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Image Processing: A Report on How the Technique Helped Reforming the Disease Detection in Plants

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ABSTRACT: Distinguishing proof of the plant ailments is the way to keeping the misfortunes in the yield and amount of the farming item. The investigations of the plant sicknesses mean the investigations of outwardly discernible examples seen on the plant. Wellbeing observing and sickness location on plant is basic for maintainable farming. It is hard to screen the plant illnesses physically. It requires huge measure of work, ability in the plant infections, and furthermore requires the unreasonable handling time.

Consequently, picture preparing is utilized for the discovery of plant maladies. Malady location includes the means like picture obtaining, picture pre-handling, picture division, highlight extraction and order. This paper examined the strategies utilized for the recognition of plant ailments utilizing their leaves pictures. This paper likewise talked about some division and highlight extraction calculation utilized in the plant malady discovery.

This paper exhibits a calculation for picture division system which is utilized for programmed recognition and grouping of plant leaf sicknesses. The present work has been carried out for the detection of diseases: Alternaria Alternata, Anthracnose, Bacterial Blight, Cercospora Leaf Spot using image processing techniques.

Keywords: Matlab, image processing, segmentation, plant leaf diseases, and agricultural production.

I. INTRODUCTION

In a country like India where about 70% of the population depends on agricultural activities, we need systems and techniques to counter the diseases found in plants.

Mostly, the techniques used by the farmers is the use of pesticides. Pesticides are basically used by visually observable patterns. It is highly important to monitor and detect the health factors and diseases in plants to make sure the cultivation results in a good yield.

From early ages, manual techniques have been used to monitor and analyse the plant disease but one major drawback of this is that it requires a great amount of work and large processing time. To reduce the amount of visual manual work, we can use image processing technique for the plant disease detection.

The symptoms of the diseases in plants can be mostly seen on the leaves, stems and fruits. This paper provides a review on what has been done previously in the field of plant diseases detection.

Two main characteristics of plant disease detection machine-learning methods must be achieved to provide satisfactory results. They are: speed and accuracy.

Automatic plant disease detection and classification techniques should be developed using the leaf image processing techniques.

This can be proved as a very useful technique for farmers. They will be alerted at the right time before spreading of the disease over large area. This process is having four main phases;

1) First phase we create a colour transformation structure for the RGB leaf image and then, colour space transformation is applied for the colour transformation structure. The image is then segmented using the K-means clustering technique.
2) In the second phase, we remove the unnecessary part (green area) within leaf area.3)
3) The texture features for the segmented infected object are calculated in the third phase.
4) Finally, in the fourth phase the extracted features are passed through a pre-trained neural network.

II. RELATED WORKS

Many researchers have proposed and also came up with some conventional and non-conventional approaches for helping out the farmers to detect diseases when their crops are affected. Below is the overview of some of the works done in this field.

An attempt was made in the 90‟s by **Hetzroni et al. (1994)**[2] using neural networks to monitor the health of plants. In their system, they tried to detect zinc, iron and nitrogen deficits by observing lettuce leaves. An analogue video camera was used in image capturing and then digitalized afterwards. The digital image is segmented into background and leaf in the first phase of their algorithm. The required feature (colour and size) are extracted from both the HIS and RGB pictures of the image. These extracted parameters were fed finally into the analysis phase made of neural networks and statistical classifiers, which then determines the condition of the plant[2].

Sena et al. (2003) proposed a method of detecting diseases on leafs using a pre-set threshold value (h), which aims at differentiate among maize plants affected by fall armyworm from healthy employing digital images. Their proposed algorithm was divided into two sections namely the image processing and image analysing. At the processing stage the captured image is transformed to grey scale, filtered and tresholded to removed noise. The image is then divided into twelve block at the analysis stage of their algorithm and blocks with leafs less than 5% with respect to the total area are thrown away. The number of connected

objects (n) signifying the diseased areas is totalled for each remaining block. The plant is concluded to be disease infected if this number is above a set value (threshold), (thus if n > h) which, after experimental assessment, was set to 10 [3].

Al Bashish et al. (2010) proposed a method which attempts to detect 5 diverse plant diseases. The authors of this paper didn't lay down the types of plants used in their tests, and the images existed in situ. After a pre-processing stage to clean- up the image, a K-means crowding algorithm was applied to divide the image into 4 clusters. From their paper, at least one of the clusters must match to one of the diseases. Afterwards, a number of texture and colour features are extracted from each by means of the supposed Colour Co-Occurrence Technique, which runs with images in the HSI presentation. The features are then fed to a MLP Neural Network with ten (10) concealed layers, which implements the final identification and classification [4].

A mobile enhanced image processing approach for detecting plant leaf diseases was proposed. The research aimed at developing an image recognition system that can recognize crop diseases. The first stage of their methodology was to digitalize the uploaded leaf image by the system user via mobile phone to a remote server. A mathematics morphology is employed to segment these images, then shape, texture and colour features of colour image of disease spot on leaf is extracted, and finally a classification technique of associates functions was used to discriminate between the three types of diseases [5]. The research concluded that there are still numerous techniques that can be employed to better the detection and identification of diseases on plant leafs.

Detecting the Plant Diseases and Issues by Image Processing Technique and Broadcasting was proposed by [6]. The proposal begins with, the image, then an analysis is carried out and eventually, the image is well understood and evaluated. This renders the required target of perceptive plants and their diseases. This forms the key factors of their paper. Their idea was to look at and determine the diseases that attacked the plants, with the help of sensors that use image process techniques to broadcast the captured image to the cloud. In turn, the image can then be viewed in any part of the world [6]. The research concluded that, their approach proves to be an improvement compared to **Boesse et al, in 2008 and Pagola et al in 2009**.

Skaloudova et al. in 2006 cited by [7] proposed another methodology plan that ascertains the injury caused in leaves by the spider bites and mites. Two stage thresholding was the procedure used for this system. The 1st 1/2 the leaf in background was targeted within the first a part of the technique. The second part centres on the sorting of the healthy elements of the plants. The final estimation is provided the ratio of the quantity of pixels in injury areas and therefore the number of pixels of the healthy region. This approach was then matched with the outcomes of two unconventional ways and it was realised that the leaf damage index delivered extra advanced results than the opposite ways in contrast supported pigment and light [7].

Dhaygude & Kumbhar, (2013) proposed a texture statistics technic for plant leaf dieses detection, the developed processing theme consists of four main steps, first a colour transformation structure for the input RGB image is created, this RGB is converted to HSI as a result of RGB is for colour generation and his for colour descriptor. The green pixel area unit then cloaked and removed mistreatment specific threshold worth, then the image is segmented and the helpful segments area unit extracted, finally the texture statistics is computed. From SGDM matrices. Finally the presence of diseases on the plant leaf is evaluated [8]. Their research concluded that there is a need to improve or to increase the recognition rate of classification process.

Zulkifli Bin Husin et al, in their paper [9],they captured the chilli plant leaf image and processed to determine the health status of the chilli plant. Their technique is ensuring that the chemicals should apply to the diseased chilli plant only. They used MATLAB software for feature extraction and image recognition. For object classification, computer vision extends the image processing paradigm. Digital camera is used here for capturing the image and LABVIEW software tool is used to build the GUI. The segmentation of leaf image is important while extracting the feature from that particular image. **Mrunalini R. Badnakhe, PrashantR. Deshmukh** compare the Otsu threshold and the k-means clustering algorithm used for infected leaf analysis in [10].They concluded that the extracted values of the features are less for k-means clustering. The clarity of k-means clustering is more accurate than other method. For the identification of disease the RGB image is used. After applying k-means clustering techniques, the green pixels are identified and then

using otsu's method, varying threshold value is obtained. For the feature extraction, color co-occurrence method is used. RGB image is converted into the HSI translation. For the texture statistics computation the SGDM matrix is generated and using GLCM function the feature is calculated [11].

III. METHODOLOGY

The strategic that we have used in disease acknowledgment from an image is to extract the characteristic feature of the unhealthy region. The choices may vary according to the disease. The features extracted from the image are, colour, texture etc.

3.1 Approach

Below is the block diagram which depicts the basic technique of the recommended vision-based detection algorithm in this research. Firstly, the images of various plants leaves are obtained using a digital camera. The next stage is to apply the image-processing techniques on the acquired images to extract useful features for onwards analysis.

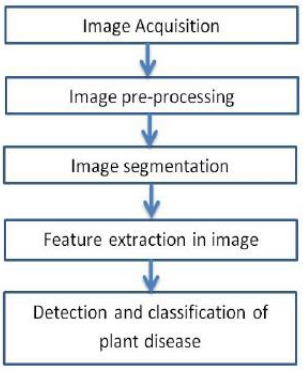

Figure 1: The basic process of the proposed methodology.

IV. FUTURE SCOPE

4.1 Application

We can develop an android application for agriculture. Here we are can give the information of short duration of crops in different seasons. Where, when and which fertilizers, pesticides and herbicides are used to save various crops from various diseases.

4.2 Medicine

Plant disease control through host- plant resistance and fungicide treatment makes a major contribution to both climate- change mitigation and sustainable crop production systems to ensure global food security. Addition of all the available medicines an other remedial features to an advanced level can be achieved.

4.3 Consultation with the agriculture specialists

Interaction facility with the experienced persons in this field can be arranged.

4.4 Install webcam, direct image capture

WebCamImageSave is simple WebCam capture utility that allows you to easily capture a still image from your camera every number of seconds that you choose, and save it into image file (.jpg, .png, .bmp) on your disk. Those images can then be used directly for the detection of diseases.

4.5 Collaborate with specialists and create website

Plant pathologists utilize modern scientific equipment and techniques to unravel the mysteries of how plants are attacked by various entities and to understand the effects of environmental conditions on disease development. Just like any other website, a proper website can be created which can be used by anyone related to the farming to get to know about the hows, dos and don'ts of related to the plants and the associated diseases.

V. CONCLUSION

For successful cultivation of the crops, we need accurate detection and classification of the plant diseases and this can be done by using the image processing technique using the trained data which is done by the support vector machine algorithm and k- means clustering method. This paper discussed some of the previous researches done in the past for detecting the diseases in plants. ANN methods can be used for classifying the plant diseases such as back propagation algorithm, SVMs etc can be used efficiently. Various plant diseases can be accurately identified and classified using image processing techniques.

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