ABSTRACT

Motorcycle detection is an important component of traffic surveillance systems. This study aims to develop a modified YOLO11 architecture for efficient motorcycle detection using high-angle cameras, where variations in object size are relatively insignificant. Therefore, model optimization is required to maintain detection accuracy while reducing computational complexity. To achieve this, a modification of the YOLO11 architecture through pruning is proposed and compared with the baseline method. Pruning was selected because it can improve computational performance when adapted to the object size characteristics of the dataset. This study utilizes a dataset consisting of 963 motorcycle images. The resulting model is capable of improving detection system performance while also reducing model training time. The evaluation process was conducted using precision, recall, mAP50, and mAP50-95 metrics, as well as computational performance metrics including inference time and frames per second (FPS). The experimental results show that the Detection Head Large method with the YOLO11x variant achieved improved efficiency, obtaining an inference time of 11,8 ms and an FPS ranging from 43,30 to 43,96, with a training time of 1 hour, 31 minutes, and 3 seconds. In comparison, the baseline YOLO11x model achieved an inference time of up to 18,5 ms and an FPS of 30,9, with a training time of 2 hours and 16 minutes. Based on these results, it can be concluded that applying pruning to the detection head improves the computational performance of the model, although a decrease in the mAP50-95 metric was observed compared to the baseline method. The resulting model can be applied to traffic surveillance systems.

Keywords : Motorcycle Detection, YOLO11, Pruning, *Detection Head*