

Application of Mask R-CNN Algorithm for Apple Detection and Semantic Segmentation

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This research presents an application of the Mask R-CNN algorithm for apple detection and semantic segmentation, aiming to enhance automation in the agricultural sector. Despite the growing use of deep learning techniques in object detection tasks, their application in agricultural contexts, specifically for fruit detection and semantic segmentation, remains relatively unexplored. This study evaluates the performance of the Mask R-CNN algorithm through a series of numerical experiments, with metrics including mean intersection over union (mIoU), F1 score, accuracy, and a confusion matrix analysis. Our results demonstrated that the Mask R-CNN model was effective in detecting and segmenting apples with a high degree of precision, achieving an mIoU of 0.551, an F1 score of 0.704, and an accuracy of 0.957. However, areas for potential improvement were also identified, such as reducing the model's false negative rate. This study provides insights into the application of deep learning algorithms in the agricultural sector, paving the way for more efficient and automated fruit harvesting systems.

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