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Medicinal Plants Identification through Image Processing Using Machine Learning Algorithms

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ABSTRACT: The Indian medical practice of Ayurveda has gained international renown. Herbal preparations are the basis of Ayurveda medicine. The pharmaceutical industry is beginning to pay more attention to medicinal plants because they have fewer adverse effects and reactions than modern medicine and are also less expensive. In recent years, numerous Deep learning, machine learning algorithms that are both effective and reliable have been utilized for plant classifications by using images of leaf.

KEYWORDS: medicinal plants, image processing, convolution neural network, usage of medicinal plants.

I. INTRODUCTION

Ayurveda is sometimes referred to as the "mother of all medical sciences" since it is an ancient Indian system of medicine that makes use of medicinal herbs that are found naturally in the Indian subcontinent. According to historical accounts, the practice of Ayurveda dates back more than 5,000 years and was developed by wise people in ancient India. Early researchers believed herbs could cure a variety of illnesses. They experimented to determine the medicinal efficacy of different herbs. Thus-formulated drugs have few side effects. The manual identification of medicinal plants is a process that takes a significant amount of time and requires the assistance of trained professionals in order to be completed properly. Automatic ways of detecting and categorizing medicinal plants, which will ultimately be of greater benefit to society, are necessary to solve this problem. In the domain of image processing, one of the most active study areas at the moment is concerned with the automatic detection and classification of various medicinal/herbal plants. This required several processes, the most important of which are feature extraction and classification, both of which have an impact on the accuracy of the classification system as a whole. The spread of medical plant agriculture can be aided by automatic identification and classification of medicinal plants, which is being done to better inform the public and provide reliable information to farmers. Suppliers, agents, pharmacy students, pharmaceutical companies, researchers, Ayurvedic medicine practitioners, botanists, and the cosmetics industry all benefit from the information and species database made available by the automatic identifying and classifying system. To distinguish between objects of similar and dissimilar types, recognition accuracy is the most crucial metric to consider. There should be a high degree of precision in the detecting procedure. Applications such as face recognition use this parameter to restrict access to authorized users, while medicinal plant recognition systems use it to locate the appropriate plant in time to save a patient's life.

II. LITERATURE SURVEY

In this section, previously performed studies on Medicinal plants identification through image processing using machine learning algorithms done.

The paper [1] is study on the conservation of biodiversity is crucial as many plant species are critically under extinction. The traditional medicinal system, an alternative to synthetic drugs, promote healthy living and mainly depends on the wide repository of plants. A vision-based automatic medicinal plant identification system is proposed using different neural network techniques in computer vision and deep learning. The challenge lies in the unavailability of the medicinal herb dataset.

The Paper [2] Texture plays a crucial role in computer vision, providing valuable information about image regions. Log Gabor filters that mimic the human eye's visual cortex are used as feature extractors to identify medicinal plants based on the leaf textural features.

The paper [3] Indonesia is one country that has enormous potential in the use of medicinal plants as herbal medicines. Utilization or use of plants, especially medicinal plants as a means of healing disease has long been used. However, people in general still have difficulty knowing the types of plants that can be used as herbal medicines. This is due to the limited information and knowledge possessed by the community to identify and identify the use of medicinal plants. In paper [4] Ardabil is well-known for offering the ideal environment for a good, cheap medicinal herb. Various plant parts are used as essential components in producing natural medicines. According to IUCN (International Union for Conservation of Nature) records, many medicinal plants are on the verge of extinction, so employing image processing and computer vision algorithms to distinguish proof of medicinal plants is critical. As a result, the digitalization of beneficial therapeutic plants is critical for biodiversity preservation.

In paper [5] Leaf pattern recognition through automated methods has gained significant popularity in the field of computer vision in recent years as it plays crucial role in monitoring plant health. By effectively identifying leaf patterns, it becomes possible to prevent the unnecessary wastage of crop yield as leaves depict relevant information about plant health, making it a vital pursuit in agricultural research.

III. PROPOSED SYSTEM

The main target of the project was to proposed a leaf recognition system based on specific characteristics from leaf images by using deep learning technique from Python, that contribute an approach in which the plant was classified based on the parts of its leaves. To automatic ways of detecting and categorizing medicinal plants, which To automatic ways of detecting and categorizing medicinal plants, will ultimately be of greater benefit to society, To detect the usages of the plants. To build an efficient application to know the usages and benefits of the medical plants using deep learning.

IV. METHODOLOGY

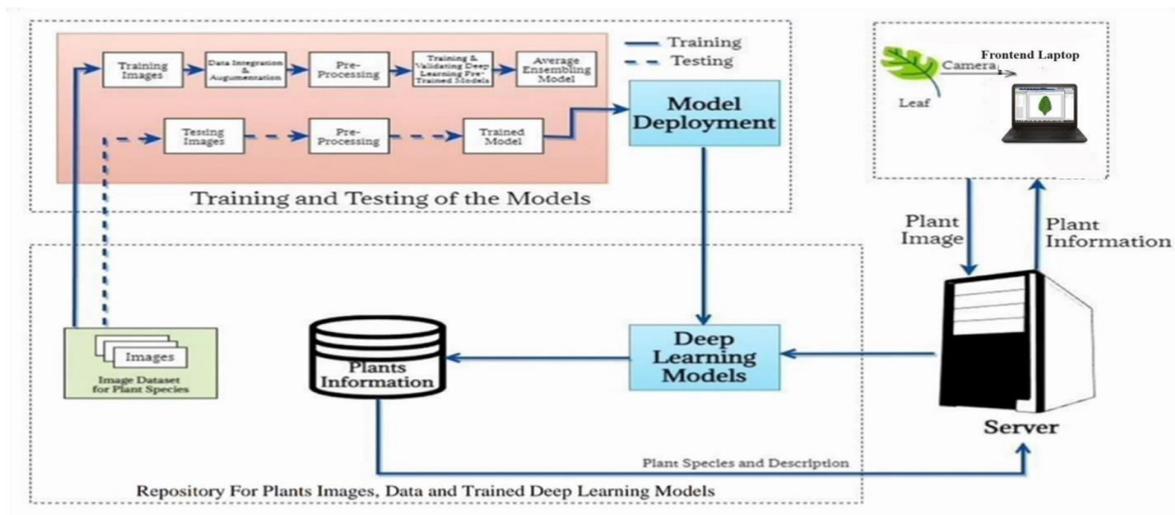


Figure 1: System Architecture

In this work, we propose our own system based on the conversational framework of employing the use of DNN algorithm general-purpose neural embedding to detect the medical plants from the leaf input image.

V. IMPLEMENTATION

Input Medicinal Plant images: The new images are loaded into a database of images for classification. Separate the data into sets for training and validation. 70% of the images should be used for training, while 30% should be used for validation. Before proceeding with further operations, it is essential to visualize and then pre-process the images we will be working with, which are stored in a list.

Load Pretrained network: In this stage of the process, a pre-trained version of the Xception network should be loaded. More than a million pictures drawn from the ImageNet database were used during the training process for this version. Using the Xception model to classify new images requires retraining the network.

Replace final layers: The network's convolutional layers are responsible for the extraction of image features, which are then used by the network's final learnable layer and its final classification layer to classify the input image. Most networks' last learnable weight layer is fully connected. Replace this fully connected layer with one that has as many outputs as the new data set's classes (45, in this study) Increase the layer's learning rate factors to learn faster than in transferred layers. The network's final output categories are defined in the classification layer. Change out the labelled classification layer with one that is label- free. When you train a network, the layer's output classes are determined for you automatically.

Train Network: Retraining the network with the updated data set is now possible. Weights in lower-level network layers can be "frozen" if desired. based on the specifications of the network, convert the size of the input image. Indicate any further augmentation procedures that should be applied to the training images.

Predict and Access accuracy: The training epoch length must be entered. You can determine how well the network performs at classification by applying it to the validation images Training for transfer learning does not require as many iterations. For the purposes of training, an epoch is a complete iteration over the entire dataset. Mini-batch size and validation information must be provided. Once per epoch, you should calculate the validation accuracy.

VI. RESULTS

All implementations are carried out on Windows 10 and above having hardware configuration of Intel core i5 processor with 4GB internal RAM.



Fig 2. uploading Dataset



Figure 3: Uses and Benefits

VII. CONCLUSIONS

In Accurate identification helps unlock the medicinal potential of plants, leading to the development of new and more effective medicines. Precise knowledge of plant species and potential diseases ensures the safe use of medicinal plants, minimizing the risk of adverse effects on patients.

In this work, we addressed the problem of identifying the medicinal plant species by the analysis of leaf images. 30 distinct medicinal plant leaves were used, and a deep learning model was applied in order to achieve a high degree of accuracy in the classification and recognition procedures that were carried out with the help of computer vision techniques. After categorizing the leaves of numerous medicinal plants, the CNN model has a 98.95% accuracy rate.

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