



A Survey on Plant Leaf Identification in the Field of Agriculture

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ABSTRACT: Plants are amid the earth's helpful and attractive products of environment. A plant has been vital to mankind's endurance. The urgent require is the more plant was at the risk of extermination. An ayurvedic medicines can be prepared by using the plant leaves and this plant class belong to the endanger group. So it is crucial to set up the database for plant defense. Plant leaf detection has been challenge for several researchers. In this paper, introduced on the survey of various classification methods is used for the plant leaves classification. The method of classification deals with classify of each model in the different classes. A classification is a method that leaf can be classified on its various morphological features. It is a big challenging task to analyze plant leaves images by a layman because there are extremely minute variation in few plants leaves & big data set for study. This is a pretty complex to develop an automated recognition scheme which is the process on large data and gives correct assessment.

KEYWORDS: Leaf Images, Feature Extraction, Classification.

I. INTRODUCTION

Image classification plays essential role in many applications like image analysis, remote sensing, and pattern detection. It can be denoted as the procedure of sorting every the pixels in an image into the limited number of individual classes [4]. There are many kinds of methods which can be used to classifying and recognizing dissimilar kinds of substance in images. For conventional statistical methods for land cover classification, used for the gray values of the image to identify and classify the objects.

Plant is very much important source for person living and implement whether in company, medicines or food stuff. It is important for ecological security. According to World Wide Fund for Nature (WWF), there is presently concerning 50, 000 - 70, 000 identified species each and every one over the world (WWF, 2007). Nevertheless, more plant species are still unidentified yet and by the deterioration of environment, these unidentified species may be at the margin of extermination. So it is required to accurately and rapidly to recognize the plant class in order to defend its inherent resources.

A plant maintains the equilibrium of the O₂ and CO₂ of earth's environment. The plants are important means of occupation and manufacture of person. Automated plant recognition system is very useful in botanical garden or management of the natural reserve park, novel plant species innovation, plant classification, exotic plant discovery so on. A computer plant detection or classification method can used dissimilar features of the flora, preliminary at extremely easy level like color and shape of the leaf, fruit and flower kind, root type, branching style, seasonality, viewpoint to extremely difficult such that the tissue and cell structure, structure of genetic.

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Figure 1: Different Plant Spices

Plant species detection is the procedure in which every entity of plant can be accurately attached to descending the sequence of group of associated plants is based on regular description. Figure 1 shows the different spices of the plants. Presently, plant taxonomy approaches still used a customary classification approach like morphologic anatomy, molecular biological and cell biology methods. This function mostly carried out with botanists [10]. The customary approach is time consuming and less proficient. In addition, this is a problem task. Nevertheless, appropriate to the fast progress in computer technologies daily basis, there is the novel opportunity to enhance the capacity of the plant species detection such as scheme an automatic and convenient detection system of the plants.

Plants are classified according to a colors shape, structures, and textures and of their bark, leaf, flower and morph and seedling [11]. However, if the plant classification is on the basis of two dimensional images, it is extremely hard to revise the flowers shapes, morph and seedling of plants because of its difficulty of the three dimensions of the structures. Plant leaves are two dimensional in environment and grasp significant features is useful for the classification of different plant species. In this paper, we study the various algorithms for plant spices to recognize the plant types.

II. LITERATURE SURVEY

Savita N. Ghaiwat et.al [01] proposes the study of classification algorithms. The k-nearest-neighbor approach can be perhaps the easiest of every technique for prediction of the test class example. An evident drawback of the k-NN method has time complexity of creating the predictions. Moreover, neural networks may tolerant to the noise inputs. But in neural network it is very tricky to appreciate the structure of methods. SVM is found a competitive as well as the best accessible machine learning techniques in classification of high-dimensional information sets. The computational of SVM complexity can reduce to the quadratic optimization difficulty and it is very easy to manage the difficulty of the decision rule with the error of frequency. Disadvantage of SVM is hard to decide the optimal parameter when the training information cannot be the linearly separable. Furthermore, SVM is very complex to comprehend and execute.

Sanjay B. Dhaygude et.al [02] introduces the application of numerical texture for identify the plant disease is described. Initially, by the color transformation of RGB structure is converted into the HSV space since HSV is best color descriptor. Removing and masking of the green pixels by pre-calculated a level of threshold. Therefore, the next stage segmentation can performed by using the patch size 32X32 and obtain the helpful segments. This segment is used for the texture study with color cooccurrence matrix. At last if the texture parameters is compared to parameters of texture usual leaf. The future work can focus on the basis of implementing techniques and NN's is to increases the detection rate of the classification procedure.

Sapna Sharma et.al [03] introduces an automatic recognition scheme for the plants of the leaf image by the multiple layers feed forward a neural network and also back propagation methods. The experimental result represents



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that the algorithm is effective by the accuracy is larger than the 90% for 10000 numbers of epoch is necessary for the neural network training. This technique is very fast in implementation, proficient in classification and simple in performance. This paper can be successfully meet the aspiration and developed successfully, run and optimized the appearance of the classification method. Further, they are going to concern the statistical pattern detection systems which can take the noise into consideration and large plants database.

A.H. Kulkarni et.al [04] presents that the incorporating a Zernike moment for the feature descriptors can be possible substitute for the classification of complex images structurally. They present special invariance feature and expose better performance than the other moment based solution. Though, the only negative feature of the Zernike moments is costly calculation, which can make inapt for a few efforts. However, they are calculated in parallel and performance of the computational computers can increases, the time is necessary for their computation perhaps cannot be a difficulty in their close by hope. Then use of the dual phase learning technique, for the training of RBP neural networks are fast, than the previous systems that is used to the train multiple layer of the neural networks. Moreover the usage of the dual phase learning technique results in quicker convergence through training phase.

M. Z. Rashad et.al [05] proposes the system that LVQ and RBF are performed by the robust algorithm. Accuracy 98.7% is compare to previous systems. Further, they applied the numerical model detection methods which can take noise into deliberation. The system is having benefit of capability of classify and recognize the plant as of a little part of leaf without depending on a leaf shape or color features, because the scheme basically depends on features of texture. Therefore, the scheme is helpful for botany an investigator when they need to recognize a spoilt plant, then it can be carried out depending on only small element of the spoilt plant. When the botany investigator is having a damage plant and then they require placing it into its location in the classification. The proposed system is the resolution since it can depend on texture features, not for the color features is obviously varying through the seasonal series.

Jayamala K. Patil et.al [06] provides a novel insight in identification of plant disease. There are two major description of the plant disease recognition by using the machine-learning algorithms that can be obtained, such that speed and accuracy. Therefore there is an aim for effective improvement of the innovative, proficient & quick interpreting techniques which can help for the plant scientist in identifying the disease. Automatically estimates the severity of detect disease. Proposed by researcher is extended for the progress of hybrid methods such that genetic methods with neural networks to increase the detection rate of last classification procedure.

Stephen Gang Wu et.al [07] presents the neural network method for the plant leaf detection. The computer is automatically classifying the 32 types of plants by leaves images can be loaded from the scanners or digital cameras. PNN is maintained for its high speed on the training and easy structure. 12 features are extracted and process with the PCA to appearance the vector input of the PNN. The results specify that the technique can effective by accuracy which is larger than the 90% on 32 types of plants. Then, Compare with previous algorithms, these methods gives s fast execution, capable in detection and simple in performance. Further, work is in contemplation to get better performance.

Table 1: Comparison table for classification and feature extraction techniques

Title	Year	Algorithm	Advantage	Performance
A Leaf Recognition Algorithm for Plant Classification Using Probabilistic Neural Network [7]	2007	PNN	Fast in execution, efficient in recognition and easy in implementation.	Improves the accuracy
Fast and Accurate Detection and Classification of Plant Diseases [12]	2011	Neural network in back propagation, Color Co occurrence Matrix	Less time consumption	Accurate detection of leaf in a little computational effort.
Enhancing Accuracy of Plant Leaf Classification Techniques [13]	2014	Back Propagation, Incremental back propagation, Levenberg–Marquardt	High accuracy	The classification accuracy of Batch Back propagation increases by 1.61% than incremental Back propagation



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		Algorithm, Multi-Layer Perceptron (MLP).		and increases by 3.28% than Levenberg-Marquardt based learning method.
Leaf Disease Detection and Classification using Neural Networks [14]	2016	SVM	Increase the speed and accuracy	Improves 92% accuracy than the previous method
An Automatic Leaf Recognition System for Plant Identification using Machine Vision Technology [15]	2013	ANN	High accuracy than the KNN classifier	ANN is a good choice for a scaled dataset.

D. Wijesingha et.al [08] presents a study of confirms the significance of leaf width, length, perimeter and area thus the results are achieved by the method of feature selection which can selected the features as of the most discriminant ones with combined them to other morphological features can increased to 85 %. Substantial deviations are observed in *S. angustisipalum* and *S. Oblongifolius* suggestive of requirements for more development of the scheme. Though, as the revise is on the basis of size of the limited sample, reconfirmation is required by the size of an adequate sample. The automated scheme is a new system of detection of plant through herbarium specimens, and believes that the accuracy, performance and results are achieved at the least promising and contain a possible in actual plant recognition appliance. In future, to improve the statistical results required to finding the good back propagation model.

Miss. Needa Samreen I.Khan et.al [11] proposes an image processing algorithms are used for the extraction of the morphological parameter that has a few importance and achieve on the classification of leaves. For recognize the accurate image of leaf detection system is developed. This proposed system is helpful to finds out the problem to identify accurate leaf. The system is used for those person keep view which can use the plant leaves for building Ayurveda medicine and it is used as good learning tool for botany student. The leaf detection system is implemented with the neural network and feature extraction points. Before feature extraction points a few pre-processing algorithm is applied like binarization, segmentation and digitization to leaf images. All vertical and horizontal feature points are extracted and also trained with the neural network and compared the input sample leaf image by the leaf image in the database to recognize the accurate plant leaf. The detection is on the percentage of match.

Table 1 shows a comparison table on the survey of various classification methods and feature extraction methods with their performance.

III. OVERALL BLOCK DIAGRAM

The overall block diagram is shows in Figure 2. This block diagram contains a feature extraction and classification blocks. Feature extraction is one of most important fields in artificial intelligence field. It contains to extract the more relevant features of the images and allocate it into the label. By using a feature extraction technique extract the feature from the preprocessed image. Then the extracted features are passed to classification, the vital stage is to study the property of image features and to categorize the statistical features into the classes.

The performance of the classification form and the classification of accuracy rate depend mainly on the numerical properties of different image features which representing the information of the classification forms. In latest years, different feature extraction techniques has been implemented and each technique having a strength and weakness. A best feature extraction technique provide significant features

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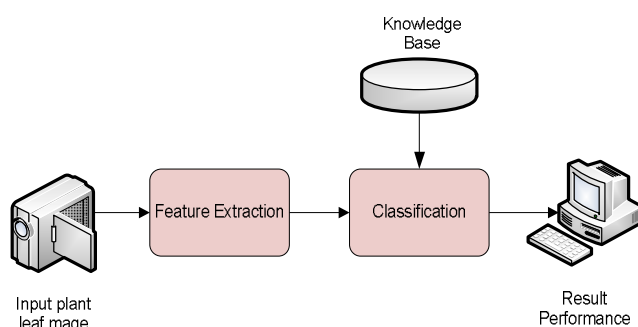


Figure 2 : Proposed System of Plant Classification

IV. EXPECTED RESULT

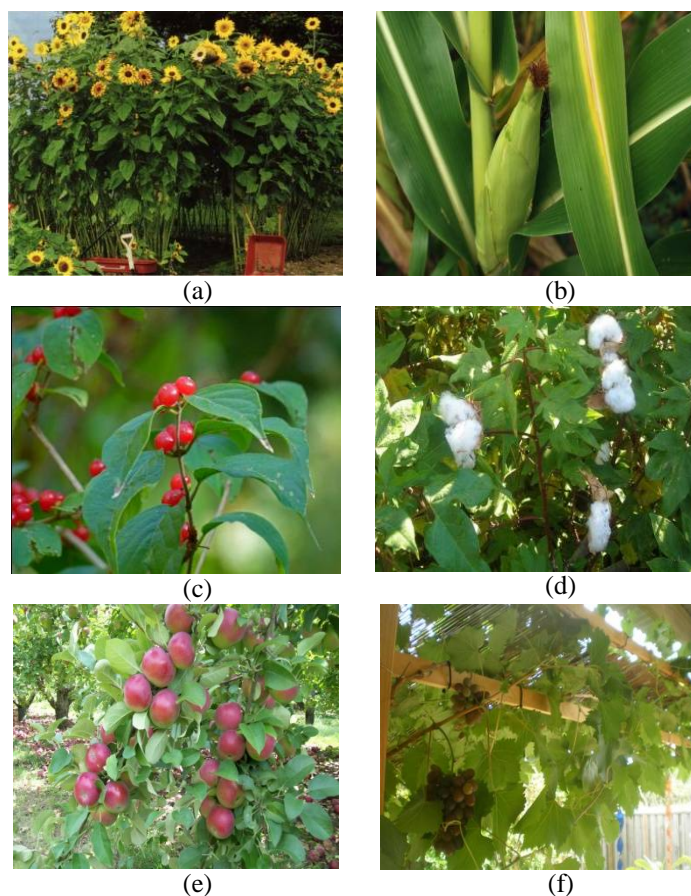


Figure 3: Different types of classification (a) Sunflower; (b) Wheat; (c) cotton; (d) Cherry; (e) Grape; (f) Apple leaves

The expected result is obtained on agricultural plants which images can be acquired in camera agro meteorological smart stations equipped by various sensors. The plants of the sunflower, wheat, cotton, cherry, grape and apple leaves as shown in Figure 3. This can be implemented by Matlab programming environment on a computer with window 7. Then, identifies the plant types and gives better performance.



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V. CONCLUSION

A survey of some classification methods has been done. This paper concludes different feature extraction with classification techniques for plant classification. The paper has gives an explanation and analysis of the methods and proposed method and implementation for the procedure of plant classification in the agricultural field. Each and every method has few advantage and limitation. This paper describes comparison between other methods; these algorithms are shows which is fast in execution, easy to implementation and efficient in identification.

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