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Fungal Disease Detection of Lotus Leaf Using Digital Image Processing

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ABSTRACT:- Research in Botany grows day by day due to various new technologies. Botanical research desires to identify prevalence and the clinical patterns of superficial fungal infections among different plants. Detection of fungal disease is the most interesting research area of researches in early stages which one helps to survive the medicinal, beautiful, heavenly appearance plants and flowers. As the leaves provides the food to all over the plants, if it is possible to detect and cure the disease of leaf it will result the healthy plant and flowers. The Digital Image Processing - one of the new computer technologiescan be used to detect fungal disease of lotus leaf. For this research colored image of lotus leaf is used to detect fungal disease. Various image processing techniques like gray scale, thresholding and edge detection are applied on colored lotus leaf image. The resultant images detect the each and every cell infected by fungal as well as shows the intensity of fungal infection.

Keywords: Digital Image Processing, Lotus leaf, Fungal diseases, Segmentation for Thresholding, Edge detection.

I. INTRODUCTION

Botanical Research is growing up rapidly emerging with new technologies.It desires to recognizeoccurrence and the clinical patterns of superficial fungal infections among different plants. The most interesting research area of researches in botany is to detect fungal disease in early stages which one helps to survive the medicinal, beautiful, heavenly appearance plants and flowers. The leaves of plants provide the food to grow up the plants. Detection of leaf diseases can be able to cure the disease and consequence the healthy plant and flowers.

Leaf disease diagnosis is an art as well as science. The diagnostic process (i.e., recognition of symptoms and signs), is inherently visual and requires intuitive judgment as well as the use of scientific methods. Leaf disease diagnosis is an art as well as science. The diagnostic process (i.e., recognition of symptoms and signs), is inherently visual and requires intuitive judgment as well as the use of scientific methods.

The new computer technologies, the Digital Image Processing can be emerged with botany to detect fungal disease of lotus leaf.Research in this paper presents the image processing technique used to detect and classify the cells of lotus leaf affected by fungal disease. A fungus on lotus leaf is a eukaryote that digests food externally and absorbs nutrients directly through its leaves. Fungal leaf spot attacks on the flowers can also. Computer vision systems would help to tackle the problem. Most are microscopic plants that feed on living lotus leaf or on dead organic material. When fungal they attack living leaf, fungal disease results. Fungi usually produce spores which, when carried to a leaf, can begin an infection. Fungus diseases are common during wet, humid seasons. Computer vision digital image systems would help to tackle the problem on lotus leaf.

II. EMERGING COMPUTER TECHNOLOGY WITH BOTANY:

Fungal diseases can be managed using following tips,

- Understand the lifecycles, survival mechanisms, and conductive environmental conditions for fungi.
- Use resistant or tolerant varieties.
- Weather conditions (particularly temperature, humidity, and leaf wetness).
- Minimize ways in which the disease can spread on-farm – remove and destroy sick leaf when symptoms first show.
- Apply preventative fungicides based on weather conditions.
- Understand fungicide resistance and rotation of chemical groups.

The image processing can be applied for following purposes:

- To detect diseased leaf.

- To quantify affected area by disease.
- To find shape of affected area.
- To determine color of affected area[3]

III. RESEARCH METHODOLOGY

Experimental methodology is used for fungal disease detection of lotus leaf using digital image processing. Experiment is carried out by using Lotus DIP system algorithm. The Lotus DIP system model [1] is shown is Figure-1.

The algorithm Lotus DIP to detect fungal disease on Lotus leaf,[5]

Step-1. Input color lotus images to the Lotus DIPsystem.

Step-2. Convert selected color lotus leafimageto gray image.

Step-3. Apply threshold on gray image obtained in Step-2.Detect fungal disease on lotus leaf appear as white color spots in threshold image.

Step-4. Apply edge detection on threshold image obtained in Step-3 which shows the fungal disease area surrounded by edge.

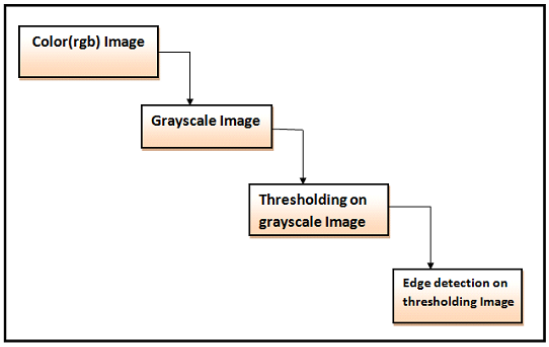

Fig1: LotusFDIP system model

IV. RESULT AND ANALYSIS

For conducting experiment the color lotus leaf image in JPEG format shown in Figure-2 is the input given to the Lotus DIPsystem model.[5]

Fig2: Lotus Leaf with fungal infection

Figure-2 indicates the lotus leaf affected by fungal infection. To detect the area of fungal infection this leaf is given to Lotus DIPsystem model. After processing the Step-1 of Lotus DIPsystem model, the color Lotus image shown in Figure-2, is get converted intograyscale image as indicatedin Figure-3. The lotus leaf image is converted into black and white color portion infected by fungal.

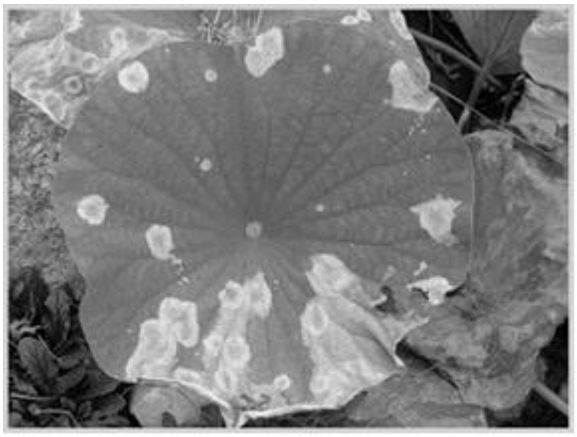

Fig3: Grayscale conversion

After processing the Step-2 of Lotus DIPsystem model, the gray scale image shown in Figure-3 is get converted into threshold image as indicatedin Figure-4. White color dotindicates the cells infected by fungal.

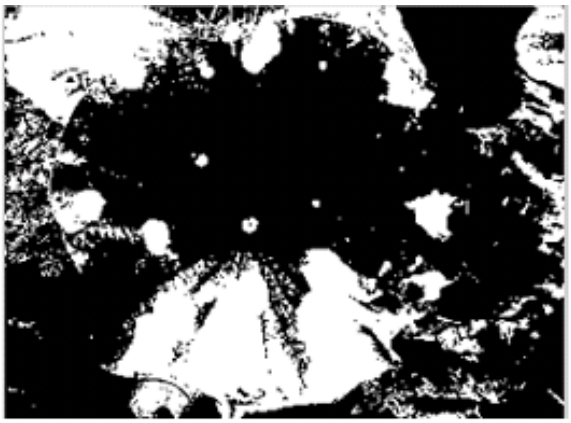

Fig4: Thresholded Image

Resultant image after processing the Step-3 of Lotus DIPsystem model, the threshold image shown in Figure-4 is then passed as input to Step-4 for Sobel edge detection. The Sobel edge detection is discovered by "Irwin Sobel" in 1968. [2]

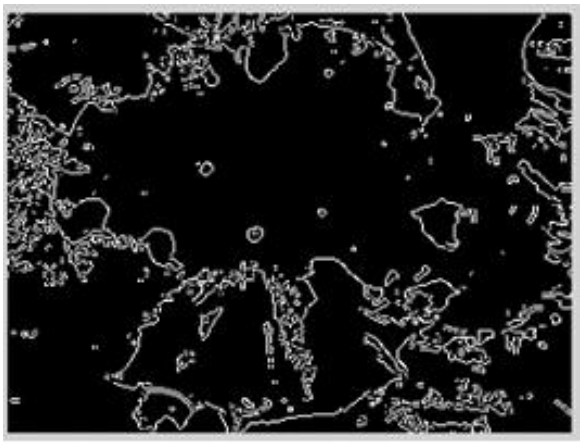

Fig5: Edge Detected Image

Figure-5 is the output of the algorithm of Step-4 ofLotus DIPsystem model. The edges detected are denoted by white color and the inside area of these edges denotes the fungal infected area of Lotus leaf. [3]

IV. CONCLUSION

The Digital Image Processing is used to determine the prevalence and the clinical patterns of superficial fungal infections among lotus leaf.The resultant images detect the each and every cell infected by fungal as well as shows the intensity of fungal infection.The most dangerous and widespread disease in world is fungal disease on lotus leaf according to stage discovery of fungal cells, this shows the detection of fungal disease on lotus leaf in early stage which plays important role to avoid fungal infection in lotus leaf.

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