

# Literature Review On Plant Leaf Classification

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## Abstract

Many models are developed to extract plant leaves features and identify its type or signature, various classification algorithms are used to check the accuracy of classification. There is large number of plant available in the world and it is hard to remember all names of plants so the system which is developed for identification of plant type is useful. In this paper we have present literature survey of various techniques used for plant leaf classification.

**Keywords:** *Feature extraction, color feature, shape feature, texture feature, classification, neural network, svm, HSV, GLCM.*

## 1. Introduction

Now a day's it is very important to identify naturally occurring objects and recognise its type. It is useful to identify plant type in various fields such as Gardening, botany research, Ayurvedic treatment, Farming, floriculture etc. Our literature survey have to found that the different Image processing techniques used to extract features from plant leaf and classify them using computational intelligence algorithms.

Digital image processing deals with manipulation of digital images through a digital computer. It is focuses on developing a computer system that is able to perform processing on an image [1]. Digital image processing technologies such as Classification, Feature extraction, Pattern recognition etc are useful to classify the images.

## 2. Classification Algorithms

Classification techniques are widely used to classify data among various classes. Classification techniques are being used in different system to easily identify the type and group to which it is belongs to. There are many algorithm used for classification. There are two types of

classification algorithms Supervised classification algorithms and Unsupervised classification algorithms.

Supervised classification algorithms [3]:

- Artificial Neural Networks
- Learning vector Quantization
- Decision tree induction
- Nearest neighbour classifier
- Bayesian classifier
- Support vector machine
- Regression trees etc.

Unsupervised classification algorithms [3]:

- Expectation-maximization algorithm
- Vector Quantization
- Generative topographic map
- Information bottleneck method
- K-means
- Fuzzy clustering etc.

In Supervised learning the computer is presented with example inputs and their desired outputs, given by a "teacher", and the goal is to learn a general rule that maps inputs to outputs [2]. While in Unsupervised learning, no labels are given to the learning algorithm, leaving it on its own to find structure in its input. Unsupervised learning can be a goal in itself (discovering hidden patterns in data) or a means towards an end[2].

## 3. Literature Review

Here we have presented the review of our working related area of plant leaf classification and also present the methods used for to classify the images.

1. ArunPriya C, Balasaravanan T., Antony Selvadoss Thanamani proposed An Efficient Leaf Recognition Algorithm for Plant Classification Using Support Vector Machine. The paper presents the application of SVM and on image processing particularly for understanding leaf image features. Therefore two techniques have been combined namely; Support Vector Machine (SVM) and K-NN. The study shows that SVM obtains the higher percentage of accuracy among K-NN technique. Color extraction is used to extract the feature. An RGB image is firstly converted into a grayscale image and boundary enhancement. Classifier tested with flavia dataset and a real dataset. The accuracy obtained by the k-NN is 78% in flavia dataset and in real dataset the accuracy of k-NN is 81.3%. the proposed approach produces very high accuracy and takes very less execution time.

2. Hang zhang, Paul Yanne, Shangsong Liang proposed Plant Species Classification Using Leaf Shape And Texture which presents the new method to generate the feature space that combines local texture features using wavelet decomposition and co-occurrence matrix statistics and global shape features. A three level 2-D DWT (Discrete Wavelet Transform) of a gray scale image will be employed to decompose the image, then nine statistical features of co occurrence matrix, e.g., contrast, energy, entropy, homogeneity, etc., are computed out of different sub-bands in approximation and detail regions. Combined with geometrical features, e.g., aspect ratio, solidity and seven Hu moments, a feature set for classification is then built for classification support vector machine is used to classify plant species. The prediction accuracy of SVM is 93.8%.

3. Suhaili Beeran Kutty, Noor Ezan Abdullah proposed Classification of Watermelon Leaf Diseases Using Neural Network Analysis. The present work deals with identification and classification of Anthracnose and Downey Mildew, watermelon leaf diseases using neural network analysis. In this paper the classification on the watermelon's leaf diseases is based on color feature extraction from RGB color model where the RGB pixel color indices have been extracted from the identified Regions of Interest (ROI). the Region of Interest (ROI) need to be identified from each infected leaf samples based on its RGB color component. Then, it is ready to crop out and resized all cropped data will be transferred to SPSS for further analysis. The analysis have been done by using error bar plot in SPSS software and the work develops a classification system for watermelon leaf diseases using Neural Network Pattern Recognition Toolbox (nprtool) in MATLAB. The obtained features are trained by Lavenberg-Marquardt backpropagation algorithm (trainlm).

4. R. Janani, A. Gopal proposed Identification of selected medicinal plant leaves using image features and ANN. In this paper, it is proposed to have a method for classification of medicinal plant leaves using Artificial Neural Network (ANN) classifier. Then extracted Features are geometric, shape and texture. The background of the image is removed from the leaf images, filling of holes, resizing and cropping of images to a standard size during GLCM based calculation. Normalization were done for GLCM matrix to avoid high range values and values were fed to the 2-layer feed forward neural network after than network was trained using the back propagation algorithm.

5. Esraa Elhariri, Nashwa El-Bendary, Aboul Ella Hassanien proposed Plant Classification System based on Leaf Features system used two algorithm Random Forests (RF) and Linear Discriminant Analysis (LDA). HSV color extraction and GLCM Texture Extraction also shape features and vein features are extracted used to extract the plant leaf features. LDA system and RF system using 10-fold cross-validation and LDA achieved accuracy better than RF.

## 4. Conclusion

Plant leaf recognition is useful to identify the plant type. The methods are used to extract plant leaf features are based on color, shape and texture etc. Classifiers plays important role to test the data and check the accuracy of classification algorithm. Supervised classification gives higher accuracy as compared to unsupervised classification algorithms. SVM and NN 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 plant type and gives better result as compare to using single parameter. Whereas feed forward method using back propagation algorithm gives higher accuracy to classify the leaf images.

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