



PROJECT REPORT

CLASSIFYING LICENSE PLATE BASED ON REGION OF ORIGIN WITH YOLOV8 AND FASTER R-CNN

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ABSTRACT

The function of automatic number plate detection and reading systems (ANPR) is well known to most of the people — their goal is to recognize license plates to identify vehicles through their registration, but classifying plates according to their region has not been widely explored. This work presents a novel ANPR system that uses YOLOv8 for license plate detection, PaddleOCR for character extraction, and Faster R-CNN as a fallback for regional classification. They were collected from PT Mitra Kasih Perkasa, Kaggle, random searches on the internet, and synthetic generation. Extensive pre-processing and augmentation performed to create a strong training dataset. Results demonstrated standalone YOLOv8 + PaddleOCR achieved an accuracy of ~33.33%, whereas hybrid YOLOv8 + PaddleOCR + Faster R-CNN led to only a minor improvement to 33.53%. Using the hybrid approach, the macro and weighted average metrics show slight but significant improvements in precision, recall, and F1-score. In order to answer the primary research questions, the performance of an integrated ANPR system for regional classification is evaluated in this study, as well as the performance improvement enabled by the hybrid approach investigated and quantified. The small improvement suggests that while, the addition of Faster R-CNN adds some value, issues with character recognition and dataset size are still major challenges. Moving forward, efforts should focus on improved quality and diversity of datasets used for training, better data augmentation methods, and experimentation with different OCR and deep learning architectures that are catered towards recognizing small characters to ensure better robustness and performance of ANPR models in real-world scenarios. Thus, performance improves.

.Keyword: Automatic number-plate recognition, ANPR, deep learning, YOLOv8, Faster R-CNN, etc.