

ABSTRACT

The increasing volume of electronic waste (e-waste) in Indonesia poses serious environmental risks, driven by suboptimal management and low public awareness. To address this issue, an integrated electronic waste bank system, based on mobile and web applications, was designed to facilitate a more efficient, transparent, and accessible e-waste management process.

The system's core is the application of deep learning to automate e-waste identification and assessment via a mobile app. It employs a YOLO11 object detection model trained on 38 e-waste categories, augmented by the Gemini AI LLM for validation and providing guidance on proper handling. Extensive testing revealed that the detection model achieved optimal performance, with a mAP@50-95 of 0.849. Post-detection, a regression model offers a price estimate, though its performance is limited (R-squared of 0.48) due to a dataset restricted to only the item's name as an attribute.

In conclusion, this project successfully developed a functional electronic waste bank system, establishing the YOLO11 model as an effective and accurate foundation for automated e-waste identification. While the price regression model is currently limited, the system is equipped with a dataset creation feature on the admin dashboard, providing a fundamental solution for future model enhancements. Overall, this system shows significant potential as a tangible and scalable solution to help mitigate the growing e-waste problem in Indonesia.

Keywords: *e-waste, electronic waste, deep learning, object detection, YOLOv11, price regression, waste bank, mobile application.*