

Leaf Disease Detection using Image Processing Technique- A Survey

Ajay Kumar

Kalinga University, Raipur C.G., India

Available online at: www.ijcseonline.org

Abstract—This paper contains the review of different image processing techniques to detect various leaf diseases using machine learning. Now a day's image processing technique is becoming a key technique for diagnosing the various features of the leaves. The diseases can touch part or area of the leaf. This paper mainly focuses detection of various leaf diseases and to classify them. The detection of leaf disease is mostly based on type of family leaves and same is approved by segmentation and classification. There are so many classification techniques such as Decision tree classifier, k-Nearest Neighbour classifier, k-means Classifier, Probabilistic Neural Network, Genetic Algorithm, Support Vector Machine, and Principal Component Analysis, Artificial neural network, Fuzzy logic. Assortment of classification method is always a difficult job because the quality of result can differ for dissimilar input data. This paper provides an overview of diverse classification techniques used for leaf disease classification [1].

Keywords— image processing, k-means, neural network, Support Vector Machine.

I. INTRODUCTION

Diseases in leaves is one of the important factor which causes significant reduction in the quality and quantity of leaf production. Discovery and ordering of leaf diseases are important task to increase

Leaf throughput and profitable progress. Discovery and ordering are one of the interesting concerns and greatly more discussed in Science and information technology fields.

There are various practices emerged to discover the leaf disease such as thresholding, region growing, clustering, watershed, etc. To discover leaf disease the image should go through pre-processing, segmentation, feature extraction and classification processes. The pre-processing is an enhancement process of image data to suppresses unwanted bias or enhances some image features important for further processing. The segmentation procedure is to partition an image into significant regions and it is vigorous process through which image features are take out. There are various qualities of an image such as grey-level, colour, texture, shape, depth, motion, etc. Grouping process is used to classify the given input data into number of classes and groups. It categorises the data based upon selected qualities [2].

India financial records for about 25 percent of world's cotton area and 16 percent of total cotton fabrication. Maharashtra is the important fibre growing state in India with 31.33 lacks hectors capacity and construction of 62.00 lack bales (2008-09), the 2nd largest fabricator of cotton in the world. About 3 million planters are tied up in cotton farming in the state

mostly in backward region of Marathwada and Vidarbha. In Vidarbhaarea, fibre is the most important cash harvest grown on an area of 13.00 lacks hectors with fabrication of 27 lack bales of cotton (2008-09). Disease on the fibre is the main problem that decreases the throughput of the fibre, This decreases the throughput to 25% of total fabrication. The diseases can be easily recognized with the help of the diseased area of the harvest. Generally through the naked eyes the clarifications taken by the Experts earliesttime for the discovery and identification of harvest diseases. But for this the non-stop monitoring is required by the Experts and it is too luxurious in huge fields. So in many under settled countries in farming area, agriculturalist needs to take lots of efforts. If we are using the machine vision then the identification and the ordering of the leaf will be done faster at every stage. The machine visualisation system now a day is normally consists of computer, digital camera and application software. Numerous kinds of procedures are incorporated in the application software. Image analysis is one important method that helps slice image into objects and background. One of the key steps in image analysis is feature discovery. Converting the input data into the set of features is called feature extraction. The image processing now a day's convert the key technique for the diagnosis of various features of the harvest, providing new approach to explore the field of farming. The image processing can be used in the agricultural applications for the following determinations [1].

1. To discover unhealthy leaf, branch, fruit.
2. To conclude unnatural area by disease.
3. To find shape of unnatural area.
4. To decide the size and shape of fruits.

II. BASIC TYPES OF LEAF FAMILIES

A. Monocot Family Leaf: Disease identification rest on the type of leaf family. There are basically two types of leaf Monocot family leaf and Dicot family leaf. The Monocot family leaf has dissimilar characteristics such as one seed leaf, leaf veins are straight and parallel, absence of wood. Examples of Monocot family leaves are wheat, ginger, corn, rice, millet, lilies, banana, palm, sugarcane, onions, banana tree, bamboo, and grass, turmeric etc.



B. Dicot Family Leaf Dicot family leaf has characteristics such as two seed leaf, nested leaf veins and complex structured, woody as well as woodless. Examples of Dicot family leaves are cotton, potatoes, tomatoes, beans, honeysuckle, roses, peppers, strawberry, coffee, etc. Cotton is preferred to make textile products and yarn products in India [2].



III. DIGITAL IMAGE PROCESSING IN DETECTING LEAF DISEASE

Digital image processing is the use of computer algorithms to perform image processing on digital images. An image may be defined as a two-dimensional function, $f(x, y)$, where x and y are spatial (plane) coordinates, and the amplitude of at any pair of coordinates (x, y) is called the intensity or grey level of the image at that point. When x, y and the intensity values of f are all finite, discrete quantities, we call image a digital image. Digital image is composed of a finite number of elements, each of which has a particular location and value. The input of that system is a digital image and the system process that image using efficient algorithms, and gives an image as an output. In figure 1.1, the process of digital image processing is defined in the form of phases [3].

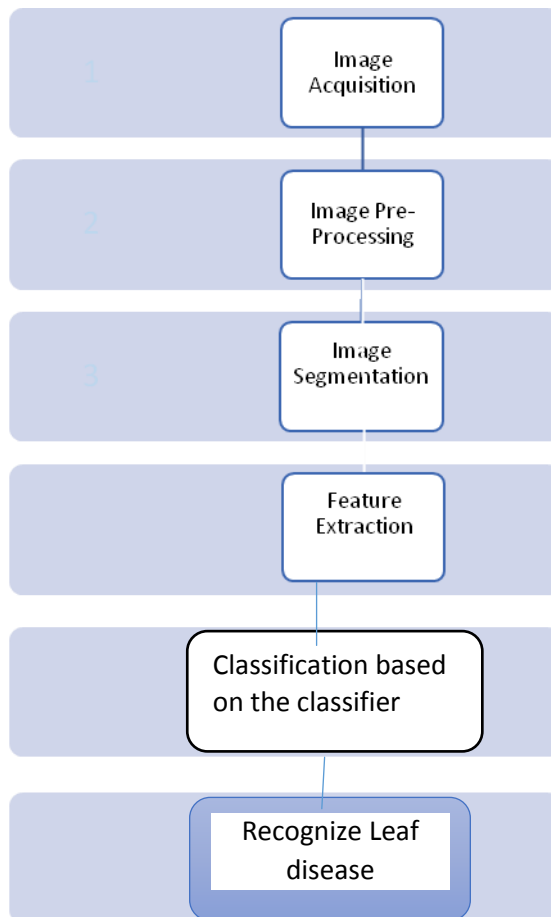


Figure 1.1 Digital Image Processing

IV .LITERATURE REVIEW

Recognising and analysing fibre disease using computer visualisation intellectually in the farming, feature assortment is a key question in pattern recognition and distresses the design and act of the classifier. Various papers are suggesting to analysis the fibre leaves using various approach signifying the various execution ways as illustrated and discussed below. Ajay A. Gurjar, Viraj A. Gulhane in Detection of Diseases on Fibre Leaves and Its Possible Judgement [5] 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 fibre leaf pixels within the image, now image which is under concern 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 precise disease uncovering depending upon the quality of image provided by the scanner and the training. More train network leads to a very efficient diagnosis of the fibre leaf disease.

Chhattisgarh is one out of twenty-nine state in India. Chhattisgarh is located northern part of India, this area is fully fertile land and total economy is based on crops i.e. rice, wheat, Maize, Gram, Tur, Soybean, Rape and Mustard. Production of rice in Chhattisgarh is large as compare to other crops. All this crops are suffering various diseases, nursery to reproductive stage. Technology involving in agriculture is an improving productivity, tracking climate changes, protecting the environment and also increasing the food securities. Agriculture and engineering involve for forming new branches agriculture engineering. Automation, machinery, disease analysis involve in agriculture to improve rural area that why we called rural development (RD). In the context of rural development (RD) electronics based agriculture involve wireless, Image processing, automation, e-mobile are playing a role. In this survey paper we include the Image processing part for rural development for crops diseases detection. Various diseases occur in different parts of the leaf can be identified by observing the change in symptoms, spots, colour etc. The fast and automatic judgement technique is the major requirement in farming to improve the harvest fabrication rate. Recently, image processing approaches have been used to solve the diverse problems based on agriculture applications like to discover disease leaf, branch, and fruit. Leaf disease harshness measurement and discovery using image processing had reported by diverse researchers [4].

Savita N. Ghaiwat, Parul Arora proposed the k-nearest-neighbor method is possibly the simplest of all algorithms to predict the set of a test example. An understandable disadvantage of the k-NN method is the time complexity of making predictions. Moreover, neural networks are liberal to noisy inputs. But in neural network it's difficult to understand formation of algorithm. SVM was found viable with the best available machine learning algorithms in classifying high-dimensional data sets. In SVM computational complexity is reduced to quadratic optimization problem and it's easy to control complexity of decision rule and occurrence of error. Drawback of SVM is it's difficult to determine optimal parameters when training data is not linearly divisible. Also SVM is more complex to understand and implement [6].

Prof. Sanjay B. Dhaygude, Mr. Nitin P. Kumbhar describes an use of texture statistics for detecting the plant leaf disease has been explained initially by color conversion structure RGB is renewed into HSV space because HSV is a good color descriptor. Masking and removing of green pixels with pre-computed threshold point. Then in the next step fragmentation is performed using 32X32 patch size and obtained useful portions. These segments are used for texture analysis by color co-occurrence matrix. At last if texture parameters are compared to texture parameters of normal leaf. The extension of this work will focus on

developing algorithms and NN's in order to increase the recognition rate of classification process [7].

Sumit Nema, Bharat Mishra,, Mamta Lambert presents a full review available in literature to design advance android application to detect the leaf disease by using image processing techniques. The dissimilar methods used in image processing, merits demerits and potential applications of each technique also described. The main issues and challenges are also explained. These suggestions are useful for researchers and policy makers. The scope of development of mix algorithms such as genetic algorithms, cuckoo optimization, and particle swarm optimization and Ant colony etc. In order to increase the convergence and detection rate of the final classification process [8].

Sabah Bashir, Navdeep Sharma adopted method in his paper is used for arrangement of a variety of kinds of plant diseases using texture and color analysis. A Bayes classifier can be used to categorize different plant diseases working upon the consequential images. We have considered some images samples, both normal and affected of *malus domestica*. First the samples are acquired then color and textures features are applied to extract useful features that are necessary for perceptive normal and affected image samples using a classifier. In future we can utilize Bayes, K-means clustering and principal component classifier can be analyzed for classification purpose [9].

V. CONCLUSION

This paper provides the study of different techniques for leaf disease detection. The main features of disease detection are quickness and correctness. Hence there is working on growth of fast, automatic, effective and precise system, which is use for detection disease on unnatural leaf. Work can be prolonged for development of system which identifies several pests and leaf diseases also. As now a day's pest are affecting leafs more and more which is sinking the production at great amount. So fast and accurate system is required to detect the pests on cotton. For ordering and feature taking out, GLCM along with Support Vector Machine classifier were found to be better in performance in comparison to others.

REFERENCES

- [1]. Rani Pagariya, Mahip Bartere "Review Paper on Identification of Leaf Diseases Using Image Processing Technique", International Journal of Advanced Research in Computer Engineering & Technology (IJARCET) Volume 3 Issue 11, November 2014.
- [2]. Sagar Patil, and Anjali Chandavale "A Survey on Methods of Leaf Disease Detection", International Journal of Science and Research (IJSR) ISSN (Online): 2319-7064 Index Copernicus Value (2013): 6.14 | Impact Factor (2013): 4.438.
- [3]. Sujeet Varshney, Tarun Dalal "Plant Disease Prediction using Image Processing Techniques- A Review", Sujeet Varshney et al,

International Journal of Computer Science and Mobile Computing,
Vol.5 Issue.5, May- 2016, pg. 394-398.

- [4]. Yashpal Sen, Chandra Shekhar Mithlesh, Dr. Vivek Baghel “ A SURVEY ON CROP DISEASE DETECTION USING IMAGE PROCESSING TECHNIQUE FOR ECONOMIC GROWTH OF RURAL AREA”, IJARIT(ISSN: 2454-132X).
- [5]. 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.
- [6].G. Savita, A. Parul, “Detection and classification of leafleaf diseases using image processing techniques: a review,” Int. J. Recent Adv. Eng. Technol., vol. 2, pp. 2347–812, 2014.
- [7]. B. Dhaygude, N. P. Kumbhar, “Agricultural leafleaf disease detection using image processing,” Int. J. Adv. Res. Electr. Electron. Instrum. Eng., vol. 2, pp. 599-602, Jan. 2013.
- [8]. Sumit Nema, Bharat Mishra., Mamta Lambert “Advance App Design Methods of Leaf Disease Detection using Image Processing Approach – A Review”, IJRSET, ISSN(Online) : 2319-8753.
- [9]. S. Bashir, and N. Sharma, “Remote area leaf disease detection using image processing,” IOSR J. Electron. Commun. Eng., vol. 2, pp. 31-35, Sep. 2012.