Review on Detection of Plant Leaf Diseases Using Color Transformation

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Abstract :

In this paper we propose an automatic detection of plant diseases using image processing techniques.The proposed system is a software solution for automatic detection and computation of texture statistics for plant leaf diseases. The developed processing system consists of four main steps, first a color transformation structure for the input RGB image is created, then the green pixels are masked and removed using specific threshold value, then the image is segmented and the useful segments are extracted, finally the texture statistics is computed. From the texture statistics, the presence of diseases on the plant leaf is evaluated.

Keywords

HSI, Co-occurrence matrix,,Texture, Masking of pixels, plant Disease Detection.

I. INTRODUCTION

The Digital image processing and the image analysis technology based on the advances in microelectronics and computers having many applications in biology and it circumvents the problems that are associated with traditional photography. This new tool helps to improve the images from microscopic to telescopic range and also offers a scope for their analysis.Plant diseases cause periodic outbreak of diseases which leads to large scale death and famine. Since the effects of plant diseases were devastating, some of the crop cultivation has been abandoned.The naked eye observation of experts is the main approach adopted in practice for detection and identification of plant diseases.[1]

But, this requires continuous monitoring of experts which might be prohibitively expensive in large farms. Further, in some developing countries, farmers may have to go long distances to contact experts, this makes consulting experts too expensive and time consuming and moreover farmers are unaware of non-native diseases. Automatic detection of plant diseases in an important research topic as it may prove benefits in monitoring large fields of crops, and thus automatically detect the diseases from

the symptoms that appear on the plant leaves. This enables machine vision that is to provide image based automatic inspection, process control and robot guidance.Grape fruit peel might be infected by several diseases like canker, copper burn, greasy spot, me lanose and wind scar .[4]

The classification accuracy is achieved with the help of HSI transformation , it is applied to the input image, and then it is segmented using Fuzzy C-mean algorithm. Feature extraction stage deals with the color, size and shape of the spot and finally classification is done using neural networks.

Fig.1 Affected Leaves with various Diseases

The fast and accurate method for detection of leaf the diseases by using the k-means which based on segmentation and the automatic classification of leaf diseases is done based on high resolution multispectral and stereo images.Sugar beet leaves are used in this approach. Here the Segmentation is carried out to extract the diseased region and the plant diseases are graded by calculating the quotient of disease spot and leaf areas. An optimal threshold value for segmentation obtained using weighted Par-

zen window. This reduces the computational burden and storage requirements without degrading the final segmentation results.Detection and classification of leaf diseases is based on masking and removing of green pixels, applying a specific threshold to extract the infected region and computing the texture statistics to evaluate the diseases.[1]

II. COLOR TRANSFORMATION TECHNIQUE

First, the RGB images of leaves are converted into Hue Saturation Intensity (HSI) color space representation. The purpose of the color space is to facilitate the specification of colors in some standard, generally accepted way. HSI (hue, saturation, intensity) color model is a popular color model because it is based on human perception.[3]

A. Color

Color is one of the most widely used feature in image retrieval because of its robustness, effectiveness & computational simplicity. The color of the image is represented through some color model. The commonly used color models are RGB(red,green,blue) , HSV (hue,saturation,value) and Y,Cb,Cr (luminance and chrominance),hence any color of the image of color contents are characterized by3-channels from some color model. The color feature can be described by color the color moment has the lowest computational complexity hence it is suitable for image retrieval.[2]

B. Texture

Texture is a very interesting image feature that has been used for characterization of images, with application in content-based image retrieval. There is no single formal definition of texture. The major characteristic of texture is the repetition of a pattern or patterns over a region in an image. The elements of pat-terns are called Tex tons. The size, shape, color, and orientation of the Tex tons can vary over the region. The difference between two textures can be in the degree of variation of the Tex tons. It can also be due to spatial statistical distribution of the Tex tons in the image. The texture can not have the capability of finding similar images but it can be combined with another visual attribute like color to design effective retrieval methods.[2]
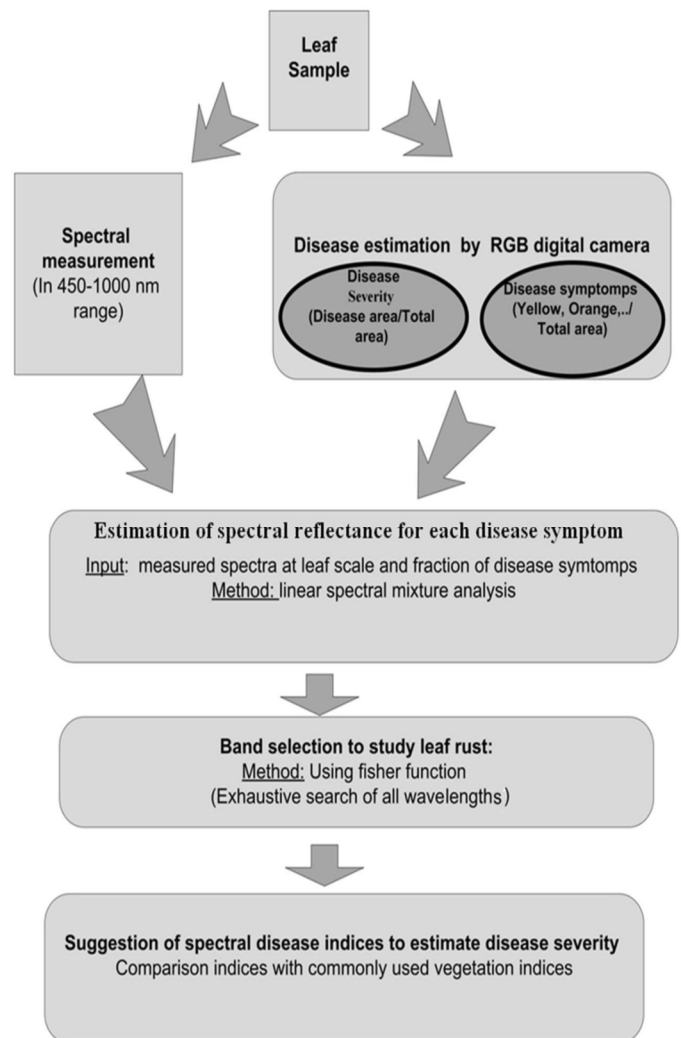

Fig.2 Step By Step Execution Of Procedure

C. Color Co-Occurrence Method

The color co-occurrence texture analysis method is developed through the Spatial Gray- level Dependence Matrices (SGDM). The gray level co-occurrence methodology is statistical way to describe shape by statistically sampling the way certain gray-levels occur in relation to other gray levels these matrices measure the probability that a pixel at one particular gray level will occur at a distinct distance and orientation from any pixel given that pixel has a second particular gray level.[4]
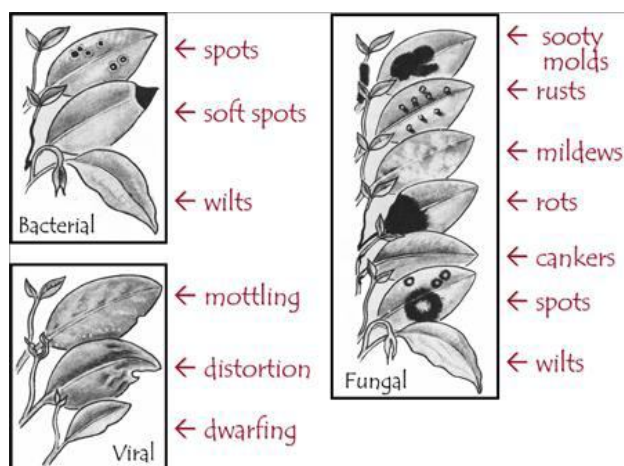
Fig.3 Types Of Diseases[1]

D. Texture Features

Texture features like Contrast, Energy, Local homogeneity, Cluster shade and Cluster prominence are computed for the Hue content of the image.The Low level features can be extracted directly from the original image.High level features can be extracted from low level features General feature is application independent features like color, texture and shape. Domain specific features are calculated over entire image or regular sub-area of an image.[2,4,5]

III. CONCLUSION

An application of texture analysis in detecting the plant diseases has been explained in this paper. Recognizing the disease is mainly the purpose of the proposed approach. The main characteristics of disease detection are speed and accuracy so,the extension of this work will focus on developing the advanced algorithms for efficient, fast and accurate detection diseases on leaf.

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