

## ABSTRACT

Victims of theft cases in Indonesia are still relatively high. The development of current technology should help reduce the percentage of victims of theft cases. One of the technologies used is surveillance cameras. Surveillance cameras are usually used in two conditions, when stationary and moving. With a surveillance camera, a system is needed that is able to detect objects at night or in conditions with minimal lighting.

This final project designs a human detection system using a thermal camera and the algorithm used is You Only Look Once version 4 (YOLOv4). The dataset used is 2535 images with several measuring distances ranging from 5m, 10m, 15m to 20m. To get the maximum mAP (Mean Average Precision) value, the system uses pre-processing on the image in the form of resizing, changing the ratio by dividing the training data and test data and changing the hyperparameter values such as learning rate and batch size. In addition to mAP (Mean Average Precision), several performance parameters tested were precision, recall, and f1-score.

The final result of this final project is able to create a system that can detect objects, especially humans based on thermal images at night with the resulting mAP (Mean Average Precision) value reaching 86.51% with the system configuration used is a comparison of the ratio of training data and test data of 90% vs 10%, image resizing to  $512 \times 512$  pixels, learning rate 0.01, and batch size 32.

**Keywords:** Theft, thermal camera, You Only Look Once version 4 (YOLOv4)