

## **Abstract**

Surveillance technology based on face detection systems has become an effective solution in improving security, especially in densely populated areas such as Indonesia. The main challenge in face detection in crowds is the difficulty of detecting small-sized facial objects with complex backgrounds and low resolution. This study aims to optimize the performance of the ResNet 101-based face detection model through hyperparameter exploration, such as batch size, learning rate, and epoch. The method used is Convolutional Neural Networks (CNN) with ResNet 101, which was chosen because of its advantages in image recognition and classification. This study uses the WIDER FACE dataset to train, validate, and test the face detection model. Performance analysis is carried out using metrics such as average precision, precision, and recall to evaluate the model results. The results show that hyperparameter exploration plays an important role in improving the accuracy of small face detection in crowds. However, the results of the comparison between Average Precision (AP) on the significant testing and validation data indicate an overfitting problem, so further optimization is needed so that the model can function well in real environments.

**Keyword : Face detection, ResNet 101, hyperparameter exploration, CNN, WIDER FACE, overfitting**