

ABSTRAK

Keberadaan produk cacat, khususnya kebocoran pada kemasan snack, di rak minimarket dapat menyebabkan kerugian finansial serta menurunkan tingkat kepercayaan pelanggan. Proses inspeksi manual yang masih umum diterapkan memiliki keterbatasan dalam aspek efisiensi, akurasi, dan konsistensi. Penelitian ini bertujuan untuk mengembangkan serta menganalisis performa sistem deteksi kebocoran kemasan produk snack dengan membandingkan dua pendekatan berbasis *computer vision*, yaitu model YOLOv8 tunggal dan model hibrida yang mengintegrasikan *Canny Edge Detection* sebagai tahap pra-pemrosesan citra.

Penelitian ini menggunakan *Dataset* yang dikumpulkan secara langsung di Swalayan Gading Mas 6 dengan total 424 citra awal, yang kemudian ditingkatkan menjadi 1.020 citra melalui teknik augmentasi (flip, rotasi, dan penyesuaian kecerahan) untuk data latih. Seluruh citra dianotasi ke dalam dua kelas, yaitu “normal” dan “bocor”. Dua skenario pelatihan dilakukan menggunakan arsitektur YOLOv8n (nano) dengan konfigurasi identik (50 iterasi dan ukuran input 640×640). Skenario pertama menggunakan citra RGB asli sebagai model baseline, sedangkan skenario kedua menggunakan citra hasil pra-pemrosesan *Canny Edge Detection*. Evaluasi performa dilakukan menggunakan metrik *precision*, *recall*, *F1-score*, *mean Average Precision (mAP@0.5)*, serta *mAP@0.5:0.95*.

Hasil penelitian menunjukkan model *baseline* mencapai performa baik dengan nilai *mAP@0.5* sebesar 98,36% dan *mAP@0.5:0.95* sebesar 86,73%. Sebaliknya, model dengan pra-pemrosesan *Canny* mengalami penurunan performa yang signifikan dengan *mAP@0.5* sebesar 96,67% dan *mAP@0.5:0.95* sebesar 76,33%. Sistem yang dikembangkan berpotensi diimplementasikan sebagai alat bantu inspeksi kualitas yang cepat dan akurat di lingkungan ritel.

Kata Kunci: YOLOv8, *Canny Edge Detection*, Deteksi Kebocoran Kemasan, *Computer Vision*, Inspeksi Kualitas Ritel.

ABSTRACT

The presence of defective products, particularly leakage in snack packaging, on minimarket shelves may lead to financial losses and decreased customer trust. Manual inspection processes, which are still widely implemented, exhibit limitations in terms of efficiency, accuracy, and consistency. This study aims to develop and analyze the performance of a snack packaging leakage detection system by comparing two computer vision-based approaches: a standalone YOLOv8 model and a hybrid model integrating Canny Edge Detection as an image preprocessing stage.

This research employs a quantitative experimental approach. The dataset was collected directly at Gading Mas 6 Minimarket, consisting of 424 initial images, which were expanded to 1,020 images through augmentation techniques (flipping, rotation, and brightness adjustment) for training. All images were annotated into two classes: “normal” and “leaking.” Two training scenarios were conducted using the YOLOv8n (nano) architecture with identical configurations (50 epochs and 640×640 input size). The first scenario utilized original RGB images as the baseline model, while the second applied Canny Edge Detection preprocessing prior to training. Model performance was evaluated using precision, recall, F1-score, mean Average Precision (mAP@0.5), and mAP@0.5:0.95.

The results demonstrate that the baseline model achieved superior performance, attaining an mAP@0.5 of 98.36% and an mAP@0.5:0.95 of 86.73%. In contrast, the Canny-based model experienced a significant performance decline, with an mAP@0.5 of 96.67% and an mAP@0.5:0.95 of 76.33%. The developed system has strong potential to be implemented as a fast and accurate quality inspection tool in retail environments.

Keywords: *YOLOv8, Canny Edge Detection, Packaging Leakage Detection, Computer Vision, Retail Quality Inspection.*