

Deep Learning-Based Plant Identification in Sri Lanka

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Abstract

Sri Lanka is home to a diverse range of plant species, many of which play critical roles in agriculture, biodiversity conservation, and ecological balance. Traditional methods of plant identification are often manual, time-consuming, and prone to inaccuracies, especially when dealing with visually similar leaf structures. This thesis presents a deep learning-based approach to automate plant identification, focusing on Sri Lankan origin plants. The research leverages advanced image classification models, including MobileNetV2, YOLOv8, EfficientNetB0, and a custom Convolutional Neural Network (CNN). A comprehensive dataset of leaf images was collected, preprocessed using resizing, normalization, and augmentation techniques, and used to train the models. Among the tested models, MobileNetV2 demonstrated superior performance with a training accuracy of 99% and a testing accuracy of 93%. The results validate the model's efficiency in distinguishing between species with similar visual characteristics. This study not only highlights the potential of deep learning for accurate and scalable plant identification but also establishes a foundation for practical applications in biodiversity management, agricultural research, and education. The challenges encountered, including limited dataset diversity and misclassifications, are addressed with recommendations for dataset expansion and enhanced preprocessing. Future development plans include creating a mobile application for real-time plant identification and integrating automated image collection systems using drones. By providing a robust framework for plant identification, this research contributes to Sri Lanka's conservation efforts and paves the way for further technological advancements in the field.

Keywords: Plant identification, MobileNetV2, YOLOv8, EfficientNetB0, CNN