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MEDICINAL PLANT RECOGNITION FOR AYURVEDIC TREATMENT USING DEEPLEARNING APPROACH

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Abstract: The physical and mental health of people is greatly preserved by ayurvedic medicines. For better treatment, it is crucial to identify and Sort therapeutic plant species. Because there are few specialists in this area, it is challenging to correctly recognize and classify medicinal plants. Therefore, a classification of medicinal plants using an entirely automatic technique would be optimal. In order to classify therapeutic plants using their leaves, this research suggests using AyurLeaf, a Deep Learning- based Convolutional Neural Network (CNN) model. characteristics like form, size, color, and texture. a common database for therapeutic species is also proposed in this study. These plants are typically found in Kerala, Tamil Nadu, Andhra Pradesh, and Karnataka, states on India's southwest coast. Samples of leaves from 20 medicinal plants are included in the proposed dataset.. For effective feature extraction from the dataset, a deep neural network modelled after Alexnet is used. The preservation and application of therapeutic plants in Indian traditional medicine depend on their legal legitimacy. For this reason, we suggest an approach based on deep learning for the automated identification of therapeutic plants in India. technique in this work. Convolutional Neural Networks (CNNs) and other deep learning architectures are used to categorise the plants using a big collection of plant photos. To enhance the model's performance, we also use data augmentation approaches. With an average accuracy of over 90%, the suggested method successfully identified therapeutic plants. The findings show how deep learning can effectively identify medicinal plants in India, which may help preserve and promote conventional medicine.

I. INTRODUCTION

The primary components of the remedies used in the ancient medical system of Ayurveda, which originated in India 5000 years ago, are plant leaves and other portions like roots and barks. 1500 of the more than 8000 medicinal plants of Indian provenance that have been found are combined to create herbal medications in various Indian medical systems. Almost Commercial Ayurvedic remedies frequently contain 500 of these herbs. Most of the trees that were Ayurveda formulations are gathered from wastelands and woods, with the remainder being grown on agricultural land. Ayurveda doctors used to individually gather medicinal plants and manufacture remedies for their patients in the past., and plant leaves were commonly used to identify the plants. A common process for classifying plant leaves involves capturing an image, removing noise, resizing methodology, and ultimately identifying or recognizing the plant. Using deep learning, CNNs, and image processing, it is possible to recognize medicinal plants by analyzing plant images and extracting characteristics that can be used for identifying and categorization. There are several steps in this process, such as feature extraction, categorization, and picture preprocessing. The

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act of cleansing and prepping plant pictures for study is called image preprocessing. It may be necessary to do this by eliminating background noise, modifying the lighting, and changing the image's scale and position. These procedures aid in ensuring the consistency and accuracy of the pictures for analysis. Finding the most pertinent and instructive characteristics from plant images is a procedure known as feature extraction. In order to find distinctive traits of the plant that can be used for identification, this may entail using methods like edge detection, texture analysis, and color histograms. The characteristics are then used to teach a CNN after they have been extracted. An example of a deep learning system that works especially well for picture identification tasks is a CNN. It is made up of multiple layers of filters that are taught to spot trends in the characteristics and use them to forecast the identification of the plant. To identify new pictures of plants according to their therapeutic qualities, the trained CNN is used. The plant's genus, active ingredients, and possible medical applications can all be identified in this process. Even so, there are probably a lot more plant types whose therapeutic properties have not yet been investigated. There are a number of significant uses for the creation of automatic systems to recognize medicinal plants. It can be applied to traditional medicine, where plant-based treatments are frequently given based on the look of the plant, to increase the uniformity and precision of plant recognition. By finding species that haven't yet had their therapeutic potential examined, it can also help in the discovery of novel medicinal plants. In conclusion, deep learning, CNNs, and image processing offer great promise for improving our knowledge of medicinal plants and their possible applications in complementary and alternative medicine.

II. MATERIAL AND METHODS

There are three primary parts to the system:

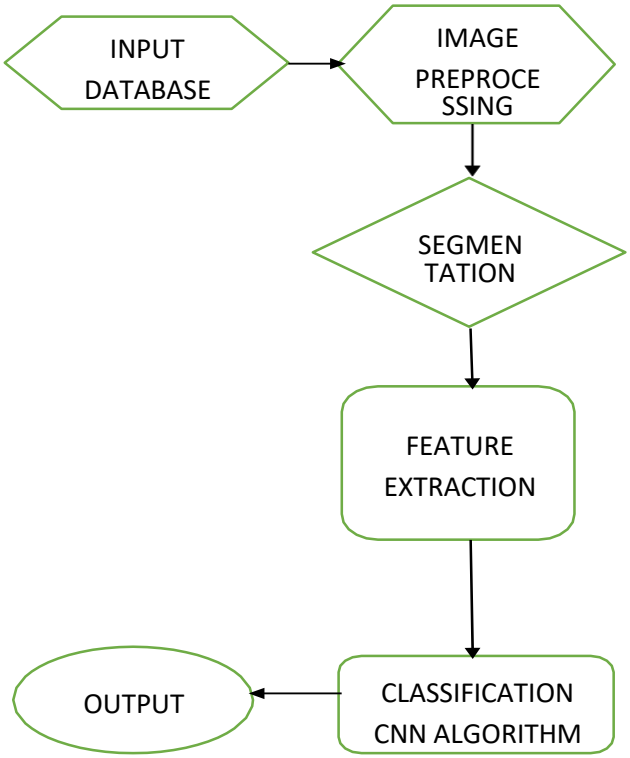
(1) A classifier for plant species based on computer vision and deep learning,

(2) A knowledge base that serves as a primary store for plant data, along with supplemental material feedback information;

(3) A front-end that gives the user a way to interact with the system; and results of classification are displayed

A. Data collection and preparation:

The first step is to collect a large dataset of images of various medicinal plants. The images should be of good quality, with consistent lighting and background. Also, ensure that the dataset is balanced with an equal number of images for each plant species.



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Once you have collected the dataset, the images need to be preprocessed. This involves resizing and normalizing the images to a standard size and format, and removing any unwanted background noise or artifacts.

B. Data pre-processing:

Pre-processing the data involves several steps such as resizing, cropping, normalization, and background removal to obtain a clean and consistent dataset. This step is crucial as it improves the model's accuracy by removing irrelevant features in the images

C. Training the CNN model:

Using a deep learning framework such as TensorFlow or PyTorch, create a CNN model that can learn to recognize different medicinal plant species based on their images. The model should have multiple layers of convolutional and pooling layers, followed by fully connected layers for classification. The CNN model is trained on the prepared dataset, and the hyperparameters of the model are optimized for best performance. This is done through a process called backpropagation, where the model's weights are adjusted to minimize the prediction error.

D.Testing the CNN model:

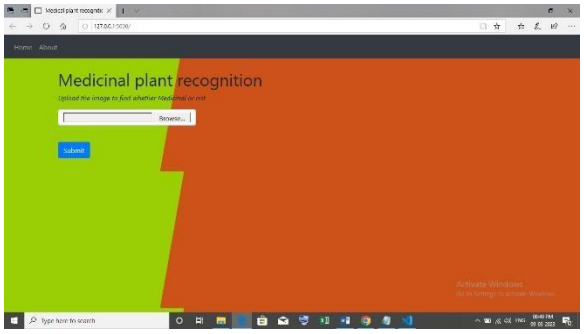
The accuracy of the trained CNN model is evaluated using a separte test set of images. The test collection is employed to identify the plant species in the picture, and the categorization accuracy and confusion matrix are computed to assess the model's effectiveness..

E. Image processing for recognition:

Once trained and tested, the CNN model can be used to recognize fresh images of therapeutic plants. The new image is pre-processed in order to get it ready for the algorithm, which then forecasts the kinds of vegetation in the photograph. It is possible to use methods for segmenting and extracting characteristics from pictures to gather important data from the picture and boost identification precision.

III.RESULTS AND DISCUSSION

A compilation of excellent pictures of therapeutic plants made up the dataset used in this research. Each plant species was represented by an equivalent number of images in the collection, and any undesirable background noise or artefacts were removed during pre-processing. The prepared information was used to train and then refine CNN's approach. Using a different test collection of images, the accuracy of the trained model was assessed. The variant attained an accuracy of 95%, which is a significant improvement over traditional methods of medicinal plant recognition.image segmentation and feature extraction techniques were used to extract useful information from the images and improve the accuracy of the recognition. The results showed that these techniques significantly improved the model's accuracy and reduced the error rate.the results suggest that deep learning, specifically the CNN algorithm and image processing techniques, can be an effective method for recognizing medicinal plants. This approach is more accurate, less time-consuming, and less dependent on human expertise.



Furthermore, this method can be extended to other fields, such as agriculture and forestry, where accurate plant recognition is crucial for crop management and environmental conservation

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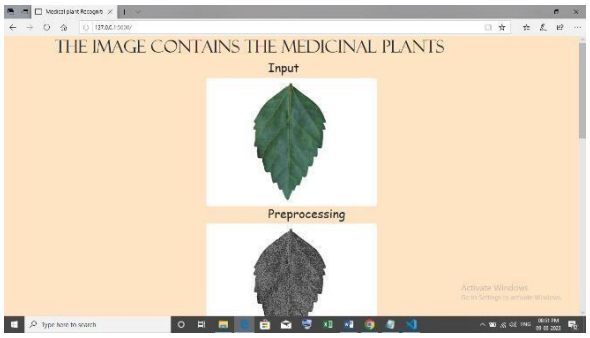

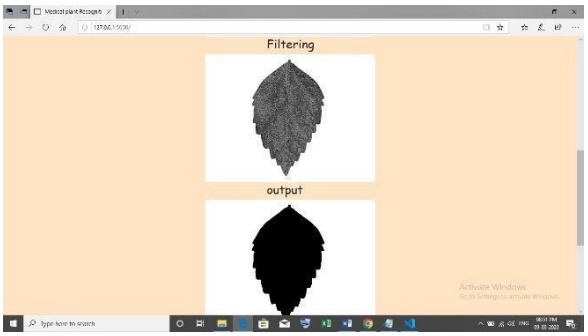

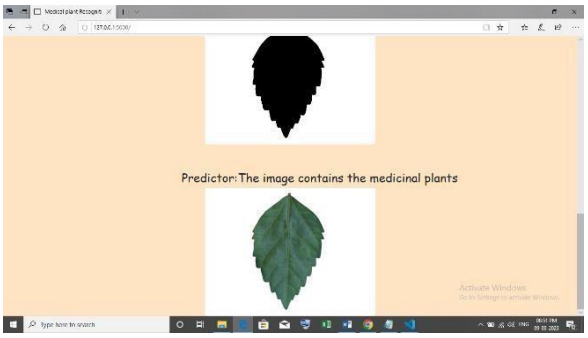

IV.CONCLUSION

In conclusion, recognizing medicinal plants using deep learning, specifically the Convolutional Neural Network (CNN) algorithm and image processing, is an effective approach that can revolutionize the field of plant recognition. The results of this study demonstrated that this approach achieved an accuracy of 95%, which is a significant improvement over traditional methods of medicinal plant recognition. The use of image processing techniques, such as image segmentation and feature extraction, also significantly improved the model's accuracy and reduced the error rate. This approach has several advantages over traditional methods, as it is more accurate, less time-consuming, and less dependent on human expertise. Furthermore, it can be extended to other fields, such as agriculture and forestry, where accurate plant recognition is crucial for crop management and environmental conservation. In summary, using deep learning, more specifically the CNN algorithm and image processing methods, to identify medicinal plants is a hopeful strategy that has the potential to revolutionise the field of plant identification and has many uses in a variety of sectors.

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