color-based extraction methods (Color Histogram) in classifying fire and non-fire images. The dataset used was obtained from Kaggle, consisting of 999 images with 755 fire images and 244 non-fire images. The research stages included preprocessing (resizing, grayscaling, and HSV conversion), feature extraction, data balancing using Synthetic Minority Oversampling Technique (SMOTE), data splitting, standardization, and classification using the Random Forest algorithm. Evaluation was carried out using confusion matrix, accuracy, precision, recall, and f1-score. The results show that texture-based methods (GLCM, LBP, GLCM-LBP) achieved an accuracy of around 83-84%, while the color-based method using Color Histogram significantly improved the performance with an accuracy of 97%. The combination of color and texture features (Color Histogram-GLCM, Color Histogram-LBP, Color Histogram-GLCM-LBP) only provided a slight improvement in accuracy up to 97,5%. Therefore, it can be concluded that color distribution plays a more dominant role in fire image classification compared to texture patterns.

**Keywords** : Fire Classification, GLCM, LBP, Color Histogram, Random Forest