Review Paper on Identification of Plant Diseases Using Image Processing Technique

Rani Pagariya, Mahip Bartere

Abstract— This paper contains the survey of various image processing techniques to detect various plant diseases using machine learning. Now a day's image processing technique is becoming a key technique for diagnosing the various features of the crop. The diseases can affect any part or area of the crop. This paper mainly focuses detection of various cotton crop diseases and to classify them. There are so many classification techniques such as k-Nearest Neighbor classifier , k-means Classifier, Probabilistic Neural Network, Genetic Algorithm, Support Vector Machine, and Principal Component Analysis, Artificial neural network, Fuzzy logic. Selecting a classification method is always a difficult task because the quality of result can vary for different input data. This paper provides an overview of different classification techniques used for plant leaf disease classification.

Keywords— image processing, k-means, nural network.

I. INTRODUCTION

India accounts for approximately 25 percent of world's cotton area and 16 percent of total cotton production. Maharashtra is the important cotton growing state in India with 31.33 lacks hectors area and production of 62.00 lack bales (2008-09), the 2nd largest producer of cotton in the world. About 3 million farmers are engaged in cotton cultivation in the state mostly in backward region of Marathwada and Vidarbha [1].

In Vidarbha region, cotton is the most important cash crop grown on an area of 13.00 lacks hectors with production of 27 lack bales of cotton (2008-09). Disease on the cotton is the main problem that decreases the productivity of the cotton [1],This decreases the productivity upto 25% of total production

The diseases can be easily identified with the help of the infected area of the crop. Generally through the naked eyes the observations taken by the Experts ancient time for the detection and identification of crop diseases. But for this the continuous monitoring is required by the Experts and it is too expensive in large fields. So in many under developed countries in agricultural area, farmer needs to take lots of efforts.

If we are using the machine vision then the identification and the classification of the plant will be done faster at every stage [2]. The machine vision system now a day is normally consists of computer, digital camera and application software. Various kinds of algorithms are integrated in the application software. Image analysis is one important method that helps segment image into objects and background. One of the key steps in image analysis is feature detection [1]. Transforming the input data into the set of features is called feature extraction [2].

The image processing now a day's become the key technique for the diagnosis of various features of the crop, providing new approach to explore the field of agriculture. The image processing can be used in the agricultural applications for the following purposes.[3]

1. To detect diseased leaf, stem, fruit.
2. To determine affected area by disease.
3. To find shape of affected area.
4. To determine the size and shape of fruits.

II. LITERATURE REVIEW

In the research of identifying and diagnosing cotton disease using computer vision intellectively in the agriculture, feature selection is a key question in pattern recognition and affects the design and performance of the classifier.

Various papers are suggesting to diagnosis the cotton leaves using various approach suggesting the various implementation ways as illustrated and discussed below.

Ajay A. Gurjar, Viraj A. Gulhane in Detection of Diseases on Cotton Leaves and Its Possible Diagnosis [1] proposed that, The features could be extracted using self organizing feature map together with a back-propagation neuralnetwork is used to recognize colour of image. This information is used to segment cotton leaf pixels within the image, now image which is under consideration is well analyzed and depending upon this software perform further analysis based on the nature of this image. According to them this system is providing 85 to 91% of exact disease detection depending upon the quality of image provided by the portable scanner and the training. More train network leads to a very efficient diagnosis of the cotton leaf disease.

In Infected Leaf Analysis and Comparison by Otsu Threshold and k-Means Clustering[2] , Prashant R. Deshmukh and Mrunalini R. Badnakhe has compared two main techniques used for image processing that is ostu threshold and k-means and concluded that k-means is better technique as compared to ostu threshold asDifference extracted for Otsu threshold are more than the same extracted value for k-means clustering.

P. Revathi andM. Hemalatha inHomogenous Segmentation based Edge Detection Techniques for Proficient
Identification of the Cotton Leaf Spot Diseases[3] proposed a system that usesmobile captured symptoms of cotton leaf spot images and classify the diseausing neural network. The major objective of their Research work is to use Homogeneity-based edge detector segmentation, which takes the result of any edge detector and divides it by the average value of the area.

3667

In this work achieving the goal of Homogeneity-based edge detector takes the result of any edge detector and divides it by the average value of the area. This division removes the effect of uneven lighting in the image. The average value of an area is available by convolving the area with a mask containing all ones and dividing by the size of the area and train and test using a neural network classifier.

In Leaf Disease Detection Using Image Processing Techniques [4] , Hrushikesh Dattatray Marathe and Prerna Namdeorao Kothe proposed a system which detects disease by calculating leaf area through pixel number statistics, the proposedalgorithm will help to detect amount of disease present onthe leaf, by means of presence of holes & changes in thecolor. It will be easy to go for the severity measurement of disease.

In, Identification of nitrogen deficiency in cotton plant by using image processing[5], by Swapnil Ayane, M. A. Khan and S. M. Agrawal considered the pattern that appeared on the leaf for detection of disease. The various feature of image of leaf are extracted such as area, shape, shape of holes present on the leaf, diseases spot, etc. These features are extracted using using different image processing techniques. These extracted feature are used determinethe occurrences of particular deficiency related to primary nutrient of cotton leaf. Nitrogen deficiency can be detected by two preliminary steps, histogram analysis and measurement of leaf area. The leaf with deficiency has compared to that normal leaf , The leaf with deficiency has reduced area compared to that of normal leaf.

In Digital image processing techniques for detecting, quantifying and classifying plant Diseases[6], Jayme Garcia and Arnal Barbedo presents a survey on methods that use digital image processing techniques to detect, quantify and classify plant diseases from digital images in the visible spectrum**.**

P.Revathi, M.Hemalatha in "Classification of Cotton Leaf Spot Diseases Using Image Processing Edge Detection Techniques" .

In this paper consists of two phases to identify the affected part of the disease. Initially Edge detection based Image segmentation is done, and finally image analysis and classification of diseases is performed using our proposed Homogeneous Pixel Counting Technique for Cotton Diseases Detection (HPCCDD) Algorithm. The goal of this research work is identify the disease affected part of cotton leaf sport by using the image analysis technique. This work find out the computer systems which analyze the input images using the RGB pixel counting values features used and identify disease wise and next using homogenization techniques Sobel and Canny using edge detection to identify the affected parts of the leaf spot to recognize the diseases boundary is white lighting and then result is recognition of the diseases as output.

In Cotton Leaf Spot Diseases Detection Utilizing Feature Selection with Skew Divergence Method[8] P. Revathi, M. Hemalatha proposed a system in which Enhanced PSO feature selection method adopts Skew divergence method and user features like Edge ,Color, Texture variances to extract the features. Set of features was extracted from each of them. The extracted feature was input to the SVM, Back propagation neural network (BPN),Fuzzy with Edge CYMK color feature and GA feature selection. The obtained features has been classified using SVM, BPN and Fuzzy classifiers. The proposed EPSO feature method gives better performance when combined with fuzzy classifier. The accuracy of this system is 94% is obtained using our proposed EPSO feature extraction which extracts Edge, Color and texture features and a feature vector is constructed using Skew divergence distance methods.

An Application of K-Means Clustering and Artificial Intelligence in Pattern Recognition for Crop Diseases [9],Mrunalini R. Badnakhe and Prashant R. Deshmukh2 , the proposed system to classify and identify the different diseaseaffected plant.

The proposed system was as follows

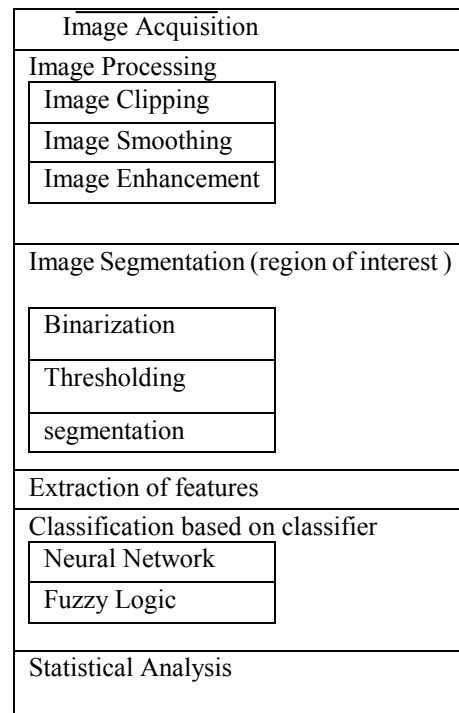| Image Acquisition |
|---|
| Image Processing |
| Image Clipping |
| Image Smoothing |
| Image Enhancement |
| Image Segmentation (region of interest) |
| Binarization |
| Thresholding |
| segmentation |
| Extraction of features |
| Classification based on classifier |
| Neural Network |
| Fuzzy Logic |
| Statistical Analysis |

Fig1.Digital Image processing

In An Improved Cotton Leaf Spot Disease Detection using Proposed Classifiers[13] , P. Revathi1 and M. Hemalatha proposed a machine learning approach based on digital cotton leaf disease classification and retrieval are achieved by extracting features from its leaf image. Various approaches has been used to classify the class of leaf diseases based on the crops features. In this investigation crops are classified on the basis of shape, color and texture with SVM, BPN, Fuzzy along with Edge, CMYK features and GA feature selection are combined for training and testing the cotton diseases dataset. Then extract edge, color and texture features using proposed Enchance Particle Swarm Optimization (EPSO) feature selection method adopts Skew divergence features. Variance has been used to recognize the wounded leaf part. After that Proposed classifiers are Cross Information Gain_Deepforward Neural Network, Cross Information Gain_Minimal Resources allocation used to predict he disease.

In [18] comparison between data clustering algorithms osama Atbu Abbas had compared various data clustering algorithm , which are widely used in image

processing for classification , concluded that k-means gives the better result as compare to other imeage processing technique.

III. CONCLUSION

This paper provides the survey of different techniques for leaf disease detection. The main characteristics of disease detection are speed and accuracy. Hence there is working on development of fast, automatic, efficient and accurate system, which is use for detection disease on unhealthy leaf. Work can be extended for development of system which identifies various pests and leaf diseases also. As now a day's pest are affecting plants more and more which is reducing the production at great extent . Hence fast and accurate system is required to detect the pests on cotton.

REFERENCES

[1]. Mr. Viraj A. Gulhane,   Dr. Ajay A. Gurjar, "Detection of Diseases on Cotton Leaves and Its Possible Diagnosis ", International Journal of Image Processing (IJIP), Volume (5) : Issue (5) : 2011.

[2]. Mrunalini R. Badnakhe,   Prashant R. Deshmukh , "Infected Leaf Analysis and Comparison by Otsu Threshold and k-Means Clustering", IJARCSSE Volume 2, Issue 3, March 2012.

[3]. P. Revathi M. Hemalatha, "Homogenous Segmentation based Edge Detection Techniques for Proficient Identification of the Cotton Leaf Spot Diseases", a, International Journal of Computer Applications (0975 – 888) Volume 47– No.2, June 2012.

[4]. Hrushikesh Dattatray Marathe , Prerna Namdeorao Kothe, "Leaf Disease Detection Using Image Processing Techniques", IJERT Volume 2 Issue 3, March – 2013

 [5]. Swapnil S. Ayane, M. A. Khan, S. M. Agrawal ,"Identification Of Nitrogen Deficiency In Cotton Plant By Using Image Processing", IJPRET, 2013, Volume 1(8): 112-118.

[6]. Jayme Garcia ,   Arnal Barbedo , "Digital image processing techniques for detecting, quantifying and classifying plant Diseases", Springerplus. 2013; 2: 660.

 [7]. P.Revathi, M.Hemalatha "Classification of Cotton Leaf Spot Diseases Using Image Processing Edge Detection Techniques" IEEE 2012.

[8]. P. Revathi, M. Hemalatha, " Cotton Leaf Spot Diseases Detection Utilizing Feature Selection with Skew Divergence Method", IJSET , Volume (3), Issue (1), Jan 2014.

[9]. Mrunalini R. Badnakhe , Prashant R. Deshmukh " An Application of K-Means Clustering and Artificial Intelligence in Pattern Recognition for Crop Diseases" 2011 International Conference on Advancements in Information Technology With workshop of ICBMG 2011,IPCSIT vol.20 (2011) © (2011) IACSIT Press, Singapore.

[10]. " An Improved Cotton Leaf Spot Disease Detection using Proposed Classifiers" , P. Revathi1 and M. Hemalatha IJERT Volume (2) : Issue (12), December   2013.

[11] Osama Atbu Abbas , "comparison between data clustering algorithms" IAJIT, Volume (5) : Issue (3), JULY 2008.

First Author name :- Rani Pagariya,, G.H. Raisoni College of Engineering and Management, Amravati, India .
Second Author name :- Mahip Bartere, G.H. Raisoni College of Engineering and Management, Amravati, India