Computer Vision Based Feature Extraction of Flower for Identification of Medicinal Values of Plants

[1]Shilpa Dasan, [2]Savitha Patil

[1]PG Student, [2]Professor
Computer Science Department,
Sharnbasva University, Kalaburgi

***Abstract*: Plants play a vital role in the field of Indian science of medicine called Ayurveda. Apart from serving as source of food, some plants have medicinal properties. Even though in our surrounding we have medicinal plants, we can't get it at our door step instead we refer fastest cure without knowing its side effects. The reason behind this is lack of knowledge about medicinal plant among the normal ones. So, a Vision based technique has been used to create automated system which helps even common man to identify medicinal plant around them. The main goal is to extract certain features from the input image by applying different techniques like thresholding, segmentation. In processing stage the input image is applied to SVM classifier in order to classify image. In this paper, it is analyzed that medicinal plant have successfully rate using image processing.**

***Index Terms*: SVM, K-means clustering, EM algorithm, Medicinal flower**

I. INTRODUCTION (HEADING 1)

Medicinal plant use in Ayurveda, the traditional form of Indian medicine, was developed by ancient sages whose astute observations led to the development of constitutional medicine. A medicinal plant is a plant that is used with the intention of maintaining health, to be administered for a specific condition. Our ancestors had enough knowledge about medicinal plants, so they could identify them very easily. But now days it is too difficult for a common man to identify medicinal plants which are available around him. So, in this paper Computer vision based approach is used to make common man to identify and recognize medicinal plant. Computer vision ultimate goal is to use computers to emulate human vision, including learning and being able to make inferences and take actions based on visual inputs.

To identify a plant first we consider the flower of that plant to classify them. Flower classification can be done based on various features like its color, texture and shape. But in our paper we have considered flower's color and shape. The images are initially trained to get the image properties. The image properties are later used for the recognition. The medicine flower are classified by using the K-means clustering and EM (expectoration maximization) algorithms in lab a*b* lab color space model.

INPUT IMAGE

Some images of medicinal flowers I have collected for medicinal flower detection and classification are shown in below table:

SL. No	Image	Name	Properties	Use
1		Rosa Centifolia	Vitamin C and Pectin	Heart disease and High blood pressure
2		Hibiscus	Minerals such as flavonoids and Laxactive	High cholesterol, Infection and High blood pressure
3		Rangoon Creeper	Quisqualie acid	Bronchial asthma.

4		Rose	Vitamin C and critic acids	Gall bladder disease, Insomnia and Nervous system
5		Vinca Rosea or Periwinkle	Alkaloids, Vincristine and Vinblastine	Cancer disease and Sore throat
6		Nerium oleander	Glycosides	Malaria and Venereal disease
7		Chrysanthemum	Luteolin and acacetin	Type 2 diabetes, Dizziness and Chest pain
8		Parijata or Night flowering jasmine	Anti-oxidant, Anti-inflammatory and Anti-bacterial	Piles, Alopecia and Sciatica
9		Gardenia	Laxative	Constipation, Depression, Diabetes and improves immune system
10		Dahlia	Anti-biotic, and Fructose	To treat grazes, rashes and cracks in skin

II. LITERATURE SURVEY

[1] It is very important and also very difficult to recognize plant species on the earth planet, from which human beings can get so much benefit. Thus it would be useful to design image classification method to automatically classify different species. To achieve this goal, in this paper they invented a new method to generate the feature space that combines local texture features using wavelet decomposition and co-occurrence matrix statistics and global shape features to describe the collected plant leaves. Finally, experiments are done using SVM (Support Vector Machine) classifiers to classify the different species.

[2] This paper a theory of two-dimensional moment invariants for planar geometric figures is presented. Complete systems of moment invariants under translation, similitude and orthogonal transformations are derived. Some moment invariants under general two-dimensional linear transformations are also included. Both theoretical formulation and practical models of visual pattern recognition based upon these moment invariants are discussed. A simple simulation program together with its performance is also presented.

[3] A revised fundamental theorem of moment invariants for pattern recognition it overcomes the problems of the fundamental theorem proposed by M.K. Hu (1962). The corrections will not affects similitude (scale) and rotation invariants derived using the original theorem, but it does affect features invariant to general linear transformations. Four invariants which were presented by

Hu, are revised to take the correction to the fundamental theorem into account. In further, these four invariants are combined to get three new invariants, which are additionally invariant to changes in the illumination of an image.

[4] In this paper, efficient computer-aided plant species identification (CAPSI) approach is proposed; it is based on plant leaf images using a shape matching technique. Firstly, a Douglas - Peucker approximation algorithm have used to the original leaf shapes and a new shape representation is used to form the sequence of invariant attributes. To recognize plant leaf a modified dynamic programming (MDP) algorithm is proposed. Finally, the superiority of their proposed method to plant species identification is demonstrated

[5] In this paper, for recognizing plant species based on leaf images, an automated system is proposed. Plant leaf images are analyzed using two different shape modeling techniques. The first technique is based on the Moments-Invariant (M-I) model and the second is on the Centroid-Radii (C-R) model. For the M-I model the first four normalized central moments have been considered and studied in various combinations viz. individually, in joint 2-D and 3-D feature spaces for producing optimum results. For the C-R model an edge detector has been used to identify the boundary of the leaf shape and 36 radii at 10 degree angular separation have been used to build the feature vector. To further improve the accuracy, a hybrid set of features involving both the M-I and C-R models has been generated and explored to find whether the combination feature vector can lead to better performance. Neural networks are used as classifiers for discrimination.

III. METHODOLOGY

The proposed system for detection and reorganization of medicinal flower by using SVM classifier has been classified by the following main modules.

1) Image preprocessing
2) Image Enhancement
3) Clustering models EM algorithm with K-means
4) Feature extraction
5) SVM based classification

1) IMAGE PRE-PROCESSING

In the initial step of proposed system, the given input image is processed before passing it to the main system. The pre-processing of the image includes image resizing, contrast adjustment, brightness adjustment, image cropping, image rotation etc. The output of the pre-processing will be the lab image which will be suitable for next processing.

The pre-processing is a sequence of operation that performs on scanned input images. It primarily enhances the image illustration for higher segmentation. The task of pre-processing is to phase the required pattern from the image and perform normalization, noise filtering and smoothing.

2) IMAGE ENHANCEMENTS

Image Enhancement is the most significant and difficult technique in the image study. The image enhancement is used to improve the clarity of an image, and provide a better transform representation for image processing by contrast adjustment. The image enhancement technique is different from one field to another field according to its objective. Enhancement of the image includes the color transformation (if needed), image contrast enhancement imadjust() based on the base of the user requirement.

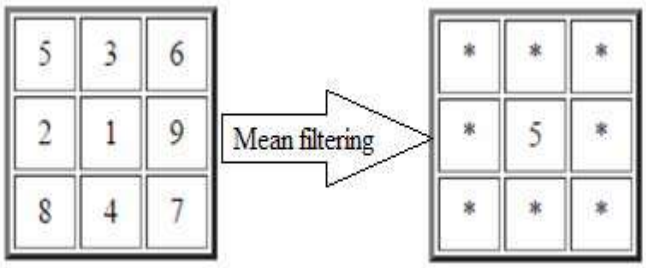

Fig 5.1: Median filter for image restoration

3) CLUSTERING MODELS EM ALGORITHM WITH K-MEANS

K-means and EM algorithm are generally same and are used in common to find the natural clusters in the range of the given data by varying the input type parameters. The K-means algorithm starts with acquiring the digital image uploaded by the user. K-means is applied for color space transformation result l*a*b (luminosity and chromaticity layer).

The EM algorithm is derived further on the aspects of the K-Means algorithm. First step is to choose partition and performs the processing of the pixel values on the input image in the colour band of the RGB. It starts the EM cycle, first expectation is performed.

4) FEATURE EXTRACTION

In this process of Feature Extraction the leaf images are possessed by using the regionprop() method of feature extraction in 2 types.

- Extraction of Feature in pattern

- Extraction of Feature in Texture

6) SVM BASED CLASSIFICATION

SVM (Support Vector Machine) is a type of the supervised machine learning method which will examine data and identify the similar type of the patterns, which are used for the later classification. SVM model has been able to model the complex structure of the non-linear decision boundaries with high accuracy and SVM is efficiently used for the binary classification. The purpose of SVM is to classify the data set with boundaries and extent it to nonlinear boundaries. SVM becomes prominent when pixel map is used as the dataset values as input. It gives high accuracy equivalent to neural network with elaborated features. By designing the kernel function, SVM can be applied to the complex data and this model is efficient in both linear and nonlinear data handling.

IV. RESULTS AND DISCUSSION

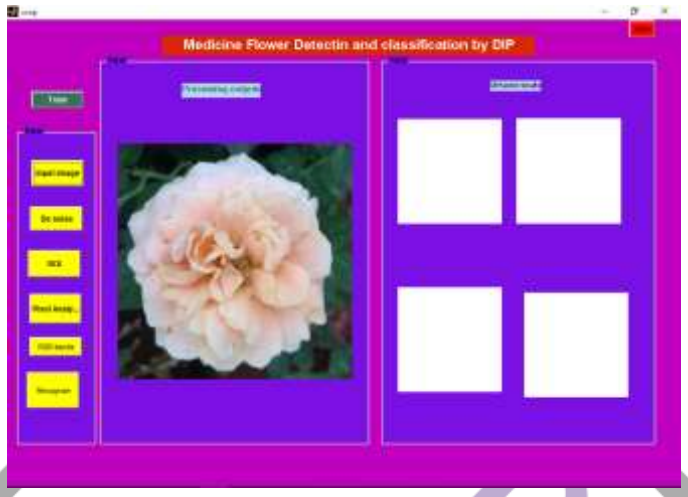

Fig 4.1: Input image

In the above diagram the initial GUI of the system is shown. The image is given into the system as input image to be processed later.

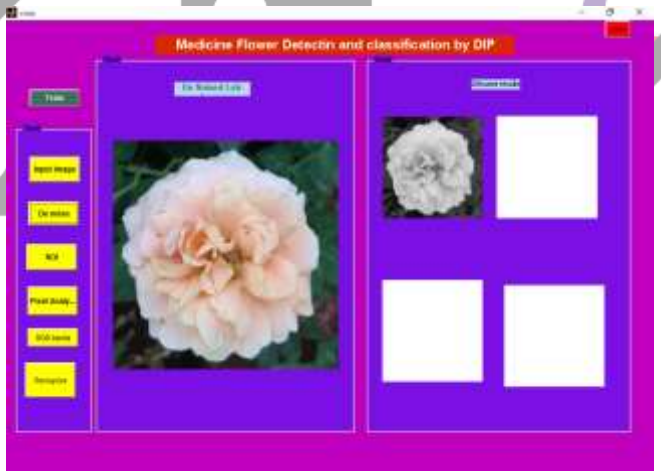

Fig 4.2: De-noising image

The input image is later passed to the image processing it performs the basic operations like image de nosing as shown in the above figure.

Fig 4.3: Region of interest

System considers only certain region within overall image and it is extracted as shown in the above figure.

Fig 4.4: Feature extraction

Later the image features are extracted by using the region properties values. The result is shown in the above diagram.

Fig 4.5: RGB bands

Then next RGB colour components are extracted from image and displayed as shown in above image.

Fig 4.7: Medicinal flower recognized

As shown I the above diagram the SVM based classifier has been demonstrated. The image feature are extracted are passed to the SVM classifier. The final result is shown to the user indicating the name and medicinal use of the flower.

V. ACKNOWLEDGMENT

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REFERENCES

[1] Hang Zhang; Shansong Liang, "Plant species classification using leaf shape and texture" Industrial Control and Electronics Engineering, 2012 International conference, Page(s): 2025-2028, Year 2012.
[2] M K HU, "Visual pattern recognition by moment invariants", IRE Trans. Info Theory, vol. 8, pp. 179-187, Year. 1962.
[3] T. H. Reiss, "The Revised Fundamental Theorem of Moment Invariants", IEEE Transaction Pattern Anal. Machine Intelligence, Vol. 13, No. 8, Page 830-834, Year. 1991.
[4] J. Du, D. Huang, X. Wang, and X. Gu, "Computer-aided plant species identification (CAPSI) based on leaf shape matching technique," Transactions of the Institute of Measurement and Control. Vol. 28, No.3 Page. 275-284, Year 2006.
[5] Jyotismita Chaki, Ranjan Parekh, "Plant Leaf Recognition using Shape based Features and Network classifiers" (IJACSA) International Journal of Advanced Computer Science and Applications, Vol. 2, Year 2011.
[6] Meeta, K., K. Mrunali, P. Shubhada, P. Prajakta, and B. Neha."Survey on techniques for plant leaf classification." International Journal of Modern Engineering Research (IJMER) vol no. 2, pp.538-544, 2012.
[7] Jamil N, Hussin NA, Nordin S, Awang K. "Automatic Plant Identification: Is Shape the Key Feature?" Procedia Computer Science, vol.74, pp.36-42, December 2015.
[8] Anami, Basavaraj S., S. Nandyal Suvarna, and A. Govardhan. "A combined color, texture and edge features based approach for identification and classification of Indian Medicinal plants." International Journal of Computer Applications, pp. 45-51, 2010.
[9] Dr.H.B.Kekre, Sudeep D.Thepade, Tanuja K. Sarode and Vashali Suryawanshi, "Image Retrieval using Texture Features extracted from GLCM, LGB and KPE", International Journal of Computer Theory and Engineering, Vol. 2, No. 5, pp. 1793-8201, October, 2010.
[10] E. Sandeep Kumar, Viswanath Talasila, "Recognition of Medicinal Plants based on its Leaf Features", Froc. Of National Systems Conference, llT- Jodhpur, India, December 2013.