

**Deteksi Plat Nomor Kendaraan Menggunakan Metode
(Principal Component Analysis) PCA (Vehicle License Plate
Detection Using PCA (Principal Component Analysis) Method)**
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ABSTRACT

Vehicle license plates serve as crucial identification for administration, traffic regulation, and security in modern transportation systems. With the increasing number of vehicles, license plate recognition is essential for vehicle identification and traffic management, including addressing parking issues and tracking stolen vehicles. This research develops a motor vehicle license plate detection system using the Principal Component Analysis (PCA) method. The system implements detection, starting from image acquisition via capture and realtime modes, license plate area detection using the YOLO model, individual character detection using You Only Look Once (YOLO) for characters, up to character recognition using the PCA model. PCA training data consisted of 6646 samples, and test data consisted of 1662 samples.

Character preprocessing for the PCA model includes conversion to grayscale, binarization, resizing to a standard 20x30 pixel size, flattening, and normalization. The trained PCA model demonstrated good character recognition capabilities. Accuracy testing results showed that the capture mode achieved 94.73% accuracy, while the realtime mode achieved 60%. This performance difference is likely influenced by the variability in frame quality in live video streams, such as motion blur, rapid lighting changes, and potential bounding box inaccuracies. The system was successfully implemented on the Android platform using Kotlin, with machine learning models (YOLO in ONNX/TFLite format and PCA parameters from JSON files) capable of running on mobile devices.

Keywords: *Vehicle License Plate, Principal Component Analysis (PCA), YOLO, Object Detection, Character Recognition, Android.*