

INTISARI

PENDETEKSIAN PLAT NOMOR KENDARAAN MENGGUNAKAN YOLOV8 DAN PENGENALAN KARAKTER DENGAN ARSITEKTUR TPS- RESNET-BILSTM-ATTENTION

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Penelitian ini bertujuan untuk mengembangkan sistem *Automatic Number Plate Recognition* (ANPR) yang akurat dalam mendeteksi dan mengenali plat nomor kendaraan di Indonesia. Penelitian ini memanfaatkan model YOLOv8 untuk deteksi plat nomor dan arsitektur TPS-ResNet-BiLSTM-Attention untuk pengenalan karakter, dengan tambahan teknik *preprocessing* seperti *grayscale* untuk meningkatkan performa. Penelitian ini penting untuk mendukung sistem transportasi cerdas, seperti pengawasan lalu lintas, manajemen parkir, dan sistem tol otomatis.

Penelitian dilakukan dengan melatih model YOLOv8 pada dataset berisi 5000 gambar plat nomor hitam dan putih, dengan augmentasi untuk menyeimbangkan data. Model TPS-ResNet-BiLSTM-Attention dilatih pada dataset dengan 47.507 kemunculan karakter. Hasil menunjukkan bahwa YOLOv8 mencapai mAP 99,26% setelah optimasi *hyperparameter*, mengungguli YOLOv5 dari penelitian sebelumnya. Pengenalan karakter dengan *preprocessing grayscale* meningkatkan akurasi hingga 85,49%, meskipun binarisasi dan operasi morfologi menurunkan performa. *Deployment* sistem menunjukkan kemampuan *real-time* dengan rata-rata FPS pipeline penuh 86,86. Analisis kesalahan mengidentifikasi substitusi karakter sebagai masalah utama, yang dapat diatasi dengan augmentasi data dan *preprocessing* yang lebih baik. Penelitian ini memberikan kontribusi signifikan dalam meningkatkan efisiensi dan keandalan sistem ANPR untuk aplikasi transportasi modern.

Kata Kunci: *Automatic Number Plate Recognition* (ANPR), YOLOv8, TPS-ResNet-BiLSTM-Attention, pengenalan karakter, deteksi plat nomor, *preprocessing*.

ABSTRACT

VEHICLE LICENSE PLATE DETECTION USING YOLOV8 AND CHARACTER RECOGNITION WITH TPS-RESNET-BILSTM-ATTENTION ARCHITECTURE

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This study aims to develop an accurate Automatic Number Plate Recognition (ANPR) system for detecting and recognizing vehicle number plates in Indonesia, focusing on varying weather conditions such as sunny, cloudy, and rainy. The research leverages the YOLOv8 model for number plate detection and the TPS-ResNet-BiLSTM-Attention architecture for character recognition, enhanced by preprocessing techniques like grayscale to improve performance. This research is crucial for supporting intelligent transportation systems, including traffic surveillance, parking management, and automated toll systems.

The study trained the YOLOv8 model on a dataset of 5000 black and white number plate images, with augmentation to balance the data. The TPS-ResNet-BiLSTM-Attention model was trained on a dataset with 47,507 character occurrences. Results show that YOLOv8 achieved a mAP of 99.26% after hyperparameter optimization, outperforming YOLOv5 from previous studies. Character recognition with grayscale preprocessing improved accuracy to 85.49%, although binarization and morphological operations reduced performance. System deployment demonstrated real-time capability with an average full pipeline FPS of 86.86. Error analysis identified character substitution as the primary issue, which can be addressed through enhanced data augmentation and preprocessing. This research significantly contributes to improving the efficiency and reliability of ANPR systems for modern transportation applications.

Kata Kunci: Automatic Number Plate Recognition (ANPR), YOLOv8, TPS-ResNet-BiLSTM-Attention, character recognition, number plate detection, preprocessing