

Deep learning based disease, pest pattern and nutritional deficiency detection system for "Zingiberaceae" crop

ABSTRACT

Plants' diseases cannot be avoided because of unpredictable climate patterns and environmental changes. The plants like ginger get affected by various pests, conditions, and nutritional deficiencies. Therefore, it is essential to identify such causes early and perform the cure to get the desired production rate. Deep learning-based methods are helpful for the identification and classification of problems in this domain. This paper presents deep artificial neural network and deep learning-based methods for the early detection of diseases, pest patterns, and nutritional deficiencies. We have used a real-field dataset consisting of healthy and affected ginger plant leaves. The results show that the convolutional neural network (CNN) has achieved the highest accuracy of 99% for disease rhizomes detection. For pest pattern leaves, VGG-16 models showed the highest accuracy of 96%. For nutritional deficiency-affected leaves, ANN has achieved the highest accuracy (96%). The experimental results achieved are comparable with other existing techniques in the literature. In addition, the results demonstrated the potential in improving the yield of ginger using the proposed disease detection methods and an essential consideration for the design of real-time disease detection applications. However, the results are specific to the dataset used in this work and may yield different results for the other datasets.