

Deep Learning-Based Detection of Diseases in *Mangifera indica* (Mango)

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Abstract

Mango (*Mangifera indica*) is one of the most commercially viable fruit crops in Sri Lanka. However, its cultivation faces increasing challenges due to various pests and diseases, which significantly reduce both yield quantity and quality. Early and accurate detection of these diseases is critical for implementing effective control strategies. Traditional detection methods often lack precision and scalability, highlighting the growing value of innovative technologies such as deep learning in the agricultural domain. This study proposes an efficient and accurate deep learning-based approach for the detection and classification of mango diseases. A diverse image dataset, sourced from Kaggle, forms the foundation of the model. The dataset undergoes comprehensive preprocessing, including noise reduction and image enhancement, followed by data augmentation techniques such as rescaling, shearing, zooming, and horizontal flipping. These steps increase dataset diversity, improve model robustness, and help mitigate overfitting. The VGG19 convolutional neural network (CNN) architecture is employed to classify mango leaf images into distinct disease categories, achieving a test accuracy of 87.56%. These results demonstrate the effectiveness of deep learning as a reliable tool for automated mango disease detection, enabling timely interventions and improved crop management. As a future enhancement, this study proposes the development of a system that not only identifies the specific disease but also recommends appropriate treatment methods based on the diagnosis, thereby offering a more comprehensive decision-support tool for farmers and agricultural experts.

Keywords: VGG19, Convolutional Neural Network, Mango Diseases, Deep Learning, Image Classification.