A Survey on Leaf Disease Detection Using Image Segmentation Based with Artificial Neural Network Technique

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Abstract - The agricultural land mass is something other than being a nourishing sourcing in this day and age. Indian economy is profoundly reliant of horticultural efficiency. Consequently in field of agribusiness, location of infection in plants assumes an imperative part. To identify a plant ailment in extremely introductory stage, utilization of programmed malady recognition system is gainful. For example an illness named little leaf infection is an unsafe malady found in pine trees in United States. The current strategy for plant sickness recognition is essentially bare eye perception by specialists through which recognizable proof and identification of plant infections is finished. For doing as such, an expansive group of specialists and in addition consistent checking of plant is required, which costs high when we do with extensive ranches. In the meantime, in a few nations, ranchers don't have legitimate offices or even thought that they can contact to specialists. Because of which counseling specialists even cost high and also tedious as well. In such conditions, the proposed method turns out to be gainful in observing substantial fields of yields. Programmed location of the ailments by simply observing the indications on the plant leaves makes it simpler and in addition less expensive. This additionally underpins machine vision to provide image based automatic process control, inspection, and robot guidance [2][4][5].Keywords - leaf disease, k-means clustering, Image segmentation, Neural network.

I. INTRODUCTION

Picture pressure is essential term for successful transmission and picture stockpiling. Necessity of picture pressure is in correspondence framework for the information and picture change, it is need of telecom industry, in the field of sight and sound information in the broadcast communications system and ring the mixed media information through Internet. Some other necessity of picture pressure is as in the field of advanced cameras, prerequisites for information stockpiling, control, and exchanges of computerized pictures, has grown violently [22]. These picture records can be huge and can involve expansive memory. A dim scale picture of 256 x 256 pixels has 65, 536 components to store, and a downloading and transferring of these pictures are exceptionally tedious undertaking. Picture information involve a profound bit of the sight and sound information and they possess the real segment of the correspondence transfer speed for media correspondence [23].

II. LITERATURE SURVEY

The various approaches for detecting the disease in plant leaf using image processing technique is described in this section.

Agricultural Plant Leaf Disease Detection and Diagnosis Using Image Processing Based on Morphological Feature Extraction:-[8] Sachin B. Jagtap et all in "Agricultural Plant Leaf Disease Detection and Diagnosis Using Image Processing Based on Morphological Feature Extraction " IOSR Journal of VLSI and Signal Processing in 2014 proposed Leaf spots can be indicative of crop diseases, where leaf batches (spots) are usually examined and subjected to expert opinion. In our proposed system, we are going to develop an integrated image processing system to help automated inspection of these leaf batches and helps identify the disease type. Conventional Expert systems mainly those which used to diagnose the disease in agriculture domain depends only on textual input. Usually abnormalities for a given crop are manifested as symptoms on various plant parts. To enable an expert system to produce correct results, end user must be capable of mapping what they see in a form of abnormal symptoms to answer to questions asked by that expert system. This mapping may be inconsistent if a full understanding of the abnormalities does not exist. The proposed system consists of four stages; the first is the enhancement, which includes HIS transformation, histogram analysis, and intensity adjustment.

Jayamala K et all in "ADVANCES IN IMAGE PROCESSING FOR DETECTION OF PLANT DISEASES" Journal of Advanced Bioinformatics Applications and Research in 2011 proposed The studies of plant trait/disease refer to the studies of visually observable patterns of a particular plant. Nowadays crops face many traits/diseases. Damage of the insect is one of the major trait/disease. Insecticides are not always proved efficient because insecticides may be toxic to some kind of

birds. It also damages natural animal food chains. A common practice for plant scientists is to estimate the damage of plant (leaf, stem) because of disease by an eye on a scale based on percentage of affected area. It results in subjectivity and low throughput. This paper provides a advances in various methods used to study plant diseases/traits using image processing. The methods studied are for increasing throughput & reducing subjective ness arising from human experts in detecting the plant diseases. The literature survey done in this paper provides a new insight in detection of the diseases of plant.

Anand.H.Kulkarni et all in "Applying image processing technique to detect plant diseases" International Journal of Modern Engineering Research in 2012 proposed The present work proposes a methodology for detecting plant diseases early and accurately, using diverse image processing techniques and artificial neural network (ANN). Farmers experience great difficulties in changing from one disease control policy to another. Relying on pure nakedeye observation to detect and classify diseases can be expensive various plant diseases pose a great threat to the agricultural sector by reducing the life of the plants. the present work is aimed to develop a simple disease detection system for plant diseases. The work begins with capturing the images. Filtered and segmented using Gabor filter. Then, texture and color features are extracted from the result of segmentation and Artificial neural network (ANN) is then trained by choosing the feature values that could distinguish the healthy and diseased samples appropriately. Experimental results showed that classification performance by ANN taking feature set is better with an accuracy of 91%. In this project 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.

III. THEORY OF PROPOSED WORK

Color is a powerful descriptor of an object and has an advantage over gray scale. Color information is an important feature like shape, texture which has been successfully used for many image processing applications like object recognition, image matching, CBIR, color image compression. The object in the scene as perceived by human eyes or the camera system is characterized by its radiance R (λ, x, y, t) where λ is the wavelength of the electromagnetic radiation at position (x, y) and at time t for a particular color.

The fundamental difference between color image and gray image is the values assigned. For color images in color space a color vector is assigned to a pixel where as in gray image a gray value is assigned. Thus in Color Image Processing vector valued functions are used. Depending on the principles of processing CIP can be broadly classified into two classes [8].

1. Monochromatic- based techniques: Planes are treated separately and the results are combined.
2. Vector- valued techniques: Image is considered as a vector value.

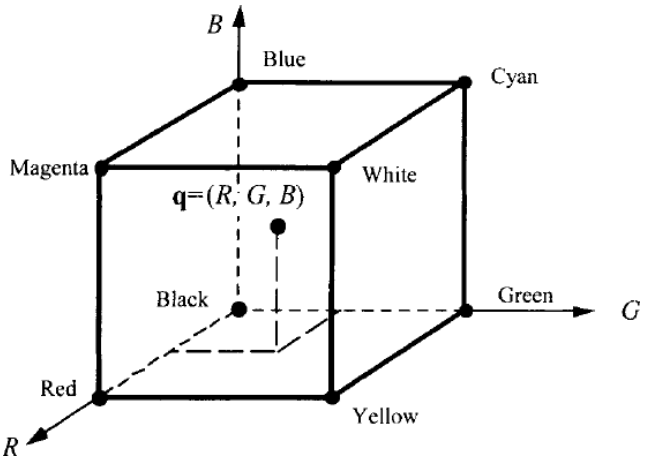

Figure 3.1: RGB color space

3.1 HSI color space

HSI model decouples the intensity from color carrying information (hue and saturation). Hue represents the dominant color, Saturation represents the purity (amount of white added) and I represents the relative brightness. Saturation depends upon the wavelengths of color.

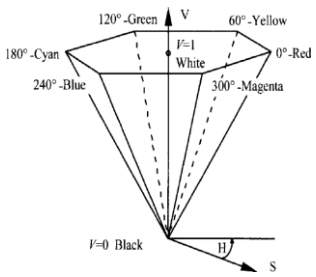

Figure 3.2: Hexagon representation of HSV color space.

Wider the wavelength range the purity is lower and vice versa. HSI color space separates the chromatic and achromatic information in color images. Existence of singularities is the disadvantage of HSI model. Fields of

computer vision and computer graphics are always interested in color spaces which intuitively represents human color perception. Colors can be easily described in this color space compared to RGB or CMYK color space. HSV color space is also known as HSB color space with hue, saturation and brightness coordinates.

4. Type of Diseases

4.1 Diseases type 1 -Alternaria - The shape Alternaria is a very much perceived sensitivity causing organism. Alternaria spores can be recognized from spring through pre-winter in most calm territories, and can achieve levels of thousands of spores for every cubic meter of air. Alternaria spores can be at their most elevated fixations amid dry, breezy conditions that are perfect for the spores to end up airborne. Alternaria is right now contained around 40-50 species. It is ordinarily disengaged from plants, soil, sustenance, and indoor air. One of the animal categories, Alternaria alternata, has been confined from various sorts of natural materials in soggy circumstances, including materials, put away sustenance, canvas, cardboard and paper, electric links, polyurethane, fly fuel, sewage and effluents. Alternaria alternata causes dark spot in numerous foods grown from the ground far and wide.

Figure 4.1 Sample Image

4.2 Diseases type 2 - Bacterial - This fungal sickness disturbs several plants, comprising vegetables, fruits, and trees. It foundations gloomy, dipped lesions on leaves, stems, flowers, and fruits. It also occurrences unindustrialized discharges and intensifying leaves. It canister spread very quickly all through drizzly periods. Anthracnose is a general term for a variety of diseases that affect plants in similar ways. Anthracnose is especially known for the damage that it can cause to trees. Anthracnose is caused by a fungus, and among vegetables, it attacks cucurbits. Anthracnose can survive on infected plant debris and is very easily spread. Like rust, it thrives under moist and warm conditions and is often spread by watering. Anthracnose is a fungal disease that tends to attack plants in the spring when the weather is cool and wet, primarily on leaves and twigs. The fungi overwinter in dead twigs and fallen leaves. Cool, rainy weather creates perfect conditions for the spores to spread. Dry and hot weather stop the progression of the disease that may begin again once the weather conditions become optimal.

Figure 4.2 Sample of Anthracnose

4.3 Diseases type 3 Bacterial Blight - In the vegetable garden, bacterial blight is most often a problem on snap beans and lima beans. (Note that other crops also suffer from bacterial diseases that may be called bacterial blight.) Symptoms of infection are large, water-soaked, pale green spots on leaves that later turn brown. These spots may also appear on pods and can produce a yellowish ooze in wet weather. Leaves infected with halo bacterial blight develop many small dead spots with yellow halos around them; spots on pods produce a cream-colored ooze. Bacterial blight is a widespread soybean disease that is most common during cool, wet weather.

Figure 4.3 Sample of Bacterial Blight

4.4 *Diseases type 4* Cercospora Leaf Spot - Cercospora leaf spot can be caused by a wide range of Cercospora contagious pathogen species relying upon the plant compose tainted. For instance, Cercospora beticola taints sugar beets while Cercospora rosicola contaminates rose plants.

Figure 4.4 Sample of Cercospora Leaf Spot

This is viewed as a foliar sickness and can be particularly pulverizing to sugar beet edits in North Dakota and Minnesota. This ailment is now and again misdiagnosed as

dark spot. Contamination will start at the base of the plant and will work up toward leaves with new development. This happens when the parasitic spores grow and enter through characteristic openings of leaves when conditions are ideal.

4.5 Healthy Leaves - A new hypothesis explaining the adaptive significance of bright autumn leaf colors argues that these colors signal tree quality to myrmecophilous specialist aphids. In turn, the aphids attract aphid-tending ants during the following spring, which defend the trees from other aphids and herbivores. In this context, other types of plant coloration, such as the color change observed in young and old spring leaves, may function as a signal of plant quality for aphids and other myrmecophilous hemipterans. If these plant colors are costly for plants, then vividly colorful plants would be required to invest more in growth than in defense; as a result, colorful plants may be more palatable for honeydew-producing hemipterans, such as aphids, scale insects and treehoppers, although the relative importance of hemipterans other than aphids may be relatively low. These hemipterans may be attracted to colorful plants, after which their attendant ants would protect the plants from herbivory. However, it is necessary to examine color vision in hemipterans to support this hypothesis.

Figure 4.5 Sample of Healthy Leaves

IV. CONCLUSION

This paper presents a survey on different method for plant leaf disease detection using image processing technique There are many methods in automated or computer vision for disease detection and classification but still there is lack in this research topic. All the disease cannot be identified using single method .The future work is to develop a method for processing an image that acquired with different background.

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