

Leaf Disease Detection Using Image Processing

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Abstract- Agriculture is considered to be the backbone of our country. In today's world, the land masses of the agriculture are more than just feeding source. The economy of India is highly dependent on the agricultural produce. The disease in the plant could cause serious effects on the product's quality and production. Hence it becomes important to detect the disease in a plant at a very early stage. Monitoring the plant disease manually is very difficult. To detect the disease it requires a great amount of work, expertise knowledge about plant disease. Hence, to detect the disease, image processing is of great help. Image processing for leaf disease detection involves various steps like image acquisition, preprocessing, segmentation, feature extraction and finally classification.

Keywords- Agriculture, disease, image acquisition, segmentation, feature extraction, classification.

I. INTRODUCTION

India is a very largely cultivated land. The economy of the country is hugely dependent on the agricultural productivity. Proper care as to be taken, if not it would result in low quality product, less rate of production. Hence the disease must be detected as early as possible to overcome the losses. The existing methods to detect the disease are just simply through the naked eyes observation which is carried out by the experts. For performing such manual tasks, continuous monitoring of the plant is needed, a huge group of experts are required which would eventually cost high. To overcome this problem, the paper proposes a cost efficient technique using image processing. This project proposes an image pattern classification to detect rust disease in leaves along with texture extraction and feature extraction. The main purpose of this research is to identify the appropriate features that could identify the leaf disease. The procedure includes various steps. Firstly, the images of normal and diseased leaves are collected. Then they are subjected to preprocessing. Then colour, texture, features of the shape is extracted from images. After the above steps, the images are classified with the help of support vector machine classifier.

Plants play a vital role in our environment. There will be no existence of earth's ecology without the plants; hence a database of plant is essential to handle the information. Thus

the efficient methods of classification has become an active area for research.

The primary symptoms of the plant diseases are generally microscopic; hence the identification of disease is usually restricted by human visual capacities. So there's need to design a system that acknowledges, classifies and detect symptoms mechanically.

In most of the varieties of the plants the disease is usually seen on leaves, fruits and stems of the plant. Here we use the images of leaves to detect the diseases in it.

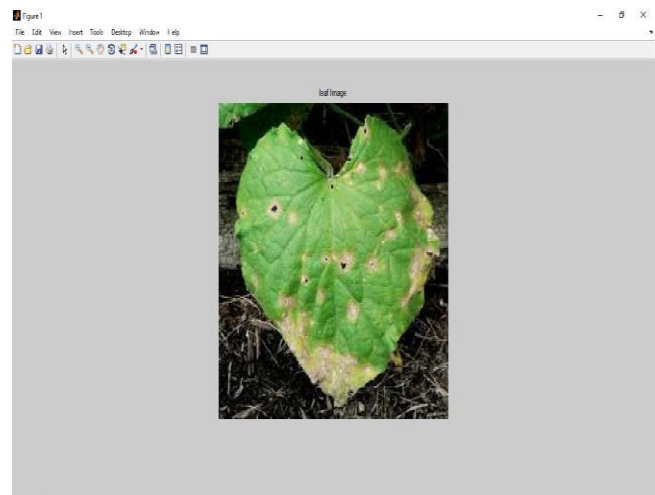


Figure 1: Diseased leaf

To avoid a person's interference developing a computer vision system to seek out, recognize, and classify illness affected on crops and thus solution in proper unbiased call regarding illness infection and its more valuation. Farmers to avoid consulting divine the event of an automatic system helps. Automatic detection might prove gain in looking huge fields of crops and plant disease detection is most significant analysis topic then from the symptoms that gift on the plant leaves, it can automatically notice the diseases image. The image processing starts with capturing of digital high resolution pictures. Healthy and unhealthy pictures are captured and hold on for experiment. Then pictures are applied for pre-processing for image.

The image processing in matlab begins with capturing the pictures with high digital resolution. Diseased and healthy images are captured and used for the experiment.

II. PLANT PATHOLOGY

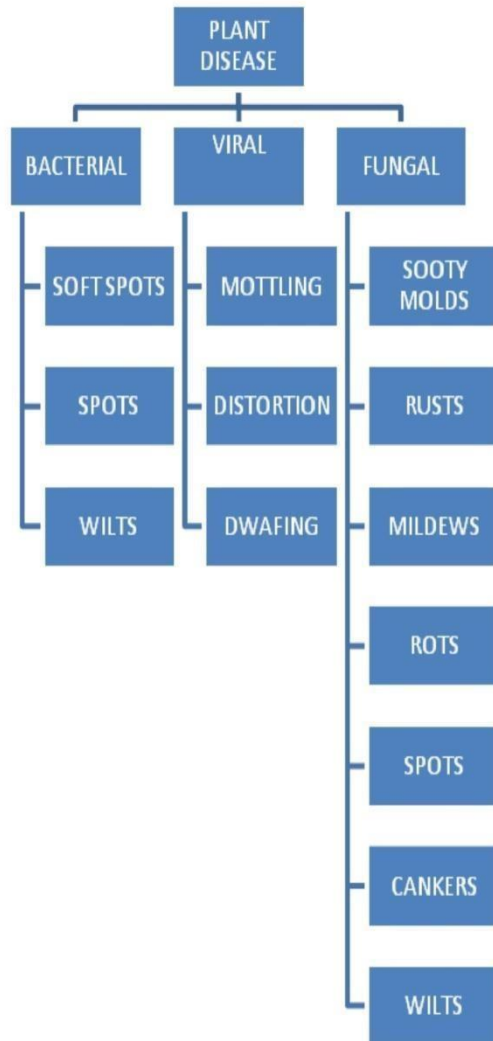


Figure 2: Fundamental of plant pathology or disease.

The plant diseases are of three forms. They are

1. Bacterial
2. Viral
3. fungal

III. LITERATURE SURVEY

Prior papers are portraying to recognize basically pests like aphids, whiteflies, thrips, and so forth utilizing different methodologies proposing the different execution ways as showed and talked about beneath. Proposed a psychological vision framework that consolidates image processing, learning

and Knowledge based systems. They just identify develop phase of white fly and check the quantity of flies on single leaf. They used 180 images as test dataset among this pictures they tried 162 pictures and each picture having 0 to 5 whitefly bother. They figure false negative rate (FNR) and false positive rate (FPR) for test pictures without any whiteflies (class 1), at any rate one white fly (class 2) and for entire test set. Broaden usage of the picture preparing calculations and methods to distinguish bothers in controlled condition like nursery. Three sorts of average highlights including size, morphological element (state of limit), and shading segments were thought of and explored to recognize the three sorts of grown-up creepy crawlies, whiteflies, aphids and thrips. Advance early pest discovery in green houses dependent on video investigation. Their objective was to characterize a choice emotionally supportive network which handles camcorder information. They executed calculations for recognition of just two bio aggressors name as white flies and aphids. The framework had the option to distinguish low pervasion arranges by identifying eggs of white flies along these lines breaking down conduct of white flies. Proposed bug location framework including four stages name as color conversion, segmentation, reduction in noise and counting whiteflies. An unmistakable calculation name as relative difference in pixel intensities (RDI) was proposed for distinguishing pest named as white fly influencing different leaves. The calculation works for nursery based yields as well as agrarian based harvests also. The calculation was tried more than 100 pictures of white fly bug with a precision of 96%.Proposed another technique for bother recognition and situating dependent on binocular sound system to get the area data of nuisance, which was utilized for directing the robot to shower the pesticides naturally. Presented relevant parameter tuning for versatile picture division that permits to effectively tune calculation parameters as for varieties in leaf shading and difference. Presents a programmed strategy for order of the fundamental operators that cause harms to soybean leaflets, i.e., bugs and caterpillars utilizing SVM classifier.

IV. PROPOSED SYSTEM

The proposed system comprises different stages including assortment of pictures of horticultural natural products for making of database. Picture division is performed utilizing grouping strategies. Highlights of portioned pictures are put away in database with particular picture of rural natural products. Utilizing bolster vector machine classifier we would discover kind of illness presents in picture and offer solutions for control it.

Shape feature extraction:

Shape include extractions utilized in this task are strength, degree, minor hub length and capriciousness. These highlights taken from explore so as to remove shape include in ailing locale.

Eccentricity is utilized to perceive whether the rust shape is a circle or line portion. Erraticism is the proportion of the separation between the foci of the circle and its significant pivot length. An oval whose unusualness is 0 can be perceived as a circle, while an oval whose capriciousness can be perceived as a line portion [9]. Minor pivot length is utilized to gauge length of hub of the ailing district. Minor hub length is the length of the minor pivot of the oval that has the equivalent standardized second focal minutes as the area (in pixels)[9]. Degree is utilized to quantify region of ailing locale that is isolated by the region of the jumping box. Degree is processed as the territory isolated by zone of the jumping box [9]. Solidity is utilized to quantify region of sick district partitioned by pixels in the curved body. Robustness is the extent of the pixels in the raised structure that are additionally in the locale. It is registered by separating the zone by raised territory [9].

Texture Feature Extraction

Gray Level Co-occurrence Matrix (GLCM) remove second request factual surface highlights [10]. Surface component extraction utilized in this exploration is differentiate, relationship, vitality and homogeneity. These highlights taken from look into [3] to separate surface component in leaf unhealthy locale. Difference of the pixel and its neighbors is determined over the entirety of the picture pixels. Difference is utilized to quantify differentiate between neighborhood pixel. Shading Feature Extraction: Color is an unmistakable element for picture portrayal that is invariant concerning scaling, interpretation and pivot of an image[9]. Mean, skewness and kurtosis are utilized to speak to shading as highlights. To do this, we change RGB to LAB. Multi Support Vector Machine: Training test in multi bolster vector machine is detachable by a hyper plane. This hyper planes figured by the choice capacity, where w is a weight vector and b is an edge cut-off [3]. For example arranging should be possible into multiple gatherings.

There are 3 kinds of classifier are utilized to which classifier gives the better outcome. The back engendering and feed forward classifiers are not identifying a few bugs in a picture. Be that as it may, SVM gives better outcome. SVM is a non-straight classifier, and is a more up to date pattern in Image Processing calculation.

Design of Image Processing Model

So as to manufacture a machine inclining model it comprises of two stage specifically testing and preparing stage were the model is first prepared and an info is given to test the model which is known as the test information. The model comprises of a few picture preparing steps, for example, picture procurement, picture preprocessing, division, highlight extraction and SVM classifier to characterize the maladies.

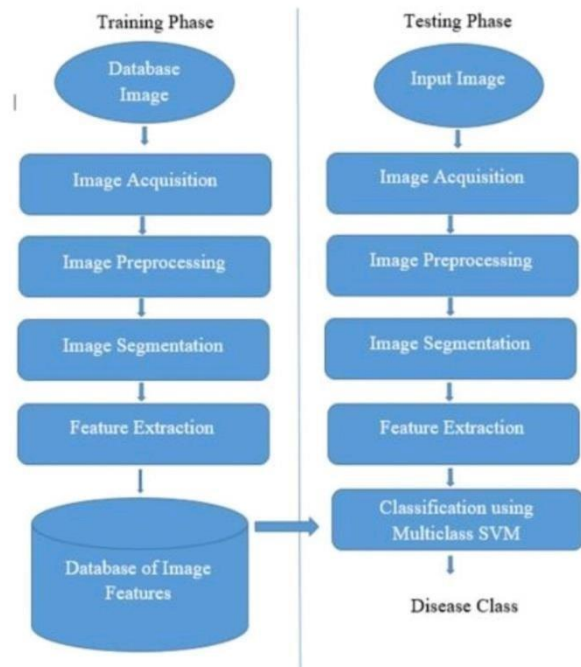


Figure 3: Proposed Block Diagram for Classification of Disease

Image acquisition:

The sick leaf picture is obtained utilizing the camera; the picture is procured from a specific uniform separation with adequate lighting for learning and order. The example pictures of the ailing leaves are gathered and are utilized in preparing the framework. To prepare and to test the framework, unhealthy leaf pictures and less solid pictures are taken. The pictures will be put away in some standard organization. The picture foundation ought to give a legitimate difference to the leaf shading. Leaf sickness dataset is set up with both highly contrasting foundation, in view of the near investigation dark foundation picture gives better outcomes and thus it is utilized for the malady distinguishing proof leaf.

Image pre-processing: Image got using the automated camera is pre-arranged using the racket clearing with averaging channel, concealing change and histogram equalization. The concealing change step changes over the RGB picture to HSI (Hue, Saturation and power) depiction as

this concealing space relies upon human perception. Tone implies the common concealing trademark correspondingly as observed by a human onlooker. Submersion suggests the proportion of quality or white light added to the tone. Force suggests the abundance of light. After the RGB to HSI change, Hue some segment of the image is considered for the assessment as this gives only the required information. S and I section are ignored as it doesn't give any tremendous information.

Masking green pixels: Since most of the green shaded pixels insinuate the sound leaf and it doesn't expand the estimation of the disease recognizing evidence systems, the green pixels of the leaf are emptied by a particular veiling procedure, this method significantly reduces getting ready time. The asking of green pixels is cultivated by preparing the power estimation of the green pixels, if the force isn't actually a predefined edge regard, RGB fragment of that particular pixel is designated with an estimation of zero. The green pixel covering is an optional development in our contamination ID technique as the undesirable bit of the leaf can be completely separated in the division methodology.



Figure 4: Gray Conversion

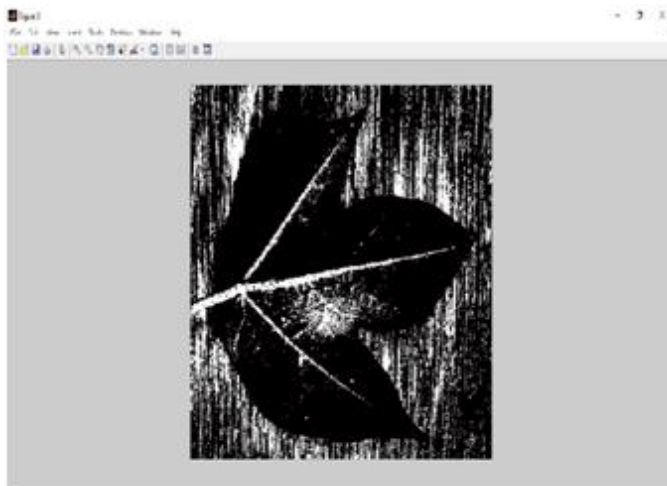


Figure 5: Black and white conversion

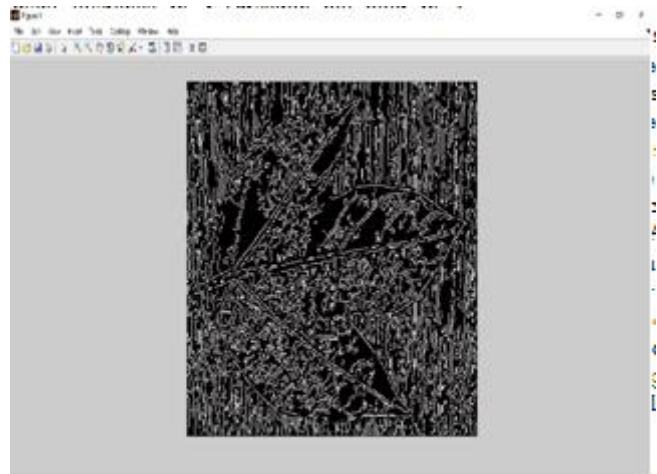


Figure 6: Canny Edge

V. RESULTS AND DISCUSSION

I. ANTHRACNOSE

Anthracoze shows in Fig. 7 a bunch of fungal illness that has an effect on a spread of plants in heat, humid areas. Shade trees like sycamore, ash, oak, and maple are particularly inclined, though the illness is found during a variety of plants, as well as grasses and annuals.

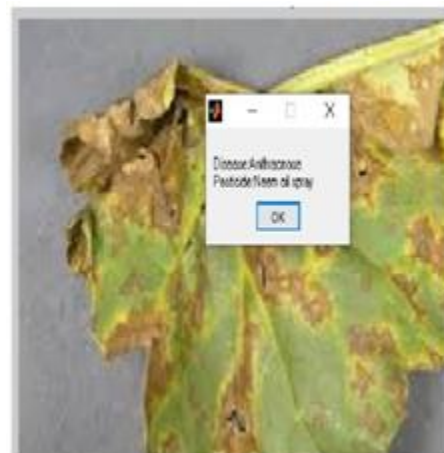


Figure 7: Anthracnose

II. ASCOCHYTA BLIGHT



Figure 8: Ascochyta Blight

Ascochyta blight shows in fig 8 is a fungal disease.

III. CITRUS BLACK SPOT

A citrus black spot shown in Fig. 9 is a fungal disease. This Ascomycete parasite influences citrus plants all through subtropical atmospheres, causing a decrease in both organic product amount and quality.



Figure 9: Citrus Black Spot

VI. CONCLUSIONS

This venture proposed a leaf picture design characterization to recognize disease in leaf with the assistance of surface and shading highlight extractions. At first the farmers sends a computerized picture of the unhealthy leaf of a plant and these pictures are perused in MATLAB and handled naturally dependent on SVM and the outcomes were appeared. The point of this task is to discover fitting highlights that can recognize leaf disease of certain normally made ailment plants. Right off the bat, typical and unhealthy pictures are gathered and pre-handled. At that point, highlights of shape, shading and surface are removed from these pictures.

From that point onward, these pictures are grouped by help vector machine classifier. A blend of a few highlights is utilized to assess the proper highlights to discover unmistakable highlights for recognizable proof of leaf illness. At the point when a solitary component is utilized, shape highlight has the least exactness and surface element has the most elevated precision. The surface and shading highlight extraction results the most noteworthy arrangement precision. A blend of surface and shading highlight extraction with polynomial part brings about great order precision. In light of the arranged sort of infection an instant message was sent to the client in the task.

VII. FUTURE WORK

In this venture, we showed just scarcely any kinds of sicknesses which were normally caused and it tends to be reached out for more ailment in future. Here we prescribe the pesticides to be utilized for individual maladies and educated to the rancher however in future a robot can be sent to shower the pesticides to the plants consequently without human cooperation.

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