ABSTRACT

Damage to container bodies poses a significant challenge in the logistics industry, particularly for port companies such as PT Berlian Jasa Terminal Indonesia (BJTI). The manual damage verification process leads to potential errors, delays, and a decline in customer trust. Therefore, this study aims to design, develop, and evaluate an automated container damage detection system. This research conducts a comparative study between YOLOv11 and other comparative models (YOLOv8, YOLOv9, and YOLOv10) to find the best architecture, which is then integrated with a web-based system as a monitoring interface. The models were trained using a dataset collected from port CCTV and public sources.The test results show that YOLOv11 emerged as the superior model, achieving the highest accuracy performance with a mAP@0.5 of 53.44%, Precision of 66.97%, and Recall of 50.69%. In terms of speed, the system, tested on a CPU, demonstrated an average inference time of 123.90 ms per image, which was also the fastest performance compared to the other comparative models, proving its efficiency for operational implementation. The detection results are automatically uploaded to a server and displayed on a web interface built with the CodeIgniter 4 framework, which provides login, statistical dashboard, and data search features. Evaluation shows that the integration between the detection model and the web system runs well and is stable. This system is expected to serve as an applicable computer vision-based solution to improve efficiency and accuracy in container monitoring within the port environment.

***Keywords**: Container damage detection, YOLOv11, port.*