Medicinal Plants Analysis

Project synopsis submitted in partial Fulfillment for the Requirements for the Degree *of*

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in

Computer Science and Engineering

Submitted by:

Rehan Rasool: (CSE-20-30)
Sheikh Mudhat: (CSE-20-11)
Saima Jan: (CSE-20-LE-68)

Under the supervision of
Dr Riaz Ahmed Khan

Assistant professor, Department of CSE, IUST

Department of Computer Science and Engineering

Islamic University of Science & Technology, Kashmir – 192122

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ABSTRACT

The proposed project aims to develop a comprehensive system for the identification of medicinal plants, specifically focusing on the rich diversity of Indian medicinal flora. Leveraging machine learning techniques, the project involves the creation of a robust image classification model capable of recognizing various medicinal plants through analysis of images captured either via a mobile phone or a web application.

The primary objective is to provide users with instantaneous information about the identified plant, including its medicinal properties and benefits.To achieve this, the project incorporates a multi-step process involving data collection, image preprocessing, and the implementation of a machine learning model trained on a carefully curated dataset of Indian medicinal plants.

In conclusion, this interdisciplinary project bridges the gap between technology and traditional knowledge, offering a valuable tool for plant identification and promoting awareness about the medicinal richness of Indian flora. The project's long-term success is supported by regular updates, bug fixes, and community engagement, ensuring a sustainable and evolving resource for users interested in medicinal plants.

CHAPTER 1

1. INTRODUCTION

The proposed project endeavors to harness the power of machine learning and emerging technologies to create a novel and user-friendly system for the recognition and exploration of medicinal plants, with a specific focus on the diverse flora found in India. The abundance of medicinal plants in India, deeply rooted in traditional knowledge systems, presents an invaluable resource that can be seamlessly integrated with modern technology to benefit both enthusiasts and practitioners. Through the lens of image classification, the project aims to develop an intelligent model capable of accurately identifying medicinal plants from images captured either through a mobile phone or a web application.

1.1 Rationale:

The rationale behind embarking on this project lies in the intersection of traditional knowledge, technological innovation, and the significant potential for societal impact. India, with its rich biodiversity, has been a repository of medicinal plants that have played a crucial role in traditional healthcare practices for centuries. However, the vastness of this knowledge often remains untapped or inaccessible to the wider population. By leveraging machine learning and image recognition technologies, this project seeks to bridge this gap, providing a practical and accessible means for individuals to identify and learn about medicinal plants indigenous to India.

1.2 Objectives:

- Curate a diverse and representative dataset encompassing images of Indian medicinal plants, ensuring inclusion from various geographical regions and ecosystems.
- Implement a robust image classification model, such as a Convolutional Neural Network (CNN), trained on the curated dataset to accurately identify different medicinal plants based on captured images.
- Design and develop an intuitive user interface for both web and mobile applications, enabling users to easily capture plant images and receive real-time identification results.
- Implement image preprocessing techniques, such as resizing, normalization, and augmentation, to enhance the model's performance and accuracy in handling diverse plant images.
- Enable real-time image capture functionality in both web and mobile applications, utilizing device cameras for seamless integration with the identification model.
- Provide users with detailed information about the identified medicinal plants, including their traditional uses, medicinal properties, and ecological significance, fostering awareness and education.
- Conduct thorough cross-validation and evaluation of the machine learning model to ensure its accuracy and reliability across various Indian plant species and environmental conditions.

CHAPTER 2

2. LITERATURE SURVEY

Jammu & Kashmir (J&K) is a predominantly Himalayan state in the north-western part of India. It has three geographically distinct divisions viz., Jammu, Kashmir and Ladakh, which are immensely rich in their biological and cultural diversity. Medicinal plants are an important element of indigenous medical system of the region. The main goal of the present article is to examine the use of ethnomedicinal plants in three divisions of J&K and to discuss cross-cultural consensus on the use of medicinal plants in these divisions. The article also discusses the gaps in the current state of knowledge on ethnomedicinal plants of the region and gives recommendations for the future studies.[1]

Medicinal plants are an important element of indigenous medical systems in Mexico. These resources are usually regarded as part of a culture's traditional knowledge. This study examines the use of medicinal plants in four indigenous groups of Mexican Indians, Maya, Nahua, Zapotec and – for comparative purposes – Mixe. With the first three the methodology was similar, making a direct comparison of the results possible. In these studies, the relative importance of a medicinal plant within a culture is documented using a quantitative method. For the analysis the uses were grouped into 9–10 categories of indigenous uses. This report compares these data and uses the concept of informant consensus originally developed by Trotter and Logan for analysis. This indicates how homogenous the ethnobotanical information is. Generally the factor is high for gastrointestinal illnesses and for culture bound syndromes. While the species used by the 3 indigenous groups vary, the data indicate that there exist well-defined criteria specific for each culture which lead to the selection of a plant as a medicine. A large number of species are used for gastrointestinal illnesses by two or more of the indigenous groups. At least in this case, the multiple transfer of species and their uses within Mexico seems to be an important reason for the widespread use of a species. Medicinal plants in other categories (e.g. skin

diseases) are usually known only in one culture and seem to be part of its traditional knowledge.[2]

This review highlights the current advances in knowledge about the safety, efficacy, quality control, marketing and regulatory aspects of botanical medicines. Phytotherapeutic agents are standardized herbal preparations consisting of complex mixtures of one or more plants which contain as active ingredients plant parts or plant material in the crude or processed state.[3]

CHAPTER 3

3. METHODOLOGY

The block diagram of the proposed system is as follows:

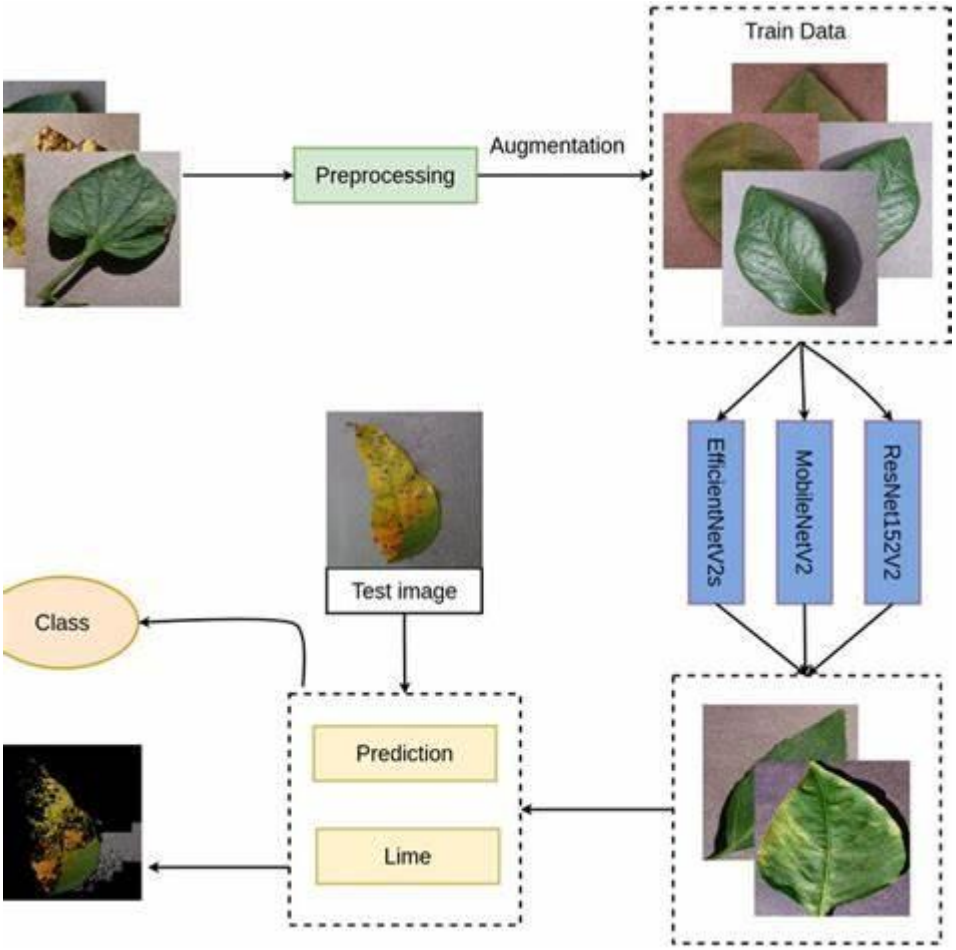

Fig 1: block diagram of proposed system

3.1 PLANNING OF WORK

Month 1: Learning and Technology Familiarization

Weeks 1-2: Python Basics and Libraries

- Learn the fundamentals of Python, including syntax and data structures.
- Familiarize yourself with essential libraries like NumPy and Matplotlib.

Weeks 3-4: Introduction to Machine Learning

- Understand basic machine learning concepts and algorithms.
- Start experimenting with simple machine learning models using scikit-learn.

Month 2: Image Processing and Dataset Collection

Weeks 1-2: Image Processing with OpenCV

- Dive into image processing techniques using OpenCV.
- Begin experimenting with basic image transformations.

Weeks 3-4: Initial Data Collection

- Start gathering a preliminary dataset of medicinal plant images.
- Label and organize the dataset for future training.

Month 3: Model Training and Application Prototyping

Weeks 1-2: Basic Model Training

- Choose a simple model architecture (e.g., a basic CNN).
- Train the model on the preliminary dataset.

Weeks 3-4: Initial Application Prototyping

- Develop a basic prototype of the web application using Flask or Django.
- Implement a simple user interface for image upload and basic model output.

Month 4: Application Development and Integration

Weeks 1-2: Full-Stack Development

- Extend the web application's functionality on both the frontend and backend.
- Implement features for capturing images.

Weeks 3-4: Model Integration and Testing

- Integrate the trained model into the web application.
- Conduct initial testing to identify and fix any integration issues.

Month 5: Application Refinement and Deployment

Weeks 1-2: User Interface Refinement

- Refine the user interface for a seamless and intuitive experience.
- Address any usability concerns based on feedback.

Weeks 3-4: Deployment and Final Testing

- Deploy the web application on a hosting platform (e.g., Heroku).
- Conduct final testing to ensure the application's functionality and performance.

3.2 FACILITIES REQUIRED

- **Development Infrastructure**: Hardware needs comprise laptops with substantial CPU/GPU computational capabilities, complemented by the high-performance computing lab at our university if necessary. Software tools required for development include Git for version control, VS Code for coding, Python along with its intrinsic libraries for data analysis and manipulation, and Jupyter Notebooks for interactive development and visualization.

- **Data Sources**: Reliable and verifiable datasets will be sourced from reputable online platforms, such as Kaggle.

- **Collaboration Utilities**: Discord and email will serve as our primary communication and resource sharing channels. Git and GitHub will facilitate version control and collaborative development, while VS Code and Jupyter Notebooks will be employed for collective code development and review.

- **Documentation Tools**: Documentation, an integral part of our project workflow, will be managed using VS Code and Microsoft Word.

- **Deployment Platform**: A suitable deployment platform will be identified and prepared for potential future use.

CHAPTER 4

4. EXPECTED OUTCOMES

The anticipated outcomes of this project are multifaceted, aiming to deliver a sophisticated and user-friendly application that significantly contributes to the realm of medicinal plant identification, particularly focusing on the rich biodiversity of Indian flora. The primary objective is the creation of a machine learning model capable of accurately discerning a diverse array of Indian medicinal plants through the analysis of images, either captured via mobile phones or uploaded on a web application. This model, integrated seamlessly into both web and mobile interfaces, ensures users can effortlessly identify medicinal plants in real-time, fostering a heightened connection between technology and traditional herbal knowledge.

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