ABSTRACT

Object recognition and detection is one of the most important fields in Computer Vision. One of its applications is vehicle detection, which has an important role in various fields such as traffic monitoring systems. Existing traffic monitoring systems, such as Closed Control Television (CCTV), are mostly passive, mainly used for recording and monitoring without active intervention. The You Only Look Once (YOLO) algorithm version 8, as an object detection algorithm, offers significant improvements in terms of efficiency and accuracy. However, research on its implementation in the context of vehicle detection is still limited. Therefore, in this study the author implemented the YOLOv8 algorithm for vehicle detection and counting on traffic CCTV video footage in the form of an application, so that it is expected to provide a better understanding of the performance of YOLOv8. The number of datasets used in the YOLOv8m model training process is 6827 images with four classes: cars, motorcycles, buses, and trucks. The tests that have been carried out are testing the performance of the YOLOv8 algorithm by training datasets based on the YOLOv8m pretrained model and testing the results of vehicle object detection based on 12 CCTV video recordings. Based on the test results, the mean Average Precision (mAP) value is 0.952 at IoU 0.5, the average value of the accuracy rate on the entire video is 71%, videos with bright light conditions are 71.22% and videos with dark light conditions are 70.64%. In addition, the percentage of vehicle object calculation accuracy is 98%.

Keywords: *Vehicle Object Detection, You Only Look Once, Traffic CCTV Video*

ABSTRAK

Pengenalan dan deteksi objek merupakan salah satu bidang yang sangat penting dalam *Computer Vision*. Salah satu aplikasinya adalah deteksi kendaraan, yang memiliki peran penting dalam berbagai bidang seperti sistem pemantauan lalu lintas. Sistem pemantauan lalu lintas yang ada saat ini, seperti *Closed Control Television* (CCTV), sebagian besar bersifat pasif, terutama digunakan untuk perekaman dan pemantauan tanpa intervensi aktif. Algoritma *You Only Look Once* (YOLO) versi 8, sebagai algoritma deteksi objek, menawarkan peningkatan signifikan dalam hal efisiensi dan akurasi. Namun, penelitian tentang implementasinya dalam konteks deteksi kendaraan masih terbatas. Oleh karena itu, dalam penelitian ini penulis mengimplementasikan algoritma YOLOv8 untuk pendeteksian dan penghitungan kendaraan pada rekaman video CCTV lalu lintas dalam bentuk aplikasi, sehingga diharapkan dapat memberikan pemahaman yang lebih baik tentang kinerja YOLOv8. Jumlah *dataset* yang digunakan dalam melakukan proses *training* model YOLOv8m sebanyak 6827 gambar dengan empat kelas yaitu mobil, sepeda motor, bus, dan truk. Pengujian yang telah dilakukan yaitu melakukan pengujian pada performa algoritma YOLOv8 dengan melakukan *training dataset* berdasarkan model *pretrained* YOLOv8m dan melakukan pengujian pada hasil deteksi objek kendaraan berdasarkan 12 video rekaman CCTV. Berdasarkan hasil pengujian, diperoleh nilai *mean Average Precision* (mAP) sebesar 0.952 pada IoU 0.5, nilai rata-rata tingkat akurasi pada keseluruhan video sebesar 71%, video dengan kondisi cahaya terang sebesar 71.22% dan video dengan kondisi cahaya gelap 70.64%. Selain itu diperoleh persentase akurasi perhitungan objek kendaraan sebesar 98%.

Kata Kunci: Deteksi Objek Kendaraan, *You Only Look Once*, Video CCTV Lalu Lintas