PROJECT ABSTRACT

Medicinal Plant Identification from Leaves using CNN

A built-to-order final-year project that identifies medicinal plants (Tulsi, Neem, Aloe vera, Moringa, Ashwagandha, Giloy) from leaf photographs with a MobileNetV3 classifier and TFLite export for offline phone use — with dataset, notebooks, demo and documentation. Educational prototype only.

01. Title

Medicinal Plant Identification from Leaves using CNN

02. Introduction / Background

Ayurvedic practitioners, herbal product makers and students face a common problem: many medicinal plants look alike to non-experts, and misidentification has real consequences. Leaf morphology — shape, margin, venation — carries the identifying signal, and a phone camera is the natural capture device in the field. This project trains MobileNetV3-Large on ~2,800 leaf photographs across six medicinal species, with green-hue segmentation isolating the leaf so the model learns botanical features instead of backgrounds. The model exports to a ~3.4 MB TFLite file that runs fully offline on a phone.

03. Problem Statement

Generic plant-identification apps cover ornamentals, not Indian medicinal species, and cloud-dependent models fail where field botanists work. A credible build needs a curated medicinal-leaf dataset, morphology-aware preprocessing and an honest educational-use disclaimer — predictions must never drive real medicinal decisions.

04. Objectives

- Curate ~2,800 leaf photographs across six medicinal species.
- Segment leaves with green-hue masking before classification.
- Fine-tune MobileNetV3-Large for six-species classification.
- Export a TFLite model for offline phone inference.
- Deliver an interactive demo with traditional-use reference notes and an explicit disclaimer.

05. Proposed Methodology

Leaves are isolated with green-hue segmentation masks, resized to 224×224 and normalised. MobileNetV3-Large (ImageNet pre-trained) is fine-tuned with a dropout-regularised softmax head using AdamW and early stopping. Augmentation uses rotation, flip and perspective warp to simulate varied photo angles. The trained model is converted to TFLite with quantisation.

06. System Architecture / Working

- Input: leaf photograph (fresh whole leaf recommended).
- Stage 1: green-hue segmentation mask isolates the leaf.
- Stage 2: MobileNetV3-Large → softmax over six species.

- Output: predicted species with probabilities + traditional-use note (educational reference).
- Deployment: TFLite model for offline Android inference; web demo for the report.

07. Hardware / Software Requirements

- Hardware: laptop/PC; free cloud GPU for training; Android phone for the TFLite model.
- Software: Python 3, TensorFlow/Keras, OpenCV, scikit-learn, Jupyter Notebook.
- Demo: any modern web browser.

08. Expected Outcomes

- Species classifier with design-target accuracy ~94% and top-2 ~98% (reported honestly after training).
- Offline-capable TFLite model (~3.4 MB expected).
- Demo, report, PPT and viva Q&A; with responsible-AI disclaimer.

09. Applications

- Educational aid for botany and Ayurveda students.
- Herbal-garden documentation.
- Baseline for ethnobotany research tools.

10. Future Scope

- Flower/fruit-based identification for leafless seasons.
- More species with expert-verified labels.
- Integration with botanical databases.