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Crop Leaf Disease Detection Using Machine Learning

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ABSTRACT: Agricultural productivity is very dependent on the economy. Plant diseases are crucial in agriculture since they are quite natural, and failing to care for them will have serious repercussions for plants, affecting the quality of the crop, or productivity of the product. Detection of plant diseases by automated techniques is beneficial because it reduces monitoring efforts on large plants and detects an indication of disease. In our proposed work we use improved segmentation method is used for get the diseased part of the leaf. It gives the best accuracy. Based on the disease give remedies for that.

KEYWORDS: Quality**,** Economy Plant diseases, Detection

I. INTRODUCTION

The Adobe Photoshop is the most common example. It is one of the most extensively used applications for digital image processing. The amplitude of F at any pair of coordinates (x, y) is called the intensity of that image at that place. An image is defined as a two- dimensional function, F(x, y), where x and y are spatial coordinates. A digital image is one in which the x, y, and amplitude values of F are all finite. We will only explore a few of the primary applications of digital image processing because it has such a broad range of applications and affects practically every technical sector.

Digital image processing isn't just about adjusting the spatial resolution of the images collected by the camera on a daily basis. It isn't only restricted to boosting the photo's brightness, for example. It's much more than that, in fact. Digital image processing isn't just about adjusting the spatial resolution of the images collected by the camera on a daily basis. It isn't only restricted to boosting the photo's brightness, for example.

It's much more than that, in fact. Electromagnetic waves can be conceived of as a continuous stream of particles travelling at the speed of light. A bundle of energy is included in each particle. A photon is the name for this bundle of energy. Image sharpening and restoration refers to the process of improving or manipulating photos acquired with a modern camera in order to obtain a desired result. It refers to the work that Photoshop normally performs. Zooming, blurring, sharpening, grey scale to colour conversion, identifying edges and vice versa, image retrieval, and image recognition are some of the features available. It refers to the technique of altering the appearance and feel of an image.

It essentially manipulates the data.images and produces the desired result Conversion, sharpening, blurring, detecting edges, retrieval, and picture recognition are all included. The very first image transferred over the wire was over an underwater cable from London to New York. The image that was sent is displayed below. It took three hours for the picture to get from one location to another. Imagine being able to observe live video feeds or live cctv footage from one continent to another with only a few seconds of delay. It implies that a significant amount of work has been done in this area as well. This field is concerned with both transmission and encoding. Many different formats for encoding photographs with high or low bandwidth and then streaming them over the internet or elsewhere have been created.

The technique of altering digital photographs using a computer is known as digital

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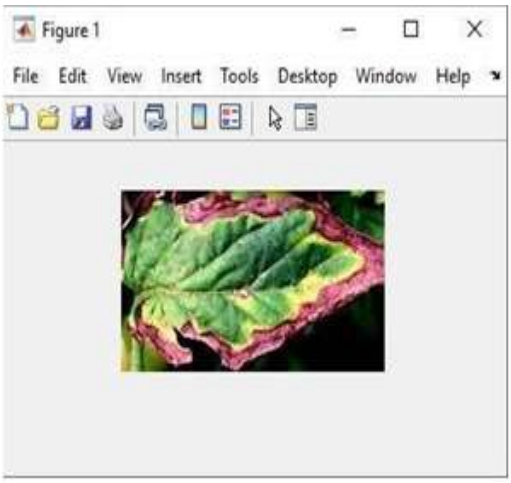
image processing.

II. EXISTING SYSTEM

In the physical world, any quantity that can be measured through time, space, or a higher dimension can be considered a signal. A signal is a mathematical function that communicates data. A signal can be one-dimensional, two- dimensional, or even three-dimensional. A signal that is measured throughout time is referred to as a one-dimensional signal. A speech signal is a common example. Signals that are measured across other physical quantities are referred to as two-dimensional signals. In the next session, we'll look at how one-dimensional or two- dimensional signals, as well as higher signals, are created and interpreted in greater depth.



Diseased Leaf

Because signal is anything that transmits information or broadcasts a message between two observers in the physical world. As a signal, this involves speech or (human voice) or an image. Since our voice is changed to a sound wave/signal when we talk, it is transformed with respect to the time to the person to whom we are speaking. Not only that, but the way a digital camera works, since acquiring an image from one portion of the system to the other requires the transfer of a signal.

Because taking a picture with a camera is a physical process. As an energy source, sunlight is employed. The image is captured with the help of a sensor array. When sunlight shines on an object, the amount of light reflected by that object is sensed by the sensors, and the amount of sensed data generates a continuous voltage signal. We must transfer this data into digital form in order to build a digital image. This necessitates the use of sampling and quantification.

Image Resizing

A two-dimensional array or matrix of numbers, which is nothing more than a digital image, is the product of sampling and quantization. Even if substantial damages are concentrated on, it takes longer to grasp damage. Because the impacted region is sometimes so large, it is impossible to inspect it with the naked eye in order to quantify damages.

Even if it is, the technique is arduous and time-consuming. As a result, digital picture processing provides a solution. An photograph of the impacted area is taken from above ground and examined to determine the different types of damage caused by the earthquake. When adopting digital approaches, all types of data must go through three general processes: pre- processing, augmentation, and presentation, as well as information extraction.

III. PROPOSED SYSTEM

The segmentation and feature extraction algorithms must be enhanced in order to improve the accuracy. Because of its simplicity, threes holding is one of the most used segmentation methods. However, the iterative procedure readily falls into the local optimal solution due to the random selection of centre points (threshold value).

Recently, evolutionary algorithms such as PSO (particle swarm optimization), a meta-heuristic technique that makes minimal assumptions about the problem being optimised and may explore very vast regions of candidate solutions, have been developed to solve this challenge. For both segmentation and feature extraction, we employ fuzzy with optimization-based segmentation and integrated features such as shape-based features, statistical features, and Local Binary Pattern.

Image pre-processing is a term used to describe activities performed on images at the lowest level of abstraction with the purpose of improving

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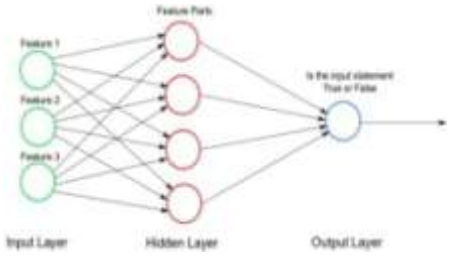
the image data by suppressing undesired distortions or increasing some key image qualities for subsequent processing.

In genuine photos, surrounding pixels that correspond to the same item have the same or similar brightness values, and if a distorted pixel canbe extracted from the image, it may be restored as the average value of neighbouring pixels. According to preprocessing, various photos of the same tissue type may have a variable scale of signal intensities. The activities that are normally necessary prior to the major data analysis and extraction of information are categorised as radiometric or geometric adjustments in preprocessing functions. This section surveys and analyses preprocessing approaches such as Content Based Model, Fiber Tracking Method, Wavelets and Wavelet Packets, and Fourier Transform Technique.



Layers of ANN

The Histogram equalisation, edge detection, and token matching are among the three modules used in image pre-processing. The median filter is a nonlinear digital filter that is commonly used to remove noise from images and signals. Noise reduction is a common pre-processing step used to improve the results of subsequent processing (for example, edge detection on an image).

Noise Removal

Median filtering is commonly employed in digital image processing because it keeps edges while reducing noise under certain situations(though see discussion below), and it also has uses in signal processing.

The median filter's fundamental principle is to goover the signal entry by entry, replacing each one with the median of the entries next to itover the signal entry by entry, replacing each one with the median of the entries next to it.

IV. METHODOLOGY

The techniques used to partition an image into meaningful segments with similar traits and qualities are known as image segmentation. The goal of segmentation is to simplify an image by expressing it in a meaningful and easy-to-understand fashion. The initial stage in image analysis is image segmentation. Picture segmentation's main purpose is to separate an image into many parts/segments with similar traits or properties. Human eyes see colour in an image as a combination of R (red), G (green), and B (blue); these three hues, Red, Green, and Blue, are referred to as primary colours.

Color components of other types can be obtained from R, G, and B colour representations using linear or nonlinear transformations. The RGB colour components indicate incoming light, or the brightness values of the image that can be retrieved using (Red, Green, and Blue filters), yet there is no common theory for colour image segmentation available at this time. We don't have any colour image segmentation methods yet, either by nature or on an ad hoc basis.

Color segmentation methodologies vary depending on the application; there are no universally accepted algorithms for colour image segmentation. Color picture segmentation is a psychophysical perception since it is critical to have prior knowledge of mathematical solutions related to image data.

The fundamental goal of colour segmentation is to detect certain objects in photographs, such as lines, curves, and so on. Every pixel in an image is given to a label in this process, and pixels with the same label share certain visual properties. PSO-based segmentation is employed in this research as a hybrid approach. It's a stochastic optimization technique based on the behaviour of a flock of birds or the sociological behaviour of a group of people.

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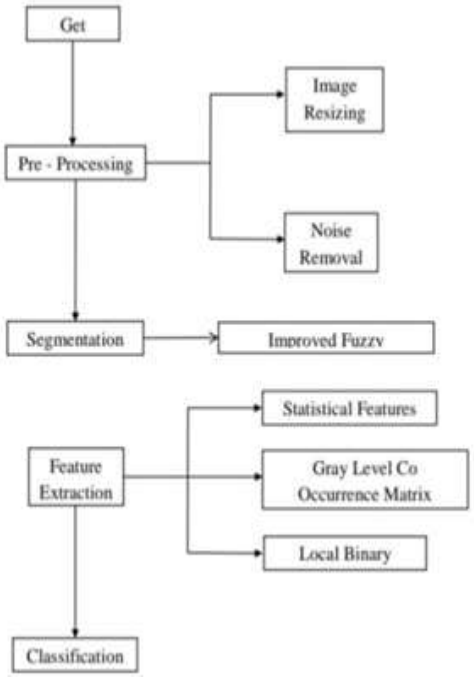


Flow Chart

All of the birds are unsure of where the food is, but with each iteration, they learn how far away it is. The best technique is to follow the bird that is close to food and has previously been in the best position. This is the foundation upon which PSO operates. Particle, Velocity, Fitness, gbest,and pbest are the five most critical metrics. The proposed method makes use of a sugeno fuzzy system. Each pixel is allocated a colour class using a set of fuzzy rules. The HSL colour space is used for fuzzy colour classification. The high number of fuzzy rules is the fundamental issue with fuzzy systems.

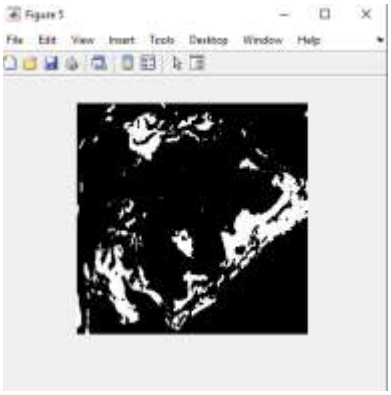
As a result, PSO is utilised, which generates the optimised membership function by automatically producing the least amount of optimum fuzzy rules. a comprehensive education PSO is a better variant of PSO that uses all particles to update the velocity of other particles. A fitness function is employed to rate each particle's optimality. a comprehensive education PSO is an optimization method for determining the best fuzzy rules and membership function. A set of fuzzy rules is assigned to each particle. Each particle strives to maximise the fitness function during this process. Furthermore, comprehensive learning PSO prevents the initial PSO from merging prematurely.

V. RESULTS AND DISCUSSION

In Feature extraction is used in machine learning, pattern recognition, and image processing to create derived values (features) that are meant to be useful and non-redundant, easing future learning and generalisation phases and, in certain situations, leading to improved human interpretations.

Improved Fuzzy Segmentation

When an algorithm's input data is too vast to process and is suspected of being redundant (for example, the same measurement in feet and metres, or the repetitiveness of images provided as pixels), itcan be reduced to a smaller collection of features (also named a feature vector). Feature selection is the process of determining a subset of the initial features. The selected features should contain the necessary information from the input data, allowing the intended task to be completed using this reduced representation rather of the entire initial data.



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VI. CONCLUSION

The current method for plant disease detection is simple naked eye inspection by professionals, which allows for disease identification and detection. This necessitates a large team of experts as well as continual plant monitoring, both of which come at a great expense when dealing with huge farms. The segmentation and feature extraction algorithms must be enhanced in order to improve the accuracy. For both segmentation and feature extraction, we use fuzzy with optimization-based segmentation and integrated features such as shape-based features and statistical features. We employ an artificial neural network for classification.

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