LEAF DISEASE DETECTION AND AUTOMATICPESTICIDE SPRAYING CONTROL ROBOT USING RASPBERRY PI

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ABSTRACT

For the location and anticipation of sickness of plants from getting spread, this venture proposed a framework utilizing picture handling. For the picture examination, Customary Brain Networks was utilized. It enjoys many benefits for the utilization in enormous ranches of yields and hence it naturally detects signs of sickness whenever they show up on leaves of the plant. In drug exploration of leaf illness, identification is fundamental and significant point for research, since it enjoys benefits in checking crops in field at the form and thus, it naturally detects symptoms of infection by image processing by CNN calculation. The term disease means the kind of harm to the plants. This project provides the best technique for identification of plant illnesses utilizing picture handling and alarming about the sickness brought about by shipping off IOT Server and showing the name of the infection and precautions on the portable use of the proprietor of the framework. By utilizing robot it naturally showers pesticides to the plants. It will lessen the cost expected for the pesticides and different items. This will prompt expansion in efficiency of the cultivating.

Keywords: *Image Processing, Raspberry Pi, Python.*

1. INTRODUCTION

Horticulture is a eminent piece of our nation's economy. Practically 70% of country homes rely upon horticulture and it additionally contributes around 17% to the absolute Gross domestic product. Farming gives work to around 60% of the populace. Accordingly, right identification of yield illnesses is expected to reinforce the area of horticulture and economy of our country. The checking of ceaselessly repeating crops need extreme power, especially for infectious prevention, which can significantly affect parts of creation to procure a benefit. The picture strategy is the best technique for getting a remunerated situation in rural application. Pictures of plants can be utilized to recognize ailment. Help for horticultural improvement can assist with balancing this impact. Since most of the essential side effects are little, human vision restricts the infection's discovery. This

approach is monotonous and tedious. A style framework that precisely perceives, orders, and
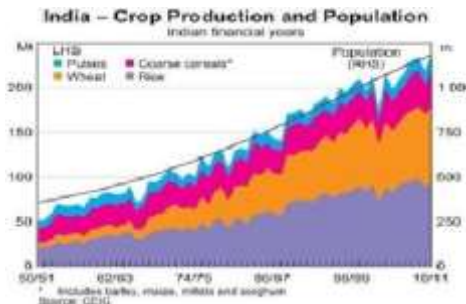
quantitatively analyzes diseases is required.

Fig 1. Chart in lieu of production of main crops

1.1 Introduction to Crop and Plant Diseases

The ordinary grimes process actual execution of the plant realm is obviously shown in the occurrence of modern disorder, which alludes to squander stock ailment. A side effect may be resolved in light of the proof currently accessible. Dealing with a disease might be a troublesome undertaking. Most diseases display themselves on the leaves, natural products, orstems of plants. Asa rule, infections are found on the plant's leaves or stems. A key job is played by the roaring development of harvests, the distinguishing proof of plants, leaves, and the quest for sicknesses, signs of infection. To forestall human impact, a PC vision framework is being created to find, recognize, and order illnesses that effect crops, bringing about a more exact and fair determination of disorder disease and its worth.

Leaf sickness discovery is the main insightful subject, and it can consequently recognize infections in light of the side effects that show up on the plant leaves. The significance of picture handling couldn't possibly be more significant.

As the ages pass, there is likewise a critical lessening in the richness of farming grounds. To supply nourishment for the enormous populace it requires a legitimate measure of creation. Consequently, it is fundamental to guarantee that the result is most extreme in accessible regions, forestalling that harm caused because of illnesses. It's basic to recognize ailments on plants and yields accurately. These side effects can be genuinely checked, yet not in adequate sums. Thus, there are an assortment of picture handling procedures for identifyingsicknesses on plant leaves and stems.

1.2 Classification of Crop Diseases

Crop or plant diseases are mainly classified into three types.

They are:

- Bacterial diseases
- Leaf mold diseases
- Early/Late Blight

1.2.1 Bacterial Diseases

Microbes that cause plant illnesses are spread in numerous ways — they can be sprinkled about by downpour or conveyed by the breeze, birds, or bugs. Individuals can accidentally spread bacterial illnesses by, for example, pruning tainted plantation trees during the blustery season. Water works with the entry of microorganisms continued pruning apparatuses into the pruning cuts. When

inside they the kill have cells, by the means depicted above, so they can develop.

Fig 2. Bacterial Disease

1.2.2 Leaf Mold Disease

Infection particles are tiny and should be visible just with an electron magnifying instrument. TMV, potato infection Y (PVY), and cucumber mosaic infection (CMV) are instances of a short unbending bar formed, a long flexuous pole molded, and an isometric infection, separately. Wounds in plants can happen normally, like in the spreading of sidelong roots. Now and again, the creature making the injury can likewise convey and send the infection.

Fig 3. Leaf Mold

1.2.3 Late / Early Blight

Late scourge, additionally called potato curse, infection of potato and tomato establishes that

is brought about by the water form Phytophthora infestans. The illness happensin muggy areas with temperatures running somewhere in the range of 4 and 29 °C (40 and 80°F). Warm dry weather conditions really looks at its spread. Potato or tomato establishes that are contaminated may decay in two weeks or less. Infestans produces sporangia and sporangiophores on the outer layer of tainted tissue and the subsequent white sporulation should be visible at the edges of injuries on abaxial (lower) surfaces of leaves.

Fig 4. Late Blight

2. 2. LITERATURE SURVEY

In this section describes various approaches for detecting the disease in plant leaf using image processing technique.

Sachin D. Khirade & et al… [1] Identification of the plant diseases is the key to preventing the losses in the yield and quantity of the agricultural product.

Prof. Sanjay, B. Dhaygude & et al… [2] Masking and removing of green pixels with pre-computed threshold level. Finally, the texture parameters are compared to texture parameters of normal leaf.

Amandeep Singh, Maninder Lal Singh& et al… [3] The most significant challenge faced during the work was capturing the quality images with maximum detail of the leaf color.

M.Malathi, K.Aruli & et al… [4] Depending on the applications, many image processing technique has been introduced to solve the problems by pattern recognition and some automatic classification tools.

Malvika Ranjan, Manasi Rajiv Weginwar& et al… [5] Image of diseased leaf is captured. As the result of segmentation Color HSV features are extracted.

Y.Sanjana, Ashwath Sivasamy& et al… [6] In this it describes the uploaded pictures capturedby the mobile phones are processed in the remote server.

Bhumika S.Prajapati, Vipul K.Dabhi& et al… [7] In this detection and classification of cottonleaf disease using image processing and machine learning techniques was carried out.

P.Revathi, M.Hemalatha& et al… [8] This proposed work is based on Image Edge detection

Segmentation techniques in which, the captured images are processed for enrichment first. Later, image features such as boundary, shape, color, and texture are extracted for the disease spots to recognize diseases and control the pest recommendation.

Mr. Pramod S. landge, Sushil A. Patil& et al… [9] In this propose and experimentally evaluate a software solution for automatic detection and classification of plant diseases through Image Processing.

Heeb Al Bashish, Malik Braik & et al… [10] In this paper an image-processing-based approach is proposed and used for leaf and stem disease detection.

3. LEAF DISEASE DETECTION AND AUTOMATIC PESTICIDE SPRAYING CONTROL ROBOT USING RASPBERRY PI

Plants are helpless to a few problems and assaults brought about by infections. There area few reasons that can be characterizable to the impacts on the plants, messes because of the ecological circumstances, for example, temperature, stickiness, wholesome overabundance or misfortunes, light and the most widely recognized infections that incorporate bacterial, infection, and parasitic illnesses. Those sicknesses alongside the plants may shows different actual qualities on the leaves, for example, a progressions in shapes, colors and so on. Because of comparative examples, those above changes are hard to be recognized, which makes their acknowledgment a test, and a previous identification and treatment can keep away from a few misfortunes in the entire plant. In this paper, we are talked about to utilize ongoing locators, for example, Quicker Locale Based Convolutional Brain Organization (Quicker R-CNN), District based Completely Convolutional Organizations (R-FCN) and Single Shot Multi box Finder to identification and order of plant leaf illnesses that effect in different plants.

3.1 Block Diagram
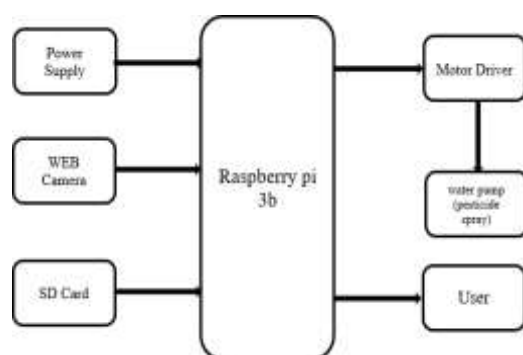
Fig 5. Block Diagram of leaf disease detection and automatic pesticide spraying controlrobot using raspberry-pi

3.1 POWER SUPPLY

5V power supplies (or 5VDC power supplies) are one of the most well-known power supplies being used today. Direct managed 5VDC power supplies control the result utilizing a dissipative directing circuit. They are incredibly steady, have extremely low wave, and have no changing frequencies to create EMI.

3.2 DC MOTORS

The raspberry pi model is modified with the end goal that if the either soil dampness or temperature boundaries pass a predefined boundary level, the water system framework is mechanized, for example the transfer associated with the raspberry pi will turn ON or OFF theengine. A DC engine is an electrical machine that changes over electrical energy into mechanical energy.

3.4 SD CARD

A Secure Digital (SD) card is a tiny flash memory card designed for high-capacity memory and various portable devices, such as car navigation systems, cellular phones, e-books, PDAs, smart phones, digital cameras, music players, digital video camcorders and personal computers.

3.5 Raspberry Pi

Raspberry Pi is a little single board PC. By interfacing peripherals like Console, mouse, show to the Raspberry Pi, it will go about as a smaller than expected PC.

Raspberry Pi is prevalently utilized for continuous Picture/Video Handling, IoT based applications and Advanced mechanics applications. The Pi isn'tsimilar to your normal machine, in its least expensive structure it doesn't have a case, and is basically a Mastercard measured electronic board - - of the sort you could find inside a PC or PC however a lot more modest.

3.6 USB Cam

A USB webcam is a camera that interfaces with a PC, for the most part through connecting it to a USB port on the machine. The video is taken care of to the PC where a product application allows you to see the photos and move them to the Web.

4. RESULTS ANALYSIS

Step 1

A web camera is connected to camera serial interface port of Raspberry pi, it continuously

monitors the crop field. The camera is used to detect the diseases in the crops especially the leaves. Here, we have considered detection of four type of unhealthy leaf diseases and one

healthy.

They are

- Bacterial Spot.
- Leaf Mold.
- Early Blight.
- Late Blight.

Fig 6. Robot that serves the purpose of leaf disease detection

Step 2

Web camera which is mounted on the robot monitoring the crops in fields at the farm and thus it automatically detects symptoms of disease. If the camera detects the disease, the information i.e. disease name and required pesticides name are sent to farmer's device. After that by using robot it automatically sprays pesticides to the crops. In this project we are taking four types of disease leaves and one healthy leaf. The camera covered the distance about 1.5 feet and the lens with a resolution of 640 x 480 (30 FPS).

Fig 7. Input plant disease identified by web camera

Step 3

After detecting the diseases, it displays the disease name and types of pesticides used for disease. After that it automatically sprays pesticides to the crops.

Case i

Fig 8. Early blight

If the camera detects light pale color on the leaf, it displays the disease name as earlyblight and pesticide used for early blight disease is azoxystrobin and mancozeb.

Case ii

If the camera detects dry or yellow leaf it displays the disease name as late blight andpesticide used for early blight disease is cymoxanil and mancozeb.

Fig 9 Late blight

Case iii

If the camera detects the crush type of leaves it displays the disease name as leaf mold and automatically sprays chlorothalonil pesticides to the crops.

Fig 10. Leaf Mold

Case iv

If the camera detects the green leaf i.e. Healthy then it displays the healthy and it doesnot spray pesticides to the crops and move to the another crop.

Fig 11. Healthy

5. CONCLUSION AND FUTURE SCOPE

Essentially, there are three fundamental sorts of Leaf sickness, they are Bacterial, Contagious and Viral. It is significant in plant sickness location to have the precision in the plant illness identification and yet the cycle ought to be of rapid. Work can be expanded utilizing quad copter for the catching of pictures of leaves of the various plants in the ranch at field level. This framework can be associated with the server for additional handling. The target of this work is the discovery, arrangement of leaf infections and all data about the illness is shipped off the rancher's cell phone through the web. To speed up and exactness of discovery as well as arrangement of leaf illnesses we use Raspberry pi 3 model B module. Another significant advantage of this framework is that it gives the name of the pesticide expected to use to keep the infection from spreading. It is giving name of pesticide according to the sickness, to save workcost by killing need of work for standard perception of plants to check regardless of whether it is impacted by any infection. This framework will generally add to development in the yield of the ranches.

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