Classification of Oil Palm Fruit Ripeness Based on RGB Color Model Using Convolutional Neural Network

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ABSTRACT

The ripeness level of oil palm fruit significantly affects the quality and quantity of the oil produced. Manual determination by plantation workers is often subjective and inconsistent. Therefore, an automatic and accurate classification system is required to determine fruit ripeness. This study aims to classify oil palm fruits into two categories, ripe and unripe, based on RGB color features using the Convolutional Neural Network (CNN) method. Palm fruit image data were collected from various sources and underwent preprocessing, including resizing to 224x224 pixels, color normalization, and labeling. The CNN model was built using DenseNet121 as the base model, with additional layers, and was trained for 10 epochs using the Adam optimizer and a sigmoid activation function for binary classification. The evaluation results showed that the proposed CNN model achieved an accuracy of 99.11%, with a precision of 0.99, recall of 0.99, and F1-score of 0.99. These findings indicate that the RGB-based CNN model is effective for automatic classification of oil palm fruits ripeness.

Keywords: *CNN, RGB, Palm Oil Classification, DenseNet121, Digital Image Processing.*