Plant Disease Detection Robot

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***Abstract* - Agriculture is a very labor-intensive field and only field where the robots are not involved. Now a days many industries are trying to reduce this human labor by making robots and machines. Here we are designing an autonomous intelligent farming robot which indicates the plant health by observing the color and texture of their leaves.**

I.INTRODUCTION

India is a horticultural nation wherein over 70% population relies upon agribusiness. The harvest misfortune is because of ailments around 10 to 30%. Ranchers judge the ailments by their experience, yet it isn't the exact and appropriate way. Sometimes ranchers take support from specialists to recognize the ailments, yet this is likewise a tedious way. At the season of review of yield harm, the investigation advisory group faces numerous issues about the distinguishing proof of illness and real rate loss of harvest because of ailment. The primary inspiration of this theme is to distinguish the sort of illness and measure the harm of harvest along these lines giving the conceivable money related assistance or remuneration to endured ranchers. This quick distinguishing proof and evaluation of infection is conceivable by utilizing picture handling strategies on various pieces of cotton crop.

II.LITERATURE REVIEW

Sachin D. Khirade and et al [1] identification of the plant ailments is the way of avoiding the misfortunes in the yield and amount of the farming item. It requires gigantic measure of work, expertize in the plant ailments, and furthermore require the unnecessary handling time. Subsequently, picture handling is utilized for the recognition of plant infections. Malady recognition includes the means like picture procurement, picture pre-handling, picture division, highlight extraction and order. This paper talks about the techniques utilized for the discovery of plant maladies utilizing their leaf pictures. This paper talks about different systems to portion the infection part of the plant. This paper likewise talks about some Feature extraction and characterization strategies to remove the highlights of tainted leaf and the arrangement of plant infections. The precisely discovery and characterization of the plant infection is significant for the fruitful development of yield, and this should be possible utilizing picture handling. This paper talks about different procedures to fragment the malady part of the plant. This paper additionally talks about some Feature extraction and order systems to separate the highlights of tainted leaf and the grouping of plant illnesses. The utilization of ANN strategies for characterization of illness in plants, for example, self-sorting out element map, back proliferation calculation, SVMs and so on can be proficiently utilized. From these strategies, we can precisely distinguish and group different plant ailments utilizing picture preparing strategy.

Prof. Sanjay, B. Dhaygude& et al [2] the utilization of surface measurements for distinguishing the plant leaf illness has been clarified firstly by shading change structure RGB is changed over into HSV space in light of the fact that HSV is a decent shading descriptor. Covering and expelling of green pixels with pre-registered limit level. At that point in the next step division is performed utilizing 32X32 fixed estimate and acquired helpful fragments. These portions are utilized for surface examination by shading co-event lattice.

Amandeep Singh, Maninder Lal Singh& et al [3] the most noteworthy test looked during the work was catching the quality pictures with greatest detail of the leaf shading. It is important to get the picture with each one of the subtleties inside a processable memory.

Such pictures are framed through high goals and subsequently are of 6-10MB of size. This was taken care of by utilizing a Nikon made D5200 camera which served the undertaking great. Second test confronted was to dispose of brightening conditions as from the begin as far as possible of paddy harvest season, light fluctuates a great deal not withstanding when the picture gaining time is fixed. The answer for this is variable client characterized thresholding and making vital changes in accordance with the shades of LCC.

M.Malathi, K.Aruli and et al [4] they give study on plant leaf sickness recognition utilizing picture preparing methods. Sickness in harvests causes critical decrease in amount and nature of the horticultural item. ID of side effects of sickness by unaided eye is hard for rancher. Harvest insurance particularly in enormous homesteads is finished by utilizing mechanized picture handling procedure that can identify sick leaf utilizing shading data of leaves. Depending on the applications, picture preparing system has been acquainted with take care of the issues by example acknowledgment and some programmed grouping apparatuses. In the following segment these papers present a review of those proposed frameworks in significant way. There are numerous techniques in robotized or PC vision for sickness recognition and order yet at the same time there is need in this examination subject. All the infection cannot be recognized utilizing single technique.

Malvika Ranjan, Manasi Rajiv Weginwar& et al [5] describes an analysis procedure that is generally visual and requires exact judgment and furthermore logical strategies. Picture of sick leaf is caught. As the consequence of division Color HSV highlights are separated. Fake neural system (ANN) is then prepared to recognize the sound and ailing examples. ANN grouping execution is 80% better in precision.

Y.Sanjana, AshwathSivasamy& et al [6] in this it portrays the transferred pictures caught by the cell phones are prepared in the remote server and exhibited to a specialist bunch for their sentiment. PC vision methods are utilized for recognition of influenced spots from the picture and their arrangement. A straightforward shading contrast-based methodology is pursued for division of the illness influenced sores. The framework enables the master to assess the examination results and give inputs to the famers through a warning to their cell phones. The objective of this examination is to build up a picture acknowledgment framework that can perceive crop sicknesses. Picture preparing begins with the digitalized shading picture of sickness leaf. A technique for arithmetic morphology is utilized to portion these pictures. At that point surface, shape, and shading highlights of shading picture of sickness spot on leaf were extracted, and a characterization technique for participation capacity was utilized to segregate between the three kinds of maladies.

Bhumika S.Prajapati, Vipul K.Dabhi& et al [7] in this identification and arrangement of cotton leaf sickness utilizing picture preparing and AI methods was completed. Additionally, the review on foundation evacuation and division systems was talked about. Through this review, we reasoned that for foundation expulsion shading space transformation from RGB to HSV is helpful. We additionally discovered that thresholding strategy gives great outcome contrasted with other foundation expulsion strategies. We performed shading division by covering green pixels out of sight evacuated picture and after that applying thresholding on the got conceal picture to get twofold picture. This is helpful to remove exact highlights of illness. We found that SVM gives great outcomes, as far as exactness, for grouping of sicknesses. There are five noteworthy strides in our proposed work, out of which three stages have been actualized: Image Acquisition, Image pre-preparing, and Image division.

P.Revathi, M.Hemalatha& et al [8] this proposed work depends on Image Edge identification Segmentation procedures in which, the caught pictures are prepared for enhancement first. At that point R, G, B shading Feature picture division is done to get target districts (ailment spots). Afterward, picture highlights, for example, limit, shape, shading, and surface are removed for the malady spots to perceive illnesses and control the nuisance proposal. In this Research work comprise three pieces of the cotton leaf spot, cotton leaf shading division, Edge identification-based Image division, examination and grouping of ailments.

Mr. Pramod S. landge, Sushil A. Patil& et al [9] in this propose and tentatively assess a product answer for programmed discovery and grouping of plant illnesses through Image Processing. Ranchers in rustic India have negligible access to agrarian specialists, who can examine yield pictures and render exhortation. Postponed master reactions to inquiries frequently achieve ranchers past the point of no return. This paper

tends to this issue with the target of creating picture handling calculations that can perceive issues in harvests from pictures, in view of shading, surface and shape to consequently distinguish ailments or different conditions that may influence yields and give the quick and exact answers for the rancher with the assistance of SMS. The plan and usage of these advancements will incredibly help in specific synthetic application, lessening expenses and consequently prompting improved efficiency, just as improved produce.

Heeb Al Bashish, Malik Braik and et al [10] in this paper a picture handling-based methodology is proposed and utilized for leaf and stem malady location. We test our program on five illnesses which impact on the plants; they are: Early sear, Cottony form, colorless shape, late burn, little whiteness. The proposed methodology is image processing based. In the initial step of the proposed methodology, the current pictures are divided utilizing the KMeans system, in the second step the portioned pictures are gone through a pre-prepared neural system. As a testbed we utilize a lot of leaf pictures taken from Al-Ghor zone in Jordan.

III.SYSTEM AND EXPLANATION

System consists of Raspberry pi along with camera module, GSM and motors. Camera interfaced with Raspberry Pi captured image of leaves shown in figure 1. GSM is used here for sending message. Motors are connected to the Raspberry pi via motor driver circuit. The motor driver circuit is connected to the general-purpose input output pins of the Raspberry pi. Motor Driver circuits act as a bridge between the controller and the motor. The input to the motor driver IC or motor driver circuit is a low current signal. The function of the circuit is to convert the low current signal to a high current signal. This high current signal is then given to the motor. After capturing image of leaves robot moves forward and capture another image for processing.

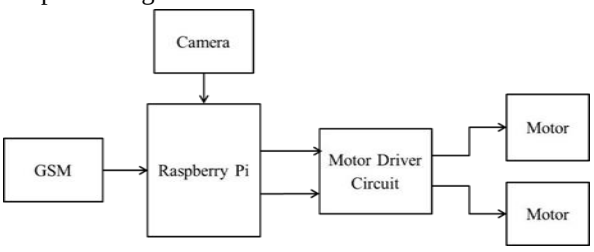

Fig 1 hardware module of proposed system

Detail explanation of each block is as follows:

1. Raspberry PI 3 model B: Raspberry PI is a small computer which has been used to develop an embedded system to perform a specific particular task. This electronic module has been operated with the use of raspbian operating system and is based on LINUX platform.
2. OPENCV: OpenCV (Open-Source Computer): is a library that can be imported in almost all computer languages like python, C, Java etc. It contains optimized image processing tools. Using OpenCV in python boosts its abilities by incorporating numpy (Numerical Python). In image processing, images are dealt as large 3D arrays and numpy serves as a robust tool for numerical array computations.
3. Raspberry Pi Camera Module: Camera is specially designed to interface with Raspberry PI and is a standard camera for a Raspberry PI. Generally, Camera has been found of about 5Mega Pixels.
4. Mountain ARK SR13CHASIS: is used in place of the motor to move the robot with adequate speed without damaging the plants.
5. IBT-2 H-bridge is a fully integrated high current H bridge module for motor drive applications.

Interfacing to a microcontroller is made easy by the integrated driver IC which features logic level inputs, diagnosis with current sense, slew rate adjustment, dead time generation and other protection features.

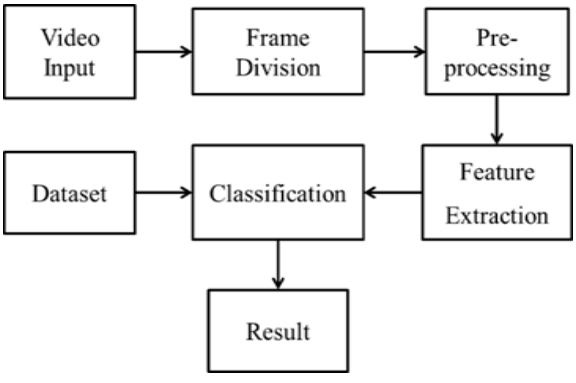

Fig 2 block diagram for image processing

Image processing and classification of leaves into healthy or deceased is shown in figure 2. The video captured from the camera will be preprocessed as follow:

The frames from the video are extracted. Pre-processing- noise and unwanted background is extracted from image. Pre-processing is a common name for operations with images at the lowest level of abstraction both input and output are intensity images. The aim of pre-processing is an improvement of the image data that suppresses unwanted distortions or enhances some image features important for further processing.

Features are extracted from image for further classification. The extraction and matching of features is based on these measures. Besides the simple point feature a more advanced type of feature is also presented. Feature extraction technique is used to extract the features by keeping as much information as possible from large set of data of image. Dataset of healthy and deceased leaves is fed to classifier. Then classifier will decide if leave is healthy or not by comparing input image of leaves with leaves image from dataset. For the image processing purpose opencv library is used which allows image processing operations in python. While performing image processing task motors are also taken care.

IV.CONCLUSION

This paper provides efficient and accurate plant disease detection and classification technique by using image processing in Python. The proposed methodology in this paper depends on Artificial Neural Network technique which is configured for leaf disease detection. The Python IDE software is ideal for digital image processing. ANN algorithm provides high accuracy and consumes very less time for entire processing. This system only classifies whether the leaf is healthy or unhealthy. It does not convey which disease leaf is suffering from.

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