

ABSTRACT

The manual container number recording process at the gate-in area of PT Pelindo Berlian Jasa Terminal Indonesia (BJTI) still poses various challenges, such as recording errors, data processing delays, and validation difficulties in damage claim cases. To address these issues, this study developed an automatic container number identification system based on deep learning, consisting of three main stages: container number area detection using the YOLOv11 model, character segmentation using another YOLOv11 model, and character classification using the ResNet-50 architecture. The dataset for each stage was collected from real-world port environments and manually annotated. The container number area detection model, trained with the AdamW optimizer for 200 epochs, achieved $mAP@0.5$ of 96.8%, precision of 97.1%, and recall of 95.4%. At the character segmentation stage, the model recorded an $mAP@0.5$ of 94.3%, precision of 95.2%, and recall of 93.7%. Meanwhile, at the character classification stage using ResNet-50, the highest accuracy achieved was 98.6%, with precision of 98.9%, recall of 98.3%, and F1-score of 98.6%. The entire system was then integrated into a web-based platform to support operations, enabling the storage of detection results in text and image formats, and equipped with login, data search, and statistical display features. Evaluations showed that the system can operate efficiently and accurately under various lighting conditions and camera angles. This system is expected to improve the efficiency, accuracy, and transparency of container number recording in port operational environments.

Keywords: *Automatic detection system, Gate In, container number, image processing, detection accuracy, Diamond Port.*