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RECOGNITION OF SILVERLEAF WHITEFLY AND WESTERN FLOWER THRIPS VIA IMAGE PROCESSING AND ARTIFICIAL NEURAL NETWORK

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Abstract - *IPM(Integrated Pest Management) is used to minimize or reduce the use of chemicals in greenhouse agriculture. IPM is basically depends upon early detection and continuous monitoring of pest populations which is very critical or time consuming task as it require continuous monitoring and it also dependent on human judgment due to this it has lots of error. To minimize this error, we propose a general approach for finding and monitoring of adult-stage whitefly and thrip in greenhouses which is based on the grouping of two process first is image-processing algorithm and second is artificial neural networks.For image processing a sticky trap paper is used from which image is taken by the process of image acquisition system. The detection of the objects from the images is perform through segmentation, and morphological and color property opinion performed by an image processing algorithm. Lastly the identification of the objects is performing through feed-forward multi-layer artificial neural network.*

***Key Words*: — IPM, Early pest detection, Insect identification, Image processing, Artificial neural network.**

1. INTRODUCTION

In this project we are going to create a system called Artificial Neural Network Technology to detect and classify leaves diseases. On plants generally 80 to 90 % of disease is on its leaves. So due to this reason our study of interest is leaf of the tree rather than whole plant. In the automated system now a days, which normally consists of computer, digital camera and application software, various kinds of algorithms are developed in the software application. We use image processing and Artificial Neural Network Technology for complete disease detection phase. We will take an image of a defected plant leaves as a input and take out the features of leaves. In our project we will consider color as feature. By using this feature we will compare our defected plant leaves with the database present there. We are going to use Artificial Neural Network as our classifier for comparison of leaves. An artificial neural network (ANN), usually called neural network (NN). A neural network consists of an interrelated group of artificial neurons, and it process information using connectionist approach for computation.In the majority cases ANN is an adaptive system which changes its structure based on external or internal information that flows through the network during the learning phase. We have formed a database of diseased cotton leaf considering two different diseases they are identified as Silverleaf Whitefly and Western flower thrips.We have to take out the separate H, S and V features and compare this features with the features that are extracted from the input test image. We have done various preprocessing steps on the input test image like gray scaling, thresholding, cropping for detecting the boundary of the image. We have divided the whole area of interest into blocks and then we have compared features of each block with the features of images in the database.

2. RELATD WORK

A. BACKGROUND

Integrated Pest Management is widely used in present work to minimize the use of different chemicals in agriculture. Mainly IPM depends on the early finding and nonstop monitoring of pest populations, a critical task which is time-consuming and human judgment that gives error. On increasing public required for food safety and quality is making market openings for certified products, developed using Integrated Pest Management (IPM) practices. A variety of non-chemical control scheme have been developed to keep pest density to a minimum level, such as insect-proof screens, sticky paper etc.

An automatic pest detection system mainly consists of two stages: image acquisition and the image processing algorithm in which image acquisition technique is use to capture the images of insects and image processing algorithms are used to detect the insects. A number of image-processing algorithms have been developed to recognize small pests in sticky traps such as whiteflies and thrips. The segmentation process is used to sense objects on the trap images. In the previously mentioned studies, color and shape features were used to identify the objects detected in the segmentation process. Classification of the processed features is an important technique in an insect detection algorithm. To perform this task, number of techniques are proposed using Support Vector Machines to classify the features extracted from the objects detected in sticky traps. Artificial neural network (ANN) is an improved learning model that has been used successfully in many applications. It consists of three elements the set of synapses or connecting links, the adder and the activation function or transfer function. Artificial neural networks are good for the sorting of insects as compare to ad hoc algorithms. ANN are not limited for the number of insects that can be classified, they do not require any prior arrangement of constants, and the upgrade of the sorting method is very simple. However, ANN is used to identify a wide range of insects, no previous studies have make the models to identify small and less detailed insects on sticky traps.

B. IMAGE PROCESSING

A digital image processing is the method of treatment of digital images through a digital computer. It is a subfield of signals and systems which is mainly focuses on images. DIP focuses on implementing a computer system which is able to do processing on an image. An input to this system is a digital image and system process that image using well-organized algorithms, and gives an image as an output. There are many type of image some of them are object detection, fragmentation and feature extraction

B.1 OBJECT DETECTION

Object detection is the method of detecting instance of real world objects such as faces, bicycles, and buildings in images or videos. It is a kind of skill for identifying objects in an image or video sequence. Humans can recognize a huge number of objects in an image very easily. Image of an object can vary from different points to points, size to size and scale to scale, when they are translated or rotated. Objects can even be known when they are moderately obstructed from view. This task is still a big challenge for computer vision systems. Many methods have been done over multiple decades for object detections.

B.2 SEGMENTATION

Segmentation is the process of dividing a digital image into number of parts or sets of pixels. The aim of segmentation is to make simpler or change the depiction of an image into something which is more significant and easier to analyze. Image segmentation is mainly used to find boundaries and objects present in images. More exactly the image segmentation is the method of conveying a label to each and every pixel in an image such that pixels with the same label share certain characteristics.

B.3 FEATURE EXTRACTION

The process of defining a set of feature or characteristics of an image with the most efficient and meaningful information which is vital for analyzing and classification of an image is called feature extraction. When processing large amount of data it requires to minimize that data set as it is too large to handle. In such a situation a feature extraction is done to limit that huge amount of data

C. ARTIFICIAL NEURAL NETWORK

It is an artificial neural network which is based on a large collection of neural units which are loosely connected in a similar way a biological brain is connected. Each neural unit is connected to many other units and links can be compulsory or inhibitory in their effect on the activation state of connected neural units. Each entity unit function performs to combine the values of all its inputs together. There is one limiting function on every link and on the unit itself that it must surpass it before it can circulate to other neurons. These systems are self-learning and trained and used in areas where it is difficult to state or predict solution or where feature detection is difficult through traditional computer program.

D. NEURAL NETWORK CLASSIFIERS

A multilayer feed-forward neural network is used to categorize or to detect substance using the extracted morphological and color properties from the detected images. The network consisted of a two-layer view that process the incoming signal with the log-sigmoid and the line transfer functions respectively. A bias network improve the mesh input of the transfer function, depending on whether it is positive or negative

3. CONCLUSION

This paper shows the idea how the disease analysis is possible through the leaf diseases detection. The examination of the different diseases present on the leaves can be successfully identified in the early days before it damage the whole plant. The effectiveness of the given work is about 80% and hence the model presented can be able to detect the disease more precisely as compare to the other classifiers. The algorithm is used to detect the diseases .The appliance is robust and would be operated in any environment and any time occlusion is clean since the image is recorded entirely. The application interact with the user well and handle a lot of level of complexity. The proposed algorithm was experienced on different diseases which affects on the plants; they are Stem borer, Brown stripe downy mildew etc.

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