

ABSTRAK

HAIKAL PURNAMA AJI. Identifikasi Pelat Nomor Multibaris Menggunakan *YOLOv8 Oriented Bounding Box* dan *Convolutional Recurrent Neural Network*. Dibimbing oleh NURUL HAYATY dan NOLAN EFRANDA.

Sistem *automatic license plate recognition* (ALPR) di lingkungan dinamis seperti Kawasan Industri Bintan Inti Industrial Estate (BIIE) menghadapi tantangan distorsi perspektif, kemiringan ekstrem, dan tata letak pelat nomor sepeda motor Indonesia yang multibaris. Metode deteksi kotak pembatas horizontal konvensional rentan menangkap derau latar belakang dan baris masa berlaku. Penelitian ini bertujuan mengevaluasi arsitektur ALPR presisi tinggi untuk mengekstrak teks pelat nomor multibaris pada kondisi nyata. Sistem yang diusulkan mengintegrasikan algoritma *You Only Look Once version 8 oriented bounding box* (YOLOv8 OBB) guna melokalisasi baris nomor polisi utama secara akurat beserta sudut kemiringannya. Titik koordinat ini kemudian direktifikasi untuk menghilangkan distorsi rotasi menjadi citra baris tunggal, yang selanjutnya ditranskripsi oleh *convolutional recurrent neural network* (CRNN) tanpa proses segmentasi karakter manual. Hasil pengujian menunjukkan model YOLOv8 OBB mencapai tingkat *mean average precision* (mAP50) sebesar 99,5% dan presisi 99,5%. Pada tahap pengenalan karakter, model CRNN mencatatkan akurasi absolut sebesar 90,65% dengan tingkat *character error rate* (CER) 1,25%. Integrasi sistem ini terbukti tangguh mengatasi variasi sudut maupun pencahayaan ekstrem, sehingga dapat diimplementasikan untuk mengoptimalkan otomatisasi manajemen parkir pintar.

Kata kunci: ALPR, CRNN, pelat nomor multibaris, pelurusan citra, YOLOv8 OBB.

ABSTRACT

HAIKAL PURNAMA AJI. Identification of Multiline License Plates Using YOLOv8 Oriented Bounding Box and Convolutional Recurrent Neural Network. Supervised by NURUL HAYATY and NOLAN EFRANDA.

Automatic license plate recognition (ALPR) systems in dynamic environments such as Bintan Inti Industrial Estate (BIIE) face challenges of perspective distortion, extreme inclination, and the multiline layout of Indonesian motorcycle license plates. Conventional horizontal bounding box detection methods are prone to capturing background noise and the expiry date row. This research aims to evaluate a high-precision ALPR architecture for extracting multiline license plate text under real-world conditions. The proposed system integrates the You Only Look Once version 8 oriented bounding box (YOLOv8 OBB) algorithm to accurately localize the main license plate row along with its tilt angle. These coordinate points are then rectified to eliminate rotation distortion into a single-line image, which is subsequently transcribed by a convolutional recurrent neural network (CRNN) without manual character segmentation. Testing results demonstrate that the YOLOv8 OBB model achieved a mean average precision (mAP50) of 99.5% and a precision of 99.5%. In the character recognition stage, the CRNN model recorded an absolute accuracy of 90.65% with a character error rate (CER) of 1.25%. This integrated system is proven robust against extreme angle and lighting variations, making it applicable for optimizing smart parking management automation.

Keywords: ALPR, CRNN, image rectification, multiline license plate, YOLOv8 OBB.