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AayuFind: Deep learning-based Ensemble approach for Recognition of Ayurvedic medicinal plants

A dissertation by

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Abstract

Accurate identification of Sri Lankan Ayurvedic medicinal plants, such as Osbeckia octandra, Atalantia ceylanica, Coccinia grandis, and Murraya koenigii, is challenging due to visual similarities, complex natural backgrounds, and the absence of specialized datasets. This limits their safe and effective use for managing chronic diseases like diabetes, high cholesterol, and NAFLD, particularly for non-specialists.

This research proposes AayuFind which is a deep learning-based ensemble system integrating UNet for precise leaf segmentation and an ensemble model of ResNet-18, EfficientNet-B0, and a custom CNN for classification. A custom dataset of 2,400 high-resolution images, captured in natural settings and annotated with LabelMe, was developed. Data augmentation techniques, including rotation and brightness adjustments, enhance model robustness, while an Agile methodology with iterative prototyping ensures user-centric design and performance optimization.

The prototype achieved a segmentation and a classification accuracy of approximately 99.32% on a test set images, validated through metrics like precision, recall, F1-score, and AUC-ROC. These results demonstrate AayuFind's potential to reliably identify Ayurvedic plants in real-world conditions, supporting healthcare practitioners and non-specialists.

Subject Descriptors:

- Computing methodologies → Machine learning → Deep learning → Image segmentation
- Computing methodologies → Computer vision → Image classification → Plant identification
- Applied computing → Life and medical sciences → Traditional medicine

Keywords: Ayurvedic plant identification, deep learning, image segmentation, ensemble classification, data augmentation