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STUDY ON IDENTIFICATION AND MANAGEMENT OF CROP DISEASES IN AGRICULTURE USING IMAGE PROCESSING

PROF. SWAPNIL A. BOBADE, PROF. SHASHIKANT R. THAKARE

Assistant Professor, College Of Engineering and Tech. Akola.

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Abstract: This paper provides a survey on agricultural plant disease detection by using image processing. Image processing is an effective tool for analysis in various fields and applications. In agricultural field, Plants suffer from many diseases. Most of the times expert advice may not be affordable or experts are not available and their services may consume time. Image processing along with availability of communication network can change the situation of getting the expert advice well within time and at affordable cost since image processing was the effective tool for analysis of parameters. Application of image processing can improve decision making for early pest identification of crops, irrigation etc. In this paper my aim is to study and find methods used by researchers all over the world for identification of plant diseases.

Keywords: Plant disease, leaf disease, image processing, Agriculture, Mobile technology.

Corresponding Author: PROF. SWAPNIL A. BOBADE

Co Author: PROF. SHASHIKANT R. THAKARE

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INTRODUCTION

India is an agricultural country where most of the peoples are depend on agriculture. Crops are infected by number of diseases which are observe on leafs or stems of plant. To manage diseases is a challenging task for farmers. Irrigation, Fertilizers, pesticides and quality are the major factors of concern in agriculture. Most of the time the expertise were required to analyze the problems and which may be time consuming and expensive. The management of crops has need of close observation particularly for the management of diseases that can affect production extensively.

Image processing is one of the tools which can be utilized to measure the parameters related to crop management. To determine the accurate value of these visually observed diseases has not to learn yet because of the difficulty of visual pattern. It can be improved by the help of technological support. With a massive volume of plant species data and extensive computing for plant recognition, the process becomes more complex and requires longer time. However, it becomes a big challenge for any system designer to design an image processing system using parallel and distributed computing. There are limited literatures on parallel and distributed image processing for agriculture application unlike other application, such as for medical imaging application. The application of agriculture science such as image processing, parallel and distributed computing reduces the computational time and as a result, plant recognition can be made much faster. This paper mainly focuses on study the application of image processing in various domains of agriculture. In evolution towards sustainable agriculture system it was clear that important contributions can be made by using emerging technologies. With the new techniques it was now possible to reduce errors, costs and inexpensively sustainable agriculture.

LITERATURE REVIEW

India is an agricultural country where most of the population depends on agriculture. Agriculture plays a major role in the Indian economy as it not only provides food and raw material but also generates employment opportunities to the large Indian population. The main aim of this study is the diseases of crops. If the crop disease is detected in earlier stage the yield loss can be reduced.

All over the world the researchers are working for disease identification by using the various tools or application of image processing. For example Fig: 1 shows the observable patterns found in agricultural plants affected by diseases. The following study describes the work done in this field.

Fig 1: leaf disease in cotton plant

Some authors are describing to find leaf diseases using various methods and to recommend the various implementations as illustrated and describe here.

Ganesh Bhadane, Sapana Sharma and Vijay B. Nerkar in paper titled Early Pest Identification in Agricultural Crops using Image Processing Techniques [1] proposed a software prototype system for pest detection on the infected images of different leaves. Images of the infected leaf are captured by digital camera and processed using image growing, image segmentation techniques to detect infected parts of the particular plants. Then the detected part is been processed for further feature extraction which gives general idea about pests. This proposes automatic detection and calculating area of infection on leaves of a whitefly at a mature stage. First objective is to detect other whitefly stages (eggs, larvae) and other bioagressors (aphids) or plant diseases (powdery mildew). Thanks to our cognitive approach, it is simple to introduce new objects to detect or new image processing programs to extract the corresponding information. We propose an original approach for early detection of bioagressors, which has been applied to detect mature whiteflies on rose leaves. To detect biological objects on a complex background, we combined scanner image acquisition, sampling optimization, and advanced cognitive vision. It illustrates the collaboration of complementary disciplines and techniques, which led to an automated, robust and versatile system. The prototype system proved reliable for rapid detection of whiteflies. It is rather simple to use and exhibits the same performance level as a classical manual approach. Moreover, it detects whiteflies three times faster and it covers three times more leaf surface. The context of our work is to automate operations in greenhouses. Our goal is rather to better spot the starting points of bioagressors attacks and to count these latter so that necessary action can be taken.

The authors Kolhe S., Saini H.S., Kamal R.and Gupta G.K. in paper titled Knowledge Management System for Crop Diseases [2] proposed a knowledge management system for crop

disease. The aim of their study was to provide a knowledge management tool for efficient knowledge acquisition, storage, knowledge engineering, processing and proper maintenance of knowledge that can be ultimately used by the diagnostic expert system. The developed system simplifies the complete process of knowledge management by providing user-friendly interface to the domain expert for entering and storing knowledge to solve the disease identification and control problem particularly for oil seeds crops. The system presently applies to the knowledge management of 25 prevalent diseases of three major oil seeds crops of India viz. soybean, ground nut and rapeseed mustard.

Mr. Hrishikesh P. Kanjalkar and Prof. S. S. Lokhande in Paper titled Detection and Classification of Plant Leaf Diseases using ANN [3] developed software solution for automatic detection and computation of plant leaf diseases. Cotton and soybean plants were used for the research. The developed processing system consists of five key steps, first a color transformation structure for the input RGB image is formed, then the noise i.e. unnecessary part is detached using the specific threshold value, then the image is segmented with linked component labeling and the useful segments are extracted, at the end ANN classification is computed by giving different features i.e. size, color, proximity and average centroid distance. Experimental detected angular leaf spots on cotton plant with an accuracy of 83%.

Anand. H. Kulkarni, Ashwin Patil R. K. in paper titled Applying image processing technique to detect plant diseases[4] present work proposes a methodology for detecting plant diseases early and accurately, using diverse image processing techniques and artificial neural network (ANN). In this work the area of plant diseases recognition is introduced. The system developed here is for plant diseases recognition, the development of good classification methods and precise features is very important in order to run the system in real time. Therefore proposed approach which is based on Gabor filter for feature extraction and ANN classifier for classification got a better results and recognition rate up to 91%. An ANN based classifier is adopted which uses the combination of color and texture features to recognize and classify different plant diseases. The results are encouraging and promise the development of a good machine vision system in the area of recognition and classification of plant diseases. The proposed approach can significantly support in recognizing normal and affected produce.

Processing Prof. Sanjay B. Dhaygude, Mr. Nitin P. Kumbhar in paper titled Agricultural plant Leaf Disease Detection Using Image [5] application of texture statistics for detecting the plant leaf disease has been explained Firstly by color transformation structure RGB is converted into HSV space because HSV is a good color descriptor. Masking and removing of green pixels with pre-computed threshold level. Then in the next step segmentation is performed using 32X32 patch

size and obtained useful segments. These segments are used for texture analysis by color co-occurance matrix. Finally 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.

Sabah Bashir1, Navdeep Sharma paper titled Remote Area Plant Disease Detection Using Image Processing [6] presents an effective method for detection of diseases in Malus Domestica using methods like K-meanclustering, color and texture analysis. In this paper an effective image segmentation algorithm has been implemented for color and texture analysis. The following steps are implemented in the algorithm for plant disease detection: 1. Images for detection the samples of Malus Domestica both healthy and affected are collected using a digital camera. 2. Separation of RGB Components The format for color images is the RGB. Each matrix corresponds to one segment of the red color, green color or blue and gives an indication of how much of each of these colors a certain pixel should use. A histogram is a chart that expresses the intensity variations in an indexed or a grayscale image. The information in a histogram can be used to choose appropriate enhancement operation. The process of manipulating intensity values can be done automatically by the histeq function. Histogram equalization can be performed by histeq function which involves transforming the intensity values so that the histogram of the output image approximately matches a specified histogram.

CONCLUSION

Image processing technique has been proved as effective system for agriculture domain. Disease detection is a system which identifies the affected part of leaf spot by using image processing technique. The literature survey done in this paper provides a new insight in detection and management of plant diseases. The paper proposed is a valuable approach which can significantly support an accurate detection of leaf diseases in little computation efforts. Thus we can conclude that image processing was the non invasive and effective tool that can be applied for the agriculture domain with great accuracy for analysis of agronomic parameters. Today most of the people use mobile. There is still scope to develop new model and improve existing models for plant disease identification using mobile and multimedia technology. Such a research will help the farmers in identification and managing of plant disease in their own language.

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