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Identification of Indian Medicinal Plant by using Artificial Neural Network

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Abstract: *This paper presents identification of medicinal plant based on features such as edge, area and color based approach extracted from the leaf images and this descriptor which have low dimension, simple and effective. The result proves this method to be a simple and an efficient attempt.*

Keywords: Medicinal plants, leaf color, edge detection, Neural Network classifier.

I. INTRODUCTION

Medicinal plants are the backbone of system of medicines called ayurveda and it is useful for treatment of certain chronic diseases. Medicinal plants are also called as medicinal herbs. Ayurveda is considered as a form of alternative to allopathic medicines in the world and this Indian system of medicine has rich history. The ethnic groups of people in India classify plants according to their medicinal values. Identification of medicinal plants is considered as an important activity in the preparation of herbal medicines.

Medicinal plants classification based on parts such as leaves has shown significant results. Color feature based recognition is found in [3].Color texture classification with color histogram is used to provide robust pattern related information. Color histogram contains very discriminative color information [7].Edge Histogram is used for extracting textural features of stems and leaf portion.

II. METHODOLOGY

Image Acquisition:

Image acquisition is making of photographic images. This term is often assumed to imply or include the processing, compaction, emporium, printing, and display of such images. We have obtained 50 images of medicinal plants.

Image samples:

The images of different plants are considered in this work. The botanical names, regional names in brackets of the medicinal plants are Ocimum Sanctum (Tulasi), Piper Betle (Betle), Ficus religiosa (Peepal), Musa Acuminata (Banana Leaf) and Mentha Piperita (Pepper mint).

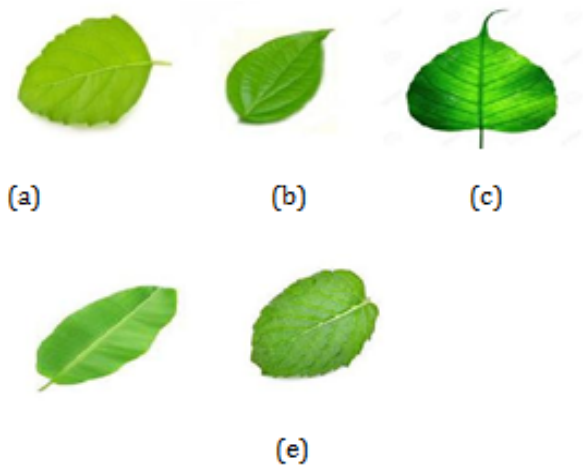


Figure 1: Leaf images of medicinal plants (a)Ocimum Sanctum (Tulasi)(b) Piper Betle (Betle) (c)Ficus religiosa (Peepal) (d)MusaAcuminata (Banana Leaf) and(e) Mentha Piperita (Pepper mint).

III. DEVISED METHODOLOGY

The methodology gives the identification of medicinal plants based on its edge features and the classification of medicinal plants by Artificial Neural Network (ANN) classifier using color feature. The color image is converted into grayscale image from this grayscale image we have to calculate edge histogram. The area is calculated by the given algorithm. Obtain the average value of this three features i.e. area, edge, color features. Repeat this process for all the images present in the database. The system block diagram is as shown in figure 2.

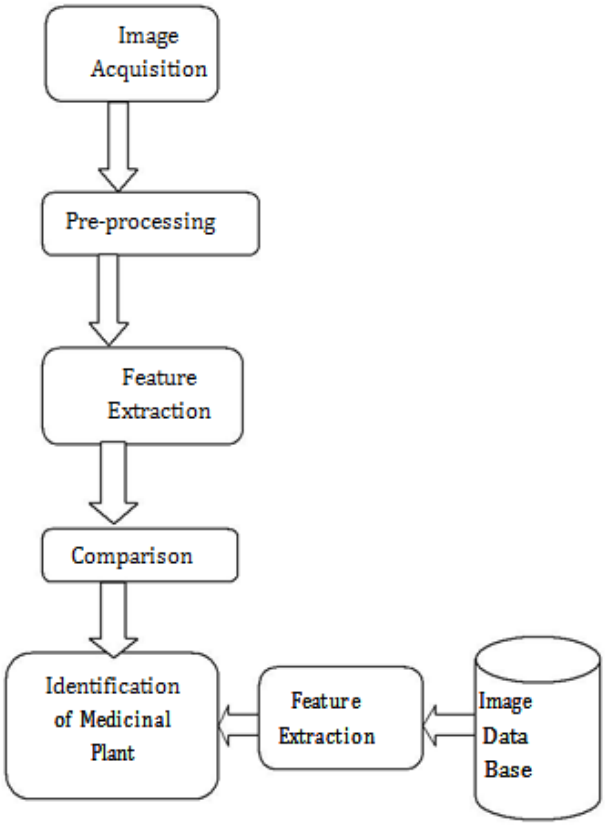
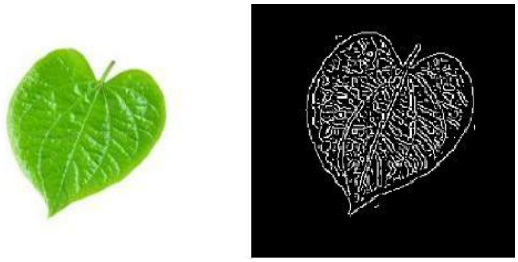


Figure 2. System Block Diagram

III. FEATURE EXTRACTION

Edge Histogram:

Edges are the features in an image since they presents the local intensity changes. Every leaf is having its own edge features. Some leaf boundaries are smooth and some are wavy so on. Also vein patterns of leaves are different. Hence this algorithm is used to extract this information. Here canny edge detection algorithm is used.



(a) (b)

Fig (a) Betle leaf image (b) Edge image of Betle leaf

Color Histogram:

Every leaf is having its own color with varying intensity. Some are Green; some are Yellow, Red and so on. Even though we consider green colored leaf its intensity will be different. Hence this part of algorithm extracts this information from an input leaf.

GLCM Feature Extraction:

GLCM is Gray Level Concurrence Matrix which is used for texture features. In the GLCM number of rows and columns are same as number of gray levels of that image. GLCM is used for number of applications in image processing.

System Algorithm:

Step 1: Start.

Step 2: Read test image and database image.

Step 3: Resize the image.

Step 4: Convert both images into grayscale.

Step 5: Convert image to binary image.

Step 6: Count the number of pixels covered by the leaf by using GLCM feature.

Step 7: Calculate the GLCM feature of both images and find the difference in area.

Step 8: Apply the Canny edge detection method to the leaf grayscale images.

Step 9: Calculate the difference in the edge histograms of both the images.

Step 10: Extract the hue, saturation and intensity a from the uncropped test image.

Step 11: Calculate hue, saturation and intensity separately.

Step 12: Repeat step 10 &11 for the image in database.

Step 13: Find the difference in color histogram for the test and database image.

Step 14: Find the average of difference in GLCM feature, edge and color histogram.

Step 15: Repeat step 1 to 14 for all the images in the database.

Step 16: Least value of overall between the test and database image is the identified leaf.

Step 17: Stop.

IV.RESULT AND DISCUSSION

For leaf classification we used ANN classifier. ANN is Artificial Neural Network .The features are obtained from different samples of medicinal plants and used to train and test this sample of three classes with ANN classifier. These classification accuracies for color, edge features are 75%.

The color and edge histogram features are extracted from medicinal plant images of different classes. The features are trained with ANN classifier.

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