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Advance in Image Processing for Detection of Plant Diseases

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Abstract: The aim of this paper is to design, implement and evaluate an image processing software based solution for automatic detection and classification of plant leaf disease. Currently, there are various diseases seen on the plants. For controlling such diseases, it is essential to detect a particular disease. In our country many farmers are not so educated to get correct information about all diseases, they require expert advice. However, it is impossible for expert to reach at each farmer. Even if they got expert, expert uses naked eye observation. But naked eye observation has very less accuracy. A new strategy is acquainted for detecting plants leaf diseases.It is very sensitive and accurate method in the detection of plant diseases, which will diminish the losses and enhances the economical profit.Following steps are involved i.e. Image acquisition, image pre-processing, features extraction and neural network based classification. There are different classification techniques. Nevertheless,in this study we are implementing artificial neural network for the classification of the disease and we will compare the results acquired from feed forward neural network and Radial basis function neural network.

Keywords: Automatic detection, Diseases, image acquisition, image pre-processing, features extraction.

I. INTRODUCTION

India is an agricultural country where 70% of the populations relyon agriculture and agriculture is one of the fundamental domains which determine economy of the nation [1]. In an agriculture field, plants are essential means of resources and production of human beings. The kinship among plants and human beings are very imminent. Plants persevere the oxygen and carbon dioxide of earth's atmosphere. Plant disease can be recognized by utilizing distinct strategies. The diseased image has environmental effects like weather, light and other conditions which are beyond control of human beings [2]. Plant disease is defined as any damage of conventional physiological function of plants, producing characteristic symptoms [3]. The detection of disease plays a significant role in the area of the agriculture because the diseases on the plant are unavoidable. Plant disease is one of the critical originators that lessen quantity and reduces quality of the agriculture products [4].

The disease symptoms can be originally starts on stem part which moderately percolates to leaves and then to fruits. The inception of the disease on the leaves with meagre , On leaves, the disease starts with small, haphazard , water soaked spots that are 2 to 5 mm in size with necrotic centre of pin head size [5]. Plant diseases cause cyclic plague of diseases which give rise to massive death and famine. Because the effects of plant diseases were calamitous, part of the crop cultivation has been relinquished. The naked eye monitoring of experts is the essential strategy adopted in practice for detection and identification of plant diseases [6]. Farmers need continuous observations of experts which might be intensely extravagant and time consuming. As a consequence, looking for fast [7], less expensive and accurate method to automatically detect the diseases from the symptoms that appear on the plant leaf is of great realistic significance. Farmers have wide range of diversity to select suitable Fruit and Vegetable crops. But, the cultivation of these crops for excellent yield and quality produce is immensely technical. It can be enhanced by the advancement of technological support [8]. So, the image processing can be exploited in agricultural appliances for following purposes [9]:

i. To diseased leaf, stem, fruit.
ii. To determine affected area by disease.
iii. To find shape of affected area.
iv. To evaluatecolor of affected area.
v. To assess size & shape of fruits.

Following two examples shows that how some diseases have demolish the economies of nations

Figure 1: Potato leaf affected by late blight

The above potatoleaf shows that the plant is agonises from disease or the inadequacy. Figure 1 demonstrates the potato leaf affected by late blight.

Figure 2: Leaf symptoms of canker on top and bottom leaves

In most cases pests or diseases are seen on the leaves or stems of the plant. As a result, identification of plants, leaves, stems and finding out the pest or diseases, percentage of the pest or disease incidence, symptoms of the pest or disease attack, plays a key role in successful cultivation of crops [7]. Now a day, image processing plays a significant role in agriculture field. The organization of the paper is as follows. In section II methodology of the presenting/suggesting approach is discussed. Section III presents the results obtained and section IV conclude and presents the future scope of the suggesting approach.

II. PROPOSED METHODOLOGY

The target of the proposed methodology is to set an accurate disease grouping system for plant leaves [10]. An image processing based solution is implemented for detection and classification of plant diseases. The entire concept for any vision related model of image classification is approximately similar. For practical purposes, several leaf samples are examined. In order to examine the leaf diseases, following steps are followed (A) Image acquisition (B) Image preprocessing (C) Feature extraction (D) Classification (E) Diagnosis.

(A) Image acquisition: It is defined as the process of retrieving an image from some source, commonly a hardware based source so it can be passed through whatever process is need to occur afterward known as image acquisition.

(B) Image preprocessing: It is also called as image restoration, involves the correction of distortion, degradation and noise acquainted during the image processing

(C) Feature extraction: It is related to dimensionality reduction.

Figure given below describe the fundamental layout that any vision-based detection model would implemented.

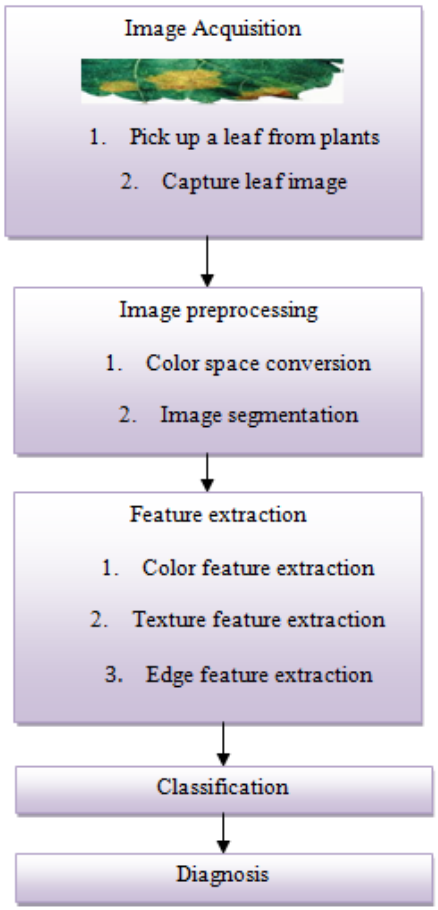

Figure 3: The basic procedure of the proposed image processing- based disease detection solution

The block diagram represents the chronological steps by which the entire process is done. This technique gives a very evident way of identifying the numerous diseases of plant, and also determines that the disease is in which stage. All these are done through distinct image processing strategies.

There are five main steps implemented for the detection of plant leaf diseases as shown in fig 3. The processing scheme consists of image acquisition through digital camera or web, image pre-processing includes image enhancement and image segmentation where the affected and useful area are segmented, feature extraction and classification. Finally the presence of diseases on the plant leaf will be identified. In the initial step, RGB images of leaf samples were picked up. The step-by-step measure is described in model. Following are the fundamentalsteps that describe the proposed model.

1. RGB image acquisition
2. Create the color transformation structure
3. Convert the color values in RGB to the space specified in the Color transformation structure.
4. Apply K-means clustering
5. Masking green-pixels
6. Remove the masked cells inside the boundaries of the infected clusters.
7. Segment the components
8. Obtain the useful segments
9. Computing the features using color co-occurrence methodology.
10. Configuring Neural Networks for Recognition.

III. RESULTS AND DISCUSSION

For the simulation we have taken 100 images from two different categories. Images from category1 belong to spot while images from category2 belong to scorch. For classification we have extracted color, texture and geometric features which is implemented for the training of the Feed forward neural network and Radial basis function neural network. After successful training classification rate for both the categories and for the classifier is:

Classifier:

- Feed Forward Neural Network

Recognition Rate:

- Spot Category Images: --- %
- Scorch Category Images: ---%

Classifier:

- Radial Basis Function Neural Network

Recognition Rate:

- Spot Category Images: ---%
- Scorch Category Images: ---%

Table 1: Simulation table for radial basis function neural network

SIMULATION ROUND	CLASSIFIER USED	SCORCH CLASS CLASSIFICATION PERCENTAGE	SPOT CLASS CLASSIFICATION PERCENTAGE
1	RBFNN	100	100
2	RBFNN	100	100
3	RBFNN	100	100
4	RBFNN	100	100
5	RBFNN	100	100
6	RBFNN	100	100
7	RBFNN	100	100
8	RBFNN	100	100
9	RBFNN	100	100
10	RBFNN	100	100

IV. CONCLUSION

A detailed study is completed to investigate the use of advance in image processing for the detection of plant diseases. A system for diagnosis the detection of plant disease has been developed using the Matlab application. In this paper, two distinct classes of plant diseases viz. scorch and spot are implemented for the detection of plant diseases. This technique is successfully implemented. The image data of the leaves is collected by using a digital camera. Algorithms for segmentation, feature extraction and classification based on image processing techniques were designed. The Feature extraction process used color co-occurrence methodology (CCM method), shape and texture based featured extraction. In CCM method, both the color and texture of an image are taken into account, to arrive at unique features, which represent that image. The manual feeding of the datasets, in the form of digitized RGB color photographs was implemented for feature extraction and training the data. After training, the test data sets were used to analyze the performance of accurate classification. The main characteristics of disease detection are speed and accuracy. Hence, there is working on

development of automatic, efficient, fast and accurate which is use for detection disease on unhealthy leaf. Work can be extended for development of hybrid algorithms & neural networks in order to increase the recognition rate of final classification process. One major challenge of this technique is that the all the analyses were done in controlled laboratory conditions. That would be a major challenge to overcome in future implementations so as to make the research portable for real time leaf classification.

Feature scope: The future implementations of the present work would include analyzing disease conditions of the citrus trees in an outdoor environment.

REFERENCES

[1] Rupesh G. Mundada, Dr. V. V. Gohokar, "Detection and Classification of Pests in Greenhouse Using Image Processing" *IOSR Journal of Electronics and Communication Engineering (IOSR-JECE),* vol.5, issue 6 , pp. 57-63, 2013

[2] RamvaniArtiben R,Shashwat Kumar, " ASurvey on plant disease identification techniques" *International journal of Advance Research in Computer Science and Management studies*, volume 3, issue 4, 2015.

[3] Anand .H .Kulkarni, AshwinPatil R. K, "Applying image processing technique to detect plant diseases" *International Journal of Modern Engineering Research (IJMER),* vol.2, no.5, pp.3661-3664, 2012

[4] Dheeb Al Bashish, Malik Braik and SuliemanBani-Ahmad, "Detection and Classification of Leaf Diseases using K-means-based Segmentation and Neural-Networks-based Classification", *Information Technology Journal* , vol.10, issue 2, pp. 267-275, 2011

[5] Rafael C.Gonzalez, Richard E.Woods, Steven L.Eddins, *Digital Image Processing*, Pearson Education, 2nd Edition

[6] AkshayKarale ,AvinashBhoir ,NileshPawar, Rahul Vyavhare, "Review on Detection of Plant Leaf DiseasesUsingColor Transformation" *International Journal of Computer Trends and Technology (IJCTT) – vol.15, issue 3, pp. 114- 116, 2014.*

[7] Arti N. Rathod, BhaveshTanawal, Vatsal Shah "Image Processing Techniques for Detection of Leaf Disease" *International Journal of Advanced Research in Computer Science and Software Engineering* , vol.3 no.11, pp. 397-399, 2013

[8] ShitalBankar, AjitaDube,PranaliKadam, Prof. Sunil Deokule, "Plant Disease Detection Techniques Using CannyEdge Detection &Color Histogram in ImageProcessing" *International Journal of Computer Science and Information Technologies*, vol. 5, issue 2, pp. 1165-1168, 2014.

[9] Snehal M. Kalmegh1, S. V. Dhopte, " Detection of Edges in Color Images to Estimate Plant Diseases"*International Journal of Science and Research (IJSR),* vol. 4, issue 4, pp. 2337-2348, 2015

[10] Manoj Mukherjee, Titan Paand DebabrataSamanta, " DAMAGED PADDY LEAF DETECTION USING IMAGE PROCESSING" *Journal of Global Research in Computer Science (JGRCS),* vol.3, No. 10, pp. 7-10, 2012

