ABSTRAK

Akbar Hidayatullah Harahap, *Real-Time Surveillance* Plat Nomor Kendaraan Menggunakan YOLOv5 Dan Tesseract-OCR *Engine*.

Sistem pengawasan lalu lintas berbasis CCTV menghasilkan volume data visual yang masif, sehingga diperlukan otomatisasi untuk mendeteksi dan mengenali plat nomor kendaraan secara *real-time*. Penelitian ini bertujuan menerapkan model deteksi objek YOLOv5 dan mesin *Optical Character Recognition* (OCR) Tesseract guna mendeteksi kendaraan, mengisolasi plat nomor, serta membaca karakter nomor polisi dari rekaman CCTV pemukiman. Metodologi *Cross-Industry Standard Process for Data Mining* (CRISP-DM) digunakan sebagai kerangka kerja. Dataset terdiri dari 507 citra primer hasil ekstraksi frame video CCTV 12 FPS dan 5.553 citra sekunder dari platform Roboflow, keduanya dilabeli kelas *license plate*. Tiga varian YOLOv5 (*nano*, *small*, *medium*) dilatih dengan *hyperparameter* standar; model *medium* (YOLOv5m) mencapai mAP50 tertinggi 99,3%, presisi 99,1%, dan *recall* 99,3%. Proses *pre-processing* citra plat meliputi konversi *grayscale*, *Gaussian blur*, *Otsu thresholding*, dan *contour grouping* sebelum dikenali Tesseract dengan konfigurasi PSM 13. Evaluasi pada 30 sampel plat menunjukkan bahwa 60,0% terbaca sempurna, 16,7% terbaca sebagian dengan kesalahan minor, dan 23,3% gagal. Kegagalan didominasi oleh plat sepeda motor dan frame awal kendaraan yang miring atau buram.

Kata Kunci: Pendeteksian Objek, Pengenalan Karakter, Tesseract-OCR *Engine,* YOLO.

ABSTRACT

Akbar Hidayatullah Harahap, *Real-Time Surveillance Vehicle Number Plate Recognition Using YOLOv5 and Tesseract-OCR Engine.*

CCTV-based traffic surveillance produces massive visual data, necessitating automation for real-time vehicle license plate detection and recognition. This study applies YOLOv5 object detection and the Tesseract Optical Character Recognition (OCR) engine to identify vehicles, isolate license plates, and read plate numbers from residential CCTV recordings. The Cross-Industry Standard Process for Data Mining (CRISP-DM) methodology was adopted. The dataset comprised 507 primary images extracted from 12 FPS CCTV footage and 5,553 secondary annotated images from Roboflow, all labeled with the "license plate" class. Three YOLOv5 variants (nano, small, medium) were trained using default hyperparameters; the medium model (YOLOv5m) achieved the highest mAP50 of 99.3%, precision of 99.1%, and recall of 99.3%. A plate image pre-processing pipeline was applied, including grayscale conversion, Gaussian blur, Otsu thresholding, and contour grouping, prior to Tesseract recognition with PSM 13. Evaluation on 30 plate samples found that 60.0% were read perfectly, 16.7% had minor character errors, and 23.3% failed completely. Failures were dominated by motorcycle plates and early frames with high skew or motion blur.

Keywords: *Character Recognition, Object Detection*, *Tesseract-OCR Engine, YOLO*.