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IDENTIFICATION OF MEDICINAL PLANTS THROUGH CNN

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Abstract : Plants are a main source of food as well as a major source of medicine. We all consumed plants and their related products to support our daily nutrition. Many plants are rich in medicinal value and contain active ingredients for medicinal use. Manual identification of medicinal plants is a time-consuming process and needs the help of experts for plant identification. To overcome this problem, automatic identification and classification of medicinal plants are needed for greater benefit to humankind**.**

Keywords **– Convolutional Neural Network, Plants, Leaves, Images.**

I. INTRODUCTION

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), 65% to 80% of the world population currently use medicinal plants as remedies for various diseases. Because of environmental factors and a lack of awareness about medicinal plants in human beings, plants are becoming extinct and rare. India is a very small hilly state in the Eastern Himalayas with a total geographical area of 7096. Sq.

Our project aims to use Convolutional Neural Network (CNN) to identify for classification of plants found in India. Our CNN model will take image of plant leaves and by processing the given leaf image it will classify whether it is a medicinal plant or not.

II. LITERATURE SURVEY

It is an important area which is the backbone for any research as it provides the entire information, problem and objectives. And to gain an understanding of the existing research and debates to a relevant particular topics or area of study and to present that knowledge in form of written report.

In Paper [1] the authors proposed a model to identify and classify medicinal plants that uses SVK, KNN, and Random Forest Algorithm to classify different plant's leaves. Leaves features taken were color, shape, and texture. Since they were utilizing 3 different algorithms and dimensionality reduction techniques all these made the preprocessing stage of dataset extremely time-consuming.

In Paper [2] the authors proposed a model to identify and classify medicinal plants, Deep Learning Neural Network, CNN to classify different plant leaves. Leaves features taken were color shape and veins and findings of this paper were Comparing various Machine Learning Algorithm which provides the best accuracy. But their proposed system relied heavily on internet and was unable to function without it as their dataset was hosted on a cloud storage platform and whenever they wanted to train and test their algorithm they needed to fetch the required images through the internet.

In Paper [3] the authors developed a CNN model and trained it on their manually collected dataset but their proposed system was not able to identify plants with tiny leaves such as Tulsi, Mint etc.

III. PROPOSED SYSTEM

A. Dataset:

Medicinal Plants Leaves Datasets for the image classification model.

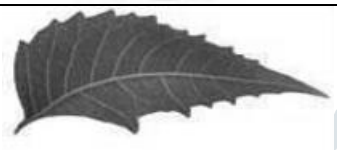
Leaves Image	Name	Medicinal Uses
	Mentha (Mint)	• Easing queasy stomach. • Mask Bad Breath.
	Ocimum Tenuiflorum (Tulsi)	• Cure fever, common cold, sore throat and kidney stones.
	Psidium Guajava (Guava)	• Used for stomach and intestinal condition, pain.
	Azadirachta Indica (Neem)	• Used for eye disorders, bloody nose, stomach upset and liver problem

Table 1: Dataset

The Datasets contains around 30 different species of medicinal plants with more than 350 pictures of Medicinal plant leaf images. Some of the names of Medicinal Leaves are:

- Mentha (Mint)
- Ocimum Tenuiflorum (Tulsi)
- Psidium Guajava (Guava)
- Azadirachta Indica (Neem)
- Ficus Religiosa (Peepal Tree)
- Mangifera Indica (Mango)
- Moringa Oleifera (Drumstick)
- Citrus Limon (Lemon)

B. CNN:

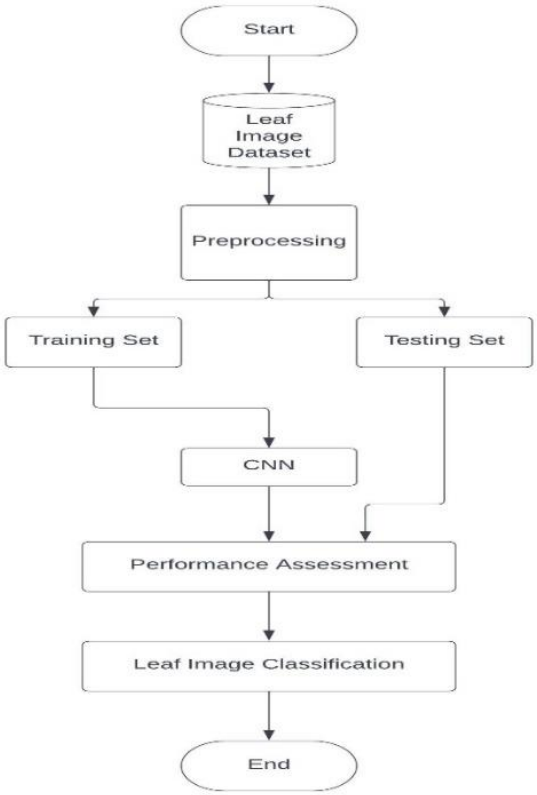


Figure 1: Flowchart of CNN

The above flowchart shows the flow of our CNN model. A subset of leaf images are taken from the leaf image dataset and then preprocessing is applied to the images that are to be fed to the CNN model. Preprocessing phase involves randomly rotating the images, resizing the image to 240x240 resolution etc. After preprocessing is done the subset of images that are taken from the dataset are then divided into training and testing set. The training set is given to CNN model and CNN model learns patterns through the training set. After training of CNN model performance assessment of CNN is done through testing set and finally leaf image classification is done.

- CONVOLUTION LAYER:

The primary purpose of Convolution in the case of CNN is to extract features from the input image. Convolution preserves the spatial relationship between pixels by learning image features using small squares of inputdata.

- POOLING LAYER:

In Max Pooling, the largest element is taken from the feature map. Average Pooling calculates the average of the elements in a predefined-sized Image section. The total sum of the elements in the predefined section is computed in Sum Pooling.

- MAX POOLING:

Max pooling is a pooling operation that selects the maximum element from the region of the feature map covered by the filter. Thus, the output after the max- pooling layer would be a feature map containing the most prominent features of theprevious feature map.

- FULLY CONNECTED LAYER:

In this, the input image from the previous layers is flattenedand fed to the FC layer. The flattened vector then undergoes a few more FC layerswhere the mathematical function's operations usually take place.

- DROPOUT LAYER:

A dropout layer is utilized wherein a few neurons are dropped from the neural network during the training process resulting in a reduced size of the model. Dropout layers are important in training CNNs because they prevent the over fitting of the training data.

IV. ALGORITHM

1. Start
2. The CNN model is provided images as input from the leaf dataset.
3. These images are pre-processed.

a. Images are resized to 240x240 resolution for better image processing

4. Now the pre-processed dataset is divided into testing and training set dataset.

5. Training data set is now driven as input to the CNN.

a. The output of CNN along with the testing dataset is provided as input for theperformance assessment.

6. After the performance assessment the final image is classified.

7. Stop.

V. RESULTS AND DISCUSSION

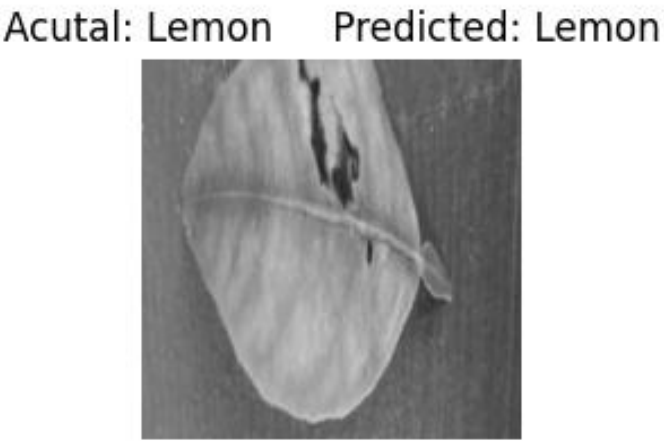


Figure 2: Lemon leaf prediction

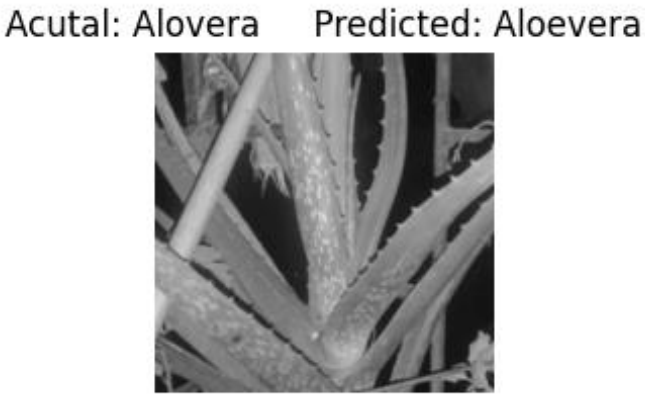


Figure 3: Aloe vera leaf prediction

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