**PLANT LEAF DISEASES FINE-GRAINED CATEGORIZATION USING CONVOLUTIONAL NEURAL NETWORKS**

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**ABSTRACT:**

The timely identification and early prevention of crop diseases are essential for improving production. In this report, Deep Convolutional Neural Network (CNN) models are implemented to identify and diagnose diseases in plants from their leaves, since CNNs have achieved impressive results in the field of machine vision. Standard CNN models require many parameters and higher computation costs. In this report, we replaced standard convolution with depth = separable convolution, which reduces the parameter number and computation cost.To evaluate the performance of the models, different parameters such as batch size, dropout and different numbers of epochs were incorporated. The implemented models achieved a disease-classification accuracy rate of 98.42%, 99.11%, 97.02% and 99.56% using InceptionV3, InceptionResNetV2, MobileNetV2 and EfficientNetB0 respectively, which were greater than that of traditional handcrafted-feature-based approaches. In comparison with other deep-learning models, the implemented model achieved better performance in terms of accuracy, and it required less training time. Moreover, the MobileNetV2 architecture is compatible with mobile devices using the optimized parameter. The accuracy results in the identification of diseases showed that the deep CNN model is promising and can greatly impact the efficient identification of the diseases which have potential in the detection of diseases in real-time agricultural systems.