

***Implementation of the YOLOv8 Algorithm for Detecting the Condition of
Javanese Long Pepper During the Drying Process***

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ABSTRACT

The condition of Javanese long pepper during the drying process is generally determined through direct visual observation. This method has several limitations because the assessment may be influenced by observer subjectivity, lighting conditions, and the absence of consistent evaluation criteria. This study aimed to implement the YOLOv8n algorithm to detect the visual conditions of Javanese long pepper into two classes, namely Ripe and Dried, in real time. The dataset was obtained through direct image acquisition and consisted of 429 images containing 3,511 object annotations, including 2,251 Dried objects and 1,260 Ripe objects. Dataset processing was conducted using Roboflow through preprocessing, bounding-box annotation, augmentation, and dataset division into training, validation, and testing data. Model training was performed on Google Colab using two scenarios of 60 and 90 epochs. The 90-epoch model was selected as the final model because it produced slightly better recall, mAP50, mAP50-95, and most loss values. The evaluation results of the selected model achieved a precision of 96.27%, recall of 95.64%, mAP50 of 97.22%, and mAP50-95 of 81.65%. Based on the confusion matrix, the model correctly detected 234 Dried objects and 105 Ripe objects. The real-time implementation used a Logitech C270 camera connected via USB, while the inference process was performed on a laptop. Tests with drying capacities of 2 kg, 3 kg, 5 kg, and 10 kg showed that the system was able to detect multiple objects simultaneously and display bounding boxes, class labels, and confidence scores. However, detection consistency was still affected by lighting conditions, overlapping objects, and similarities in color and texture between the objects and the background. Overall, YOLOv8n can be implemented to support the automatic and real-time monitoring of the visual conditions of Javanese long pepper during the drying process.

Keywords: drying, image processing, Javanese long pepper, object detection, YOLOv8n