

## ABSTRACT

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DETECTION OF OIL PALM FRESH FRUIT BUNCH (FFB) RIPENESS USING YOLOV5 ALGORITHM BASED ON WEB

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(xiv + 62 + attachment)

*Productivity and oil quality are highly dependent on the ripeness level of Fresh Fruit Bunches (FFBs) of oil palm. This study aims to develop a web-based system capable of automatically detecting and classifying the ripeness levels of oil palm FFBs using the YOLOv5 algorithm. The research is designed by applying the Cross-Industry Standard Process for the development of Machine Learning (CRISP-ML) method. The dataset used consists of labeled images of FFBs categorized into empty bunch, under-ripe, abnormal FFB, ripe FFB, over-ripe, and raw FFB. The YOLOv5 model was trained with a data split of 87% for training, 8% for validation, and 4% for testing over 50 epochs, resulting in an accuracy of 87.12%. The best model from this training was used for prediction to provide the best performance among all trained models. Implementation testing on devices was conducted using preprocessed datasets uploaded to the website for identification. System testing was carried out to detect objects both via image uploads and in real-time through a camera. The developed web-based system successfully identified the ripeness levels of FFBs with high accuracy, showing significant potential for improving efficiency and quality in palm oil plantations. Based on the model testing tables, black-box testing, and device trials, the system can accurately identify the ripeness categories of oil palm FFBs and operates effectively on both desktop and Android devices. The palm oil detection website can be accessed at <https://deteksisawit.highfives.id/> starting from August 23, 2024.*

Bibliography (2020-2023)