ABSTRACT

Point-of-sale (POS) systems play a crucial role in modern retail by streamlining transactions and improving operational efficiency. However, traditional barcode-based scanning methods can become bottlenecks, particularly in high-traffic retail environments. Small businesses, such as warungs in Indonesia, often lack access to automated checkout systems, leading to inefficiencies in transaction processing. This study explores the implementation of YOLOv8, a deep-learning-based object detection model, to enhance POS scanning by enabling the simultaneous detection of multiple retail products in a single image.

In this study, a dataset of 35 Indonesian retail product categories was collected and annotated for training. The YOLOv8m model was implemented and trained using a supervised learning approach, employing data augmentation techniques to improve generalization. The model was trained and validated using the Kaggle platform, with evaluation metrics such as precision, recall, and mean average precision (mAP) used to assess detection performance. The system was tested under various conditions to measure accuracy, response time, and robustness to environmental factors.

The results demonstrate that YOLOv8 achieves high accuracy in retail product recognition, with precision, recall, and mAP scores exceeding 90%. The model effectively detects multiple objects within a single image while maintaining real-time processing capabilities. Tests under different lighting conditions and product arrangements within realistic limits indicate that detection performance remains stable, highlighting the model's robustness.

The findings of this study indicate that YOLOv8 is a viable solution for improving POS scanning in small retail environments, such as warungs. The implementation of this system has the potential to enhance efficiency and reduce human error in retail transactions. Future research may focus on optimizing the model for real-time deployment, integrating it with mobile POS applications, and expanding its capabilities to handle dynamic retail environments.

Keywords: warung, YOLOv8, object detection, retail products, point-of-sale