Abstrak

Penelitian ini bertujuan untuk membandingkan kinerja model YOLO V8 dalam mendeteksi helm pengendara motor dengan atau tanpa teknik augmentasi data *coarse dropout*. Hasil eksplorasi berbagai skenario pelatihan YOLO V8 dengan tiga rasio dataset (90% *Train* 10% *Valid*, 80% *Train* 20% *Valid*, 70% *Train* 30% *Valid*) serta konfigurasi hyperparameter menghasilkan total 24 skenario pelatihan model untuk deteksi helm. Dua model terbaik dibandingkan berdasarkan evaluasi matriks masing-masing. Model pertama (90% *Train* 10% *Valid*, Augmentasi menggunakan Roboflow, YOLO V8 *Default*, 30 Epoch) dengan konfigurasi *Default* YOLO V8 dan augmentasi data menggunakan Roboflow menunjukkan kinerja unggul dengan *Precision* (*All*) sebesar 88,2%, *Recall* (*All*) sebesar 87,1%, *F1-score* (*All*) sebesar 87,6%, mAP50 sebesar 93%, dan mAP50-95 sebesar 54,3%. Model kedua (90% *Train* 10% *Valid*, Augmentasi menggunakan Roboflow dan *Coarse Dropout*, YOLO V8 *Default*, 30 Epoch), dengan konfigurasi YOLO V8 *Default* dan augmentasi data menggunakan Roboflow dan *coarse dropout*, menunjukkan *Precision* (*All*) sebesar 94,7%, *Recall* (*All*) sebesar 84%, *F1-score* (*All*) sebesar 88,9%, mAP50 sebesar 91,3%, dan mAP50-95 sebesar 53,6%. Selain itu, model dengan hasil kinerja terbaik diintegrasikan pada website guna memvisualisasikan proses deteksi helm pengendara motor secara otomatis.

Kata Kunci: deteksi helm, YOLO V8, augmentasi data, *coarse dropout*, perbandingan kinerja, evaluasi model.

Abstract

This study aims to compare the performance of the YOLO V8 model in detecting motorcycle helmets with or without the coarse dropout data augmentation technique. The exploration of various YOLO V8 training scenarios with three different dataset ratios (90% Train 10% Valid, 80% Train 20% Valid, 70% Train 30% Valid) and hyperparameter configurations resulted in a total of 24 training scenarios for helmet detection. The two best models were compared based on their evaluation metrics. The first model (90% Train 10% Valid, Augmentation using Roboflow, YOLO V8 Default, 30 Epochs) with the default YOLO V8 configuration and data augmentation using Roboflow demonstrated superior performance with a Precision (All) of 88.2%, Recall (All) of 87.1%, F1-score (All) of 87.6%, mAP50 of 93%, and mAP50-95 of 54.3%. The second model (90% Train 10% Valid, Augmentation using Roboflow and Coarse Dropout, YOLO V8 Default, 30 Epochs), with the default YOLO V8 configuration and data augmentation using Roboflow and coarse dropout, showed a Precision (All) of 94.7%, Recall (All) of 84%, F1-score (All) of 88.9%, mAP50 of 91.3%, and mAP50-95 of 53.6%. Additionally, the model with the best performance was integrated into a website to visualize the automatic detection process of motorcycle helmets.

Keywords: helmet detection, YOLO V8, data augmentation, coarse dropout, performance comparison, model evaluation.