Abstract:

This study explores an image acquisition process for leaf recognition, focusing on venation patterns, monocot and dicot differentiation, and leaf shape analysis. We collected a diverse set of leaf images, ensuring high quality through controlled environmental conditions and consistent pre-processing steps, including noise reduction, segmentation, and normalization. The dataset, comprising 3163 leaf images in .JPG format, was manually organized by class and utilized advanced deep learning models for comparative analysis. Our methodology involved data augmentation, feature extraction, and transfer learning.For comparative analysis, we applied the dataset to four deep learning models: VGG16, NasNetMobile, Inception V3, and MobileNet V2. These models were selected for their proven efficacy in image recognition tasks. Our evaluation metrics focused on the accuracy of each model in recognizing leaf features. The VGG16 model achieved an accuracy of 94.64%, NasNetMobile 95.12%, and Inception V3 94.52%. MobileNet V2 outperformed the others, attaining an accuracy of 97.02%.

These findings underscore the superior performance of MobileNet V2 in leaf recognition tasks, demonstrating its potential for high accuracy and efficiency. The implications of this research are significant for botanical studies and agricultural applications, where precise leaf identification can enhance plant classification, disease detection, and overall agricultural management.