CLASSIFICATION OF DISEASE IN ROBUSTA COFFEE PLANT LEAVES USING CONVOLUTIONAL NEURAL NETWORK METHOD

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ABSTRACT

Leaf diseases in robusta coffee plants can significantly impact their growth and yield. The leaves of robusta coffee plants are susceptible to various diseases caused by fungi, bacteria, or insects, exhibiting symptoms such as brown, yellow, or black spots and discoloration on their surfaces. Early detection of these diseases is crucial for effective control measures to maintain plant health. In this study, a classification model for identifying diseases in robusta coffee plant leaves was developed using the Convolutional Neural Network (CNN) architecture. The architectures employed in this research were AlexNet and Xception. A dataset comprising 1,400 images of robusta coffee leaves was collected through direct observation of coffee plantations in Temanggung Regency. The dataset was categorized into four classes: healthy, sooty mold, leaf rust, and red spider mites. The CNN model was tested by adjusting parameters, including batch size, dropout rate, learning rate, optimizer, and varying the number of epochs (35, 50, and 100), as well as different data splits (70:15:15 and 80:10:10). The findings of this study suggest that the AlexNet architecture model, with a 70:15:15 data split and 100 epoch testing, achieved the highest accuracy of 97.14%. In contrast, the Xception architecture attained 100% accuracy in each epoch test. The efficacy of the AlexNet and Xception architectures in the disease classification of robusta coffee leaves is evident. However, the Xception architecture demonstrates superiority in its capacity to process complex datasets and attains higher accuracy.

Keywords: Classification, Robusta Coffee Plants, Convolutional Neural Network, AlexNet, Xception