Identification of Different Medicinal Plants using ML

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Abstract - The use of medicinal plants has been a longstanding practice in traditional medicine worldwide. Accurately identifying medicinal plants is crucial for determining their medicinal properties and potential applications. However, it can be a challenging task due to the complexity of their appearance. Identifying plants through their leaves is a thoroughly pursued endeavor that has widely varying applications ranging from ecology, horticulture, disease identification, rare plant preservation in plants to medicinal applications in Ayurveda and various plant bases medical systems. Our purpose in this project is to identify plant species using the image of a single leaf through neural networks. We will approach our project using filtering methods, Random forest algorithm, Tensorflow, and Convolutional Neural Networks. The proposed approach can significantly impact the field of herbal medicine research, enabling researchers and healthcare professionals to identify and classify medicinal plants more accurately. The identification of different medicinal plants using Machine Learning (ML) techniques is a crucial and interdisciplinary field that holds promise for applications in healthcare, botany, and conservation. This research focuses on the development of ML models and systems designed to classify, catalog, and analyze various medicinal plant species, driven by the pressing need to harness the potential of botanical resources for medicinal purposes and preserve biodiversity.By leveraging ML algorithms, image recognition, and data analysis, this work aims of our project.

1.INTRODUCTION

The main aim of the project is to use image processing techniques for the Classification of medicinal plants. Ayurveda is the ancient Indian system of healing using medicinal plants available naturally in the Indian subcontinent, also called the mother of healing arts. According to World Health Organization (WHO), 65remedies for various diseases. Because of environmental factors and a lack of awareness about medicinal plan]s in human beings, plants are becoming extinct and rare. Identifying different medicinal plants using Machine Learning (ML) is a revolutionary To make application within the field of botany and healthcare. With advancements in computer vision and pattern recognition, ML techniques offer an innovative approach to swiftly and accurately classify various plant species based on their visual characteristics. Medicinal plants, abundant in diverse ecosystems, possess unique features and distinct visual attributes that are crucial for their identification and potential therapeutic uses. ML models can be trained on vast datasets of plant images, enabling them to recognize intricate details such as leaf shape, flower morphology, stem structure, and other botanical features.

A. Objective

Objective Project Objective.

Identification of different medicinal plants using Machine Learning (ML) has several valuable objectives and applications in the field of healthcare, botany, and conservation. Here are some key objectives.

Development of a Robust Identification Model: Develop a robust machine learning model for the accurate and efficient

identification of medicinal plants from images. Aiming to facilitate their recognition and utilization in traditional medicine and pharmaceutical research while contributing to the conservation of biodiversity." User-Friendly Interface: Design an intuitive and user-friendly interface that enables users, including non-experts, to easily capture and upload images for plant identification, promoting accessibility and usability. High Accuracy : Achieve a high level of accuracy in plant identification. Plant Species Identification: The primary objective is to develop ML models that can accurately identify and classify different medicinal plant species based on images of their leaves. Medicinal Property Prediction: ML models can be used to predict the medicinal properties and chemical compounds of plants based on their visual characteristics. Plant Image Recognition s: Create Web apps that allow users to take pictures of plants in the wild and instantly

2. PROBLEM STATEMENT

The aim of this project is to create a comprehensive web application that offers users personalized medicinal plants name based on their Individual constitution with all size of plant leaves and also deal with the large size of database and more Information.

3. LITERATURE SURVEY

First paper was [1] Automatic Recognition of Medicinal Plants using Machine Learning Techniques. The paper Author name is 1.Mr. Adams Begue 2.Mr. Upasana Singh 3. Fawzi Mahomoodally .In this we saw overview of the Ayurvedic plants leaves identification by base features using ML and the limitations was predict only English name and scientific name. Second paper was [2] Identification of different plants through image processing using different Machine Learning Algorithms. The paper Author name was 1.Ibaphyrnaishisha kharir 2. Vikaho Z Swu 3. Dibya Jyoti Bora . In this we saw overview of the Ayurvedic plants leaves identification by image processing using ML.And limitation was It does not detect tiny leaves.Third paper was[3] Identification of Medicinal Plant Using Machine Learning Approach The paper Author name was 1.Nayana G.Gavhale1, 2.Dr.A.P.Thakare.In this paper we saw create training dataset and testing by model of medicinal plants and predict the result.And limitation was It Can extended by large no. of plants.(it works on small database

4. PROPOSED SYSTEM

Our purpose in this project is to identify plant species using the image of a single leaf through neural networks.

We will approach our project using filtering methods, Tensorflow, and Convolutional Neural Networks The proposed approach can significantly impact the field of herbal medicine research, enabling researchers and healthcare professionals to Identify and classify medicinal plants more accurately

we will create a web application that allows users to submit and upload plant leaves Image. The system gives plant information for that leaf after classifying the Input leaf image

5. PROPOSED METHODOLOGY

The following figure represents the steps involved in the proposed approach in a sequence manner:

STEP 1: Image Acquisition

The general aim of Image Acquisition is to transform an optical image (Real World Data) in to an array of numerical data that could be later manipulated on a computer before any video or

It is a widely used effect in graphics software, typically to reduce image noise and reduce detail.Gaussian smoothing is also used as a pre-processing stage in computer vision algorithms in order to enhance image structures at different scales. Gaussian filtering is more effective at smoothing images. It has its basis in the human visual perception system it has been found that in the human visual perception system. It has been found that neurons create a similar filter when processing visual images. Gaussian filtering g is used to blur images and remove noise and detail. In one dimension, the Gaussian functions. Where σ is the standard deviation of the distribution. The distribution is assumed to have a mean of 0. Shown graphically, we see the familiar bell-shaped Gaussian distribution. Gaussian distribution with mean 0 and $\sigma = 1$

a) Conversion to Grayscale:

The uploaded color image is converted to grayscale. Grayscale simplifies the image and reduces computational complexity, making it easier for the model to work with.

a) Filtering:

Filtering techniques can be applied to enhance features in the image. Common filters include Gaussian, Sobel filters. These filters help highlight important details in the image, such as edges or textures. after preprocessing module training module, it involves training a Convolutional Neural Network (CNN) model.

In data preparation the preprocessed images are split into a training dataset and a validation dataset, Labels associated with

each image (leaf type) are used to train the model. A CNN architecture is defined, typically consisting of convolutional layers, pooling layers, and fully connected layers. The architecture may vary based on the complexity of the classification task. The model is trained using the training dataset. During training, the model learns to recognize patterns and features in the images that distinguish different leaf types. The model's performance is evaluated on the validation dataset to ensure it's learning correctly and not overfitting. Hyperparameters are tuned, and techniques like dropout and batch normalization are applied to improve the model's performance. Once the CNN model is trained, it's used for classifying the uploaded leaf image. the classification module works the " interface" preprocessed image is passed through the trained CNN model for inference and The model generates a prediction score for each possible leaf type and at the last user get output The leaf type with the highest prediction score is considered the classification result,The system outputs information about the identified leaf, such as its scientific name, common name, and any additional details from the database.

6. SYSTEM ARCHITECTURE

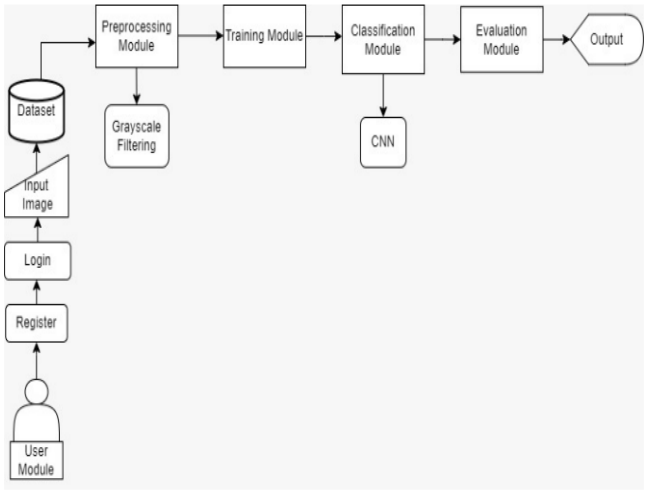

Fig -1: System Architecture

7. CONCLUSIONS AND FUTURE SCOPE

The implementation plan is robust and accurate system for identifying different medicinal plant leaves using machine learning. accurately identifying known species and handling new species to a significant extent, further improvements and continuous refinement are essential for enhancing accuracy and accommodating a wider range of plant species. The system will provide potential for reliable and efficient identification, providing a strong foundation for continual enhancement and expanded use in identifying medicinal plant leaves.

A new dataset on medicinal plants of Mauritius has been made publicly available on the machine learning repository portal. In this paper, computer vision techniques have been used to extract several shape-based features from the leaves of medicinal plants. Machine learning algorithms were then used to classify the leaves from 24 different plant species into their appropriate categories. The highest accuracy of 90.1% was obtained from the random forest classifier.

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