Performance Evaluation of YOLOv26 Architectures in Rotary Tedder Tooth Damage Detection

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The automated detection of mechanical defects in agricultural machinery is essential for the efficiency of modern smart farming [1,2]. Building upon our previous research, this study advances the inspection of rotary tedder teeth by evaluating the latest YOLOv26 architectures. We utilized a high-performance dataset, previously optimized for the YOLOv11x model, to train and benchmark both the YOLOv26s and YOLOv26m variants [3,4]. Our evaluation, comprising mAP@50, mAP@50-95, confusion matrices, and training efficiency, confirms the superiority of this newer architecture. The YOLOv26s model achieved a mAP@50-95 of 0.567, outperforming the YOLOv26m variant (0.553) by 2.53% and the YOLOv11x baseline (0.562) by 0.89%. These results demonstrate that the YOLOv26 family not only ensures detection precision but also offers a robust, efficient solution for real-time diagnostics in agricultural edge computing environments, marking a significant first step toward a fully realized computer vision-based damage detection system.

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