

Defect Detection of Plastic Woven Bags

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Abstract:

Surface defect inspection is an important quality control task in the plastic-woven bag laminating process. Traditional manual inspection is easily affected by operator fatigue, production speed, and irregular defect appearances, which may lead to missed detections and inconsistent inspection results. To address this issue, this study compares the performance of YOLO11-n and YOLO11-s for defect inspection in plastic-woven bag laminating processes.

Surface images of laminated plastic-woven bags are collected and classified into three defect categories: Split, Mark, and Foreign Object. Under the same inspection task, the YOLO11-n baseline achieves a Precision of 0.925, Recall of 0.923, mAP50 of 0.918, and mAP50-95 of 0.750. In comparison, YOLO11-s demonstrates higher detection accuracy, with an overall mAP50 of 0.930–0.940 and mAP50-95 of 0.770–0.800. The improvement is mainly observed in the Split category, where the mAP50 increases from 0.817 to approximately 0.850–0.875.

This study aims to analyze the trade-off between accuracy and real-time performance, providing a reference for selecting suitable YOLO11 models for edge-based industrial defect inspection.

Keywords:

YOLO11, Defect Inspection, Plastic-Woven Bag, Edge Computing.