Analysis of Early Leave Pest Detection

P.Brinda

Dept. Of computer science

M.Phil Scholar, Mother Teresa Women's University
Kodaikanal,India

Email.id:brindaparamasivam23@gmail.com

Dr.M.Pushparani

Dept. of computer science

Professor and Head,Department of Computer Science ,Mother
Teresa Women's University Kodaikanal, India

Abstract— Agriculture plays crucial role in Indian economy. To increase the productivity and cultivation, farmers were using chemical pesticides. Nowadays pesticide, become more hazardous and it not only kills the pest in plants, but also affect the health of human, birds and animals, Etc. To overcome this problem and to cultivate organic food it is necessary to control the use of pesticide, pest detection is the most important process for an effective cultivation. In this paper, it deals with early detection of pest in leaves using Digital Image processing, image of leaves are captured through a digital camera. The leaves with bio-aggressors are processed through many clustering algorithms in digital image processing to detect and classify.

Keywords-Blob segmentation, SVM, image processing, RGB.

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I.   INTRODUCTION

Abundant of research has been done on greenhouse agro systems and more generally on protected crops to control pests and sick area by natural means instead of pesticides. Research in agriculture is aimed towards the increase of productivity and organic food quality at reduced cost and with increased profit, which has received importance in recent time. The great demand now exists in many countries for organic cultivation and natural pesticides to control pests or diseases. Greenhouses are considered as biological systems with inputs, outputs and control process loops. Most of these loops are controlled automatically (e.g., climate). However, no automatic methods are available which precisely and periodically was detecting the pests on plants. Early detection of pest or the initial presence of a bio-aggressor is a key-point for crop management. The detection of biological objects such as small insects (dimensions are about 2mm) is a real challenge, in the greenhouse we need to consider (10-100) dimension. For this purpose different measures are taken to observe the pest in the plant. This method does not give accurate measures. Hence the automatic detection is very much important for early detection of pests

II.   LITERATURE REVIEW

Many methods are used in pest detection, to classify the existing system these papers are discussed here, In previous paper they have detected only white flies in each leaflet, in this 180 input images has been processed and 162 images have detected the whiteflies in leaflet[9]. They also counted the number of whiteflies in each leaflet, it was 0 to 5 in each, and they used a cognitive vision system that combines image processing, learning and knowledge-based techniques. [2] In pest detection and identification, input used is dynamic image, i.e., a video or a static image. Ying yang et.al.[10] From an input video image they calculate the number of pests in each leaflet and identify whether the pests are alive or not. Methods such as motion estimation, multiple-frame verification, etc are used.

Early pest detection using vector machine by Latha et al.[8] They have implemented SVM (support vector machine) method to reduce the usage of herbicides by sprinkling them only in the areas where weed is present. In this paper, we implemented digital image processing using the MATLAB software to detect the weed areas in an image. A distinct algorithm name as the relative difference in pixel in densities (RDI) was proposed for detecting pest named as white fly affecting various leaves. The algorithm can only used in greenhouse based crops, but also agricultural based crops as well. The algorithm was tested over 100 images of white fly pest with an accuracy of 96%. [3]

Proposed a new method of pest detection by binocular stereo to get the location information about pest affected in crops, which was used for guiding the robot to spray the pesticides automatically[6]

Presents an method for classification of the main agents that cause damages to soybean leaflets,i.e., beetles and caterpillars using the SVM classifier.[6] proposed Back propagation neural network for recognition of leaves, diseases, pests.

III.   METHOD AND MODELS

It consists various stages, including a collection of images of agricultural pests for creation of the database. Clustering techniques used for image segmentation. Features of segmented images are stored in a database with respective image of agricultural pests.
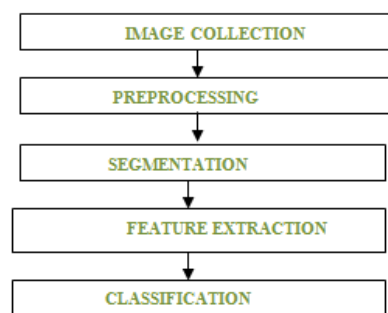

FIG 1: BLOCKDIAGRAM OF PEST DETECTION.

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A .IMAGE COLLECTION

First step in pest detection is collecting the image of leave with the help of digital camera or video recorder. These images are stored in database for further use.fig 2 show the image of leaflet which contain pest in it.

Fig 2: input image[4]

B.PREPROCESSING:

Preprocessing is process which helps us to reduce the background noise. Intensity of the image should be normalized. By Enhancing input image or image captured by digital camera, is to remove the background noise, image can get enhanced visual appearance of input images. By this enhancement process artifact image can be highlighted. In enhancement RGB image is converted into gray scale input image. In the RGB model appear to be primary color such as Red(R), Green(G), Blue(B). RGB is obtained from Cartesian coordinate system. In this model, the gray scale extends from black to white where the two points of line join together. By extending vectors from orgin the different colors inside cube can be defined [6].
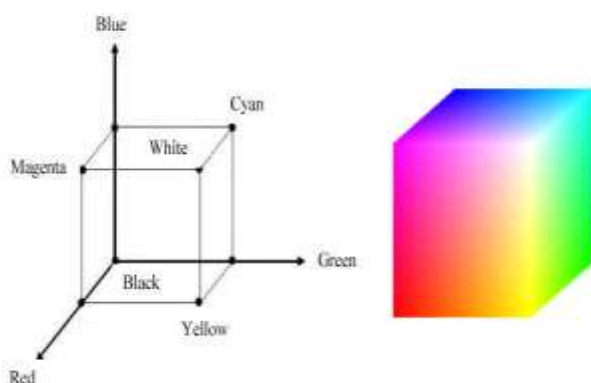
Fig3: The RGB colors cube [7] [5]

C. FILTRATION:

This is also a process which comes under pre processing, a median filtering technique is used to remove unwanted noise in enhanced image. The median filtering technique is used by mean and median value to calculate PSNR value.

D. IMAGE SEGMENTATION:

As segmentation literal meaning, in this process image is segmenting the image by group homogenous group, in this blob segmentation technique is used. This separate different region with special significance in the image. These separated regions do not intersect each other. By using blob detection method need region can be segmented for further process. Clustering techniques can also be used to group the region by same color, after color detection process edge detection can provide clear cut image of pest in leaf.
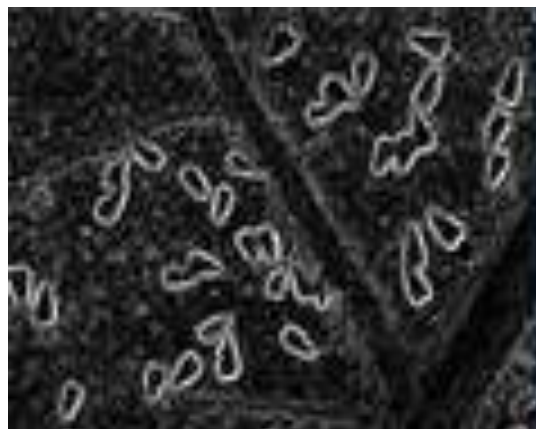

Fig 3: segmented leave image

E.FEATURE EXTRACTION:

Feature extraction is done three main steps they are histogram oriented gradient (HOG), Gaussian mixture model (GMM), Gabor feature. Histogram oriented gradient is a feature used for object detection. This techniques help to count the pest in localized portion. Gaussian mixture is used to detect the density analysis. Gabor feature is used for texture analysis in two dimensional input images, with the help of frequency and orientation it can extract useful region from the image. Finally, by using these methods extracted image is used for pest detection.[4]

F. IMAGE CLASSIFIER:

There are many methods used to classify the image some best methods are SVM (support vector machine) and graphic user interface. SVM newer technology in a machine algorithm which gives better detection result, this method used for pattern recognition and texture classification. This algorithm can calculate the number of pests in each leafs. SVM can work mostly with two classes. This work can do with maximizing the margin from the hyper plane. The samples were selected close to the margin hyper plane is also known as a support vector machine algorithm.[1] the SVM separate data from low-dimensional to a space of higher dimensions, so it can separated in higher dimension. By this separation it can identify the pest in leaves and provide the best solution to recover the pest from leaves.[1]

VI. EXPECTED RESULT:

The objective of this paper is to detect the pest as early as possible and identify the type of pest and to control the use of pesticide. The SVM technology helps us to count the number of pests in each leaves. So we can reduce the cost of pesticide used. This can be extended in future by giving the mixture ratio of pesticide that should be used in field to improve cultivation.

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V. CONCLUSION

Early detection pest analysis and identification are presented in this paper with help of image processing, input images are captured by the digital camera, image of leave which contain pest are used as input and by using mean filtration background noise can be removed and RGB image is converted into a grayscale image, the Blob segmentation process is used is to segment the grayscale image, by these preprocessing and extraction size, color, boundary can be improved. To classify and detect the pests in leaves many algorithms, where used in different paper but the SVM method is considered to be the best method and it accurately detect the number of pest in each leaves.

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