

ABSTRACT

Palm oil is one of the plantation commodities that plays a strategic role in Indonesia's economic development. As an economic backbone for millions of people, the development of this sector emphasizes meeting the requirements to ensure high-quality production results. The main challenge faced by farmers is palm oil plant diseases caused by pests and nutrient deficiencies, which can hinder growth and reduce yields. Farmers' lack of knowledge regarding the types of diseases affecting palm oil leaves often leads to errors in handling them. This research focuses on classifying palm oil leaf diseases using image processing based on artificial intelligence (AI) to help farmers accurately identify healthy and diseased leaves. The Convolutional Neural Network (CNN) method was used to recognize patterns and complex features in palm oil leaf images. The results show that training accuracy rapidly increased to nearly 1 during epochs 1–20, with a significant decrease in loss. However, validation accuracy stabilized at around 0.95, indicating overfitting. The best epoch was recorded at epoch 20, with a training accuracy of 1 and a loss of 0.001, while the highest validation accuracy occurred at epoch 80, reaching 0.975. Based on the confusion matrix, the model correctly classified diseased leaves 66 times and healthy leaves 80 times, with 14 false positive errors and no false negatives. The model achieved an accuracy of 91.25%, a precision of 82.5%, and a recall of 100%, demonstrating good performance in identifying healthy and diseased leaves. It is hoped that this research can provide practical solutions for farmers to quickly and accurately detect palm oil leaf diseases, minimize errors, and enhance agricultural yields overall.

Keywords : Oil Palm, Artificial Intelligence, Convolutional Neural Network.