

Leaf Recognition and Classification Techniques-Survey

Margesh Keskar¹ , Dhananjay Makedar²

¹Research Scholar,CSE department GNDEC,Bidar Karnataka India
Visvesvaraya Technological University Belagavi ,Karnataka India
margesh.keskar@gmail.com

² Professor CSE Department ,GNDEC,Bidar Karnataka India
Visvesvaraya Technological University Belagavi, Karnataka India
dhan_mak@yahoo.com

Abstract

Plants are an indispensable part of our ecosystem and globally it has a long history of using plants as a source of medicines. Since the advent of modern allopathic medicine, the use of traditional medicine declined to a considerable extent. However, in recent years, traditional medicine has made a comeback for a variety of reasons like they are inexpensive, nontoxic and does not impact any side effect. Different kind of medicinal plant species are available on earth but it is very difficult to identify the plant. Considerable knowledge accumulated by the villagers and tribal on medicine from plants remains unknown to the scientists and urban people. This paper explores survey a various laves recognition and classification of both ayurvedic and normal plant. The main objective of the survey is to know various classification Techniques and how effectively utilizing in Ayurvedic Plants recognition by various feature Extraction Methods.

Keywords: Classification ,Feature Extraction,Ayurvedic

1. Introduction

Globally there are many plants used as ayurvedic Medicinal plants has turned into research therefore finding out the accuracy and classification is the most important task by using various feature extraction Techniques by Pre-processing the images .For the survival of human and mammals, plants are the key factors in the earth. Initially develop a data base of ayurvedic medicinal plants and categorized into three classes namely shrub, herb and tree.

The main Aim of this paper is to survey on various Feature Extraction methods for leaf classification and their Accuracy. Basically in computer Image Processing systems images to be captured by the digital camera preprocessed because of images to be converted from original images to Gray Scale ,Segmentation of image ,smoothing the image for suppressing unwanted information, train the images via Neural Networks Techniques for finding Feature Extraction for further processing and testing for selecting similar features of query image and classify accordingly General flow Diagram for classification of plants are shown in fig 1.

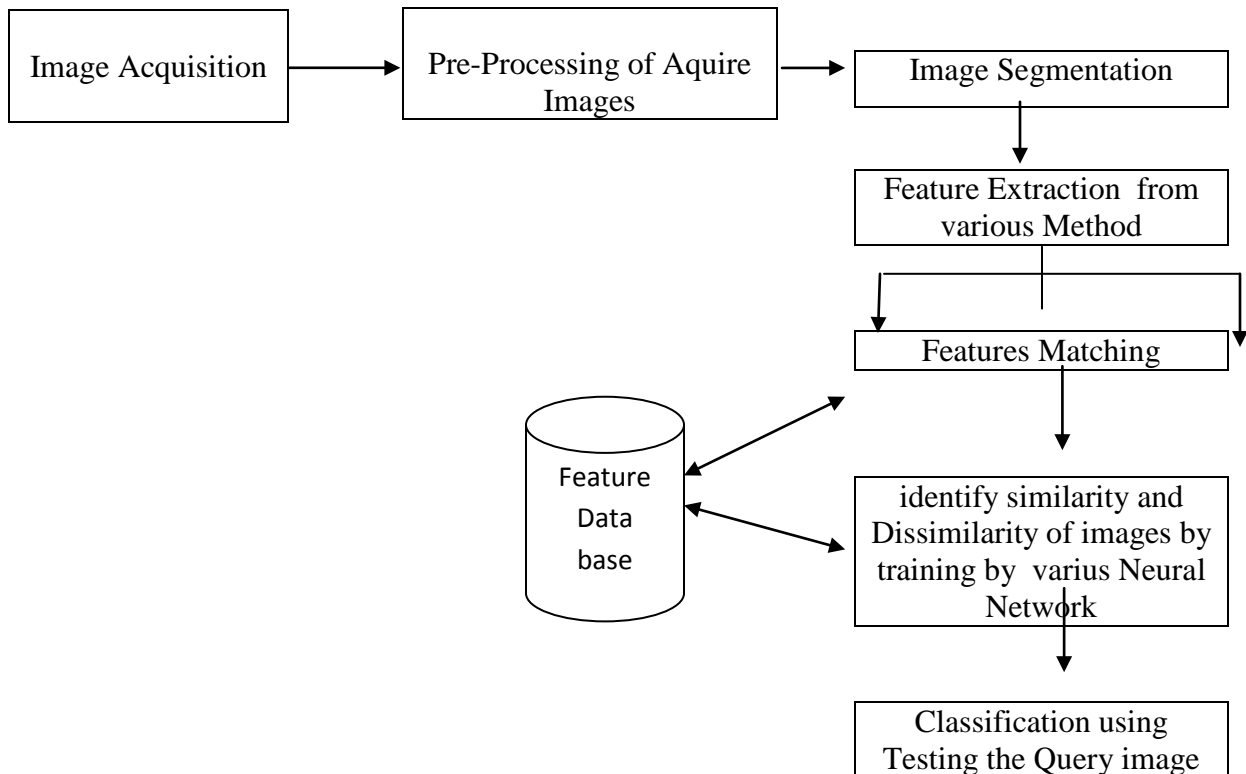


Fig 1 .Block Diagram of Leaf Classification

2.Literature Survey

E sandeep Kumar and Vishwanath Talasia [1] preprocessed the image and morphological features were Extracted and describes the segmentation of images using AND operations into respective RGB Planes ,cumulative distribution function (CDF) and methods of moment of each plant is considered.

Amola Sabu et.al[2] proposed a Speed up the robust features(SURF)and Histogram of orient gradients (HOG) for scaling invariance and object detection here K-NN classification techniques is used for classifying a leaves from plants where one half used for a training a data sets and remaining half is used for testing the data sets.HOG can efficiently capture surface Texture average accuracy of 99.6% .

Teja D dahigaonkar and Rasika T Kalyane [3] praposed methods for classify the medicinal plants using color and Texture features here describes pre-process the image by sharpening 2 D spatial un sharp filters ,RGB image for thresh holding Techniques for Improving image appearances Segmentation and binarization is carried out and morphological image features are determined .In this system 64 samples are used for training and 64 are used for testing combination of feature entropy, contrast solidity ,correlation, centricity along with SVM and provides 96.6% accuracy

Baswaraj S Anami et.al[4] classifies an Indian Medicinal Plants by SVM,RBF with scaling factor and neural network classifiers using color and texture ,color ,edge and Edge directions are extracted from whale images. Here HSV,YcBcr color space are used for getting color histograms and edge histograms are used for extracting Texture features. Accuracy of herb, shrub and Tree are 83%,70% and 85% respectively.

Mostafa Mehdipour et.al[5]Extracts K Random square Patches ,performs subtracting the leaf image for finding out four corners and centers finally trained and tested using Deep convolution Neural networks detected a citrus leaf by pre-processing a SF-CES scaling method ,image segmentation is done by K Mean clustering and GLCM features are also calculated finally classified using SVM Methods by radian ,Multiclass hybrid classifiers are carried out for vegetable disease detection .

Sushma K venkatesh et.al [6]proposes Quantization Scheme is utilized for leaf classification here describes a Gabor Magnitude and local Phase quantization where it combined called LGPQ ,Local Phase Quantization finds neighbors of each pixel position and classified by SVM Techniques

D Venkatramana and Mangayarkarasi N [7] explained the pre processing of input data for conversion from color to gray and detected the boundaries of leaf ,where morphological techniques has used for classification of plants in finding similarities among feature vectors

Dr.N Palanivel et.al[8] detects diseases using texture shape and color by Cellular Automata filters ,GLCM and LBP systems are used for feature extraction and Random forest and Principle component analysis (PCA) Used to overcome the time complexity of harlick Texture feature .

H Fu and Z chi[9]proposes the extraction of vein patterns of leaf by the combination of thresh holding and artificial Neural Network Techniques ,Segmentation is carried out based on thresh holding and used sabel operator for computing edge of leaf image Laplacian operator is performed for computation of second order derivatives of positive and negative both and finally deleting the images having less than thresh hold values.

Abdul kadir et.al[10]describes thee kind of features like color moment, vein and texture features and used PNN classifiers for classifying plants from a said features it calculates slimness, roundness of leaf ,even a irregular leaf and dispersion feature from shape of image point of view.PFT was used for Translation, Scaling and rotation of Images. Where as in color feature it Extracts the mean skeweness and kurtosis are extracted for capturing moment of plane R,G and B.Segmentation is carried out for separation of the leaf and converts the image to gray scale then to binary form .For PNN classifier it uses Radial Base Function(RBF),provides a accuracy of 93.75%.

Madas Dyrmann et.al[11] Proposes the convolution Neural Networks Techniques here Radiations and segmenting the images carries after segmentation ,Padding was used to scaled to 128X128 pixels and perform Batch Normalization which reduces the training in iteration.

Sethulaxmi V , and Sreekumar K et.al[12]recognizes the Ayurvedic leaf by classifying using BRISK/FREAK faster feature Extraction and trained and tested the images here features are classified by Principal Component Analysis (PCA) and vein features are Extracted by Cellular Neural Network(CNN).

Mohd Shamrie et.al[13] describes ensemble methods multiple Number of algorithms namely adaboost M1 with T48 and RF, where training and testing can be done using bagging algorithm. Dengsheng Zhang and Guojan Lu [14] Proposes a comparisons of four shape features retrieval Techniques like FP,CSS descriptors ,ZMD,and Grid Descriptors .

Cem Kalyoncu and Onsen Toygar [15] Explains the Geometric leaf Classification performs the image Segmentation ,counter Extraction and corner regions detection and from binary images perform a feature extraction and finally classification is carried out performing the various features like moment invariant,perimetre ratio ,Multiple Distance matrix and finally perform peak detection algorithm.

Steohen Gang Wu et.al[16] Performs a leaf recognition algorithm for plant classification using PNN where Feature is extracted using PCA for reduction of dimensions trained and tested the image by PNN .There are ten different pieces of leaves are considered for testing and training purpose and getting an average accuracy of 90%.

carranza -Rajas et.al[17] combines a leaf shape and texture for Costa Rican plant species identification here it segments the leaf image by using HSV, Color domain and applied Expectation and Maximization for clustering a pixels .In addition to this training and Prediction of pixels is carried out by EM algorithm and Image Enhancement is carried out where it performs clipping, restoring ,resizing and deleting undesired objects .

Sandeep et.al[18] identified Indian Medicinal Plants which explains the measuring edge histograms of image and canny Edge detection Method .

Malti K Singh and Subrat Chetia [19]Explains how to detects and classify the plants even describes how to detect the disease of plants by Back Propagation Neural network.

Anang Hudaya Muhamad amin et.al [20]classifies a plants using 2-D leaf shape by divide and distributed approach within Multilevel -DHGN scheme

Joao camargo Neto et.al[21]identifies the plants using elliptic Fourier leaf shape analysis and identify the leaf by binaries of sub images ,shape of leaf is modeled using Elliptic Fourier descriptor Normalization. Weekly training and testing is carried out where in third week it provides the best matured leaf for classify the plants .

Rangxiang Hu et.al [22] Proposes a Multi stage distance matrix for leaf recognition here it captures the shape geometry while invariant to translation scaling ,rotation and bilateral symmetry .Matching of shape is carried out using PCA of census transform histogram and Multi stage distance can be computed.

Feng Ni and Bin Wanget. [23] describes the retrieval of leaf by integral counter angle and invariant shape descriptor for classification .Here Dissimilarities of two leaf image is measured by changing the parameter size of ICA and mICA .

Meet P Shah et.al[24] classifies the leaf using marginalized shape context and shape and texture here it comprises two paths one used for shape Dependent feature and other for learning texture feature .

3.Suggestion

From this survey, I recommended a deep neural network classifier, to get more accuracy when compare to other classifiers. This help to identify the exact name of medical leaf and reduce searching delay. Even Symbolic Representation and by 2D Binary Phase Encoding still we can Improve the performance

4 Conclusion

In this survey, we have discussed a brief overview of notion in leaf classification and its significance in recent years. We have also analyze in many ways, to solve a issues in searching leaf name accurately and those things are formulated in literature An outline of the literature survey on various techniques that can be used for classification and extraction texture feature are also discussed. Ongoing researches are move on new techniques, this applied for more accurate texture based ayurvedic plant leaf classification.

In our survey, we found that the deep neural network (DNN) classifier are the new and popular texture extraction methods is giving the highest accuracy and performance (98.7%) for texture classification. Leaf recognition is useful to identify the medical plant leaf type. The methods are used to extract plant leaf features are based on color, shape and texture etc. Classifiers plays significance role to verify the data and survey the accuracy of classification algorithm. Deep neural network (DNN) gives better result as compare to other classifier. To identify different plant leaf images based on its surface parameter is challenging and most expensive task. Plant leaf image surface parameters are color, texture and shape. The combined feature extracted from each of its parameter is used to identify leaf type and gives better result as compare to using single parameter. The time and Frequency domain features computed by Symbolic representation (SAX) are well used in research along with 2DBPE representing a features along with DNN gives higher accuracy to classify the leaf images.

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Table 1 Various classifiers Technique Models and their pros and cons

Sl No	References	Classification Techniques	Pros	Cons
1	[1]	Weighted Averaging Technique Cumulative Distribution function(CDF)	Provides uniqueness in identity of Medicinal Plants by generating unique identity number	Actual values and estimated range values may not be same for all images
2	[2]	-SURF -HOG	Even for large Number of veins could be accurately Modeled	Limed size of HOG features and can Expand leaf data sets More Feature can be

				added to HOG and SURF .
3	[3]	-Geometric Features -GLCM -Erosion Method	It maximizing a classification Accuracy because of all three kind of features	It is used for 64 Samples , but for more samples it consumes more time
4	[4]	-SVM -ANN	Maximum amount of accuracy occurred for tress	For Herb and Shrub classification not Suitable In stem Portion it won't provide the information Reliably
5	[6]	-LGPQ -SVM	Out standing performance compared with other kind of CNN	Cross Validation is essential for partition the data sets into various categories
6	[7]	-PNN -PCA -SVM	Applies to all kind of herbal and leaves	When data Sets given in real time ,its difficult to classify medicinal plants
7	[8]	-PCA -RF	Faster in classifying a types of leaves	Leaves with similar shape difficult to classify
8	[9]	-ANN -Histogram computation	Computation time is saved	Its difficult to determine the threshold according to intensity histogram of Images
9	[10]	-Polar former transform(PFT) -PNN	Classification accuracy is more because of all three types of features	Requires more time
10	[11]	-ReLu	Even different data sets can be reused and few images are contributed to overall loss	Few (species) images are producing less accuracy
11	[12]	-BRISK -FREAK	Faster than SIFT and SURF and robustness of segmentation can be initialized	For similar kind of leaf images its big challenge to classify
12	[25]	-GLCM	Vector feature have small length and accurate Values will occurs	Required more computation

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First Author :Margesh Keskar received B.E degree in CSE from Guru Nanak Dev Engineering College, Bidar Karnataka . and M.Tech from Poojya Dodappa Appa College of Engineering, Gulberga Karnataka pursuing Ph.D from VTU Belagavi Presently working as Assistant Professor CSE Department GNDEC Bidar Karnataka.

Second Author : Dr.Dhananjay Maktedar received B.E. from REC Bhalki Karnataka M.Tech from Sri Jaya chamrajendra College of Engineering Mysore Karnataka and completed Ph.D from JNTU Hyderabad in the year 2015, Presently working as a Professor and Head of Computer Science and Engineering Guru Nanak Dev Engineering College, Bidar Karnataka, 22 years of academic Experience and supervising Ph.D Students under VTU University Belagavi, Interested a Research on Image Processing and Pattern Reorganization and Published Papers in various Journals