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Yield Disease Identification Using Pattern Recognition and Image Processing- A Survey

S. Haribabu[#1],P.Gayathiri[#2], V. Madhubala[#3], M.Madhumadhi[#4], D. Kiruthika[#5] V. Hamitha[#6]

Assistant Professor, Department of Electronics and Communication Engineering, Jai Shriram Engineering College, Tirupur, Tamil Nadu, India[1]

Department of Electronics and Communication Engineering, Jai Shriram Engineering College, Tirupur, Tamil Nadu, India[2 3 4 5,6]

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ABSTRACT: Agricultural scientists play anvital role in distinguish and finding cure for plant infections. Sometimes physical identification of disease is time consuming and difficult process. One of the most important factors paying to low yield is disease attack. M5any studies show that value of agricultural products may be compact due to various factors of plant illnesses. In banana plant, diseases which are commonly detected are panama wilt, yellow sigatoka, black sigatoka, banana streak virus and banana bunchy top virus . The banana plant foliage diseases not only limit the growth of the plant but also terminate the crop. Banana plant foliage diseases must be recognizedearly and exactly as it can showharmful to the yield. Hence, ainstrument learning method is required to identify the unusual leaf images in appropriate manner. The images required for this effort are taken from the fields using digital camera. The taken images are then treated on computer using pattern recognition and digital image processing techniques. These systems will help in categorizing banana plant diseases thereby cumulative the yield of banana. This a survey paper on disease empathy and organization of banana yields. A summary of various *methods for disease empathy and organization is also done.*

KEYWORDS: Pattern recognition, image processing techniques, ANN, SVM, PNN, MSOFM & GA.

I. INTRODUCTION

Agriculture is anvitalcause of profits for Indian people. Farmers can grow range of crops but diseases hinder the growth of crops. One of the major factors accountable for the crop damage is plant disease. Different plants hurt from different diseases. The chief part of plant to inspect the disease is foliage. The major groups of plant leaf illnesses are founded on viral, fungal and bacteria. The diseases on foliage can decrease both the worth and amount of crops and their additional growth. The stress-free method to notice the plant infections is with the support of agricultural skilled having understanding of plant diseases. But this physicalfinding of plant diseases takes lot of time and is a difficult work. Hence, there is aessential for machine learning method to spot the leaf diseases. Computer can play a chief role to progress the automatic methods for the discovery and organization of leaf diseases. There can be various pattern recognition and image processing techniques that can be used in the leaf disease finding. The leaf disease exposure and organization of leaf diseases is the key toward prevent the agricultural damage. Different plant leaves bear different diseases. There are different types of methods and classifiers to spot plant leaf diseases. Programmed detection of plant diseases is anvital task as it may showuseful in nursing large field of crops, and thus automatically detect diseases from indications that look on plant leaves. Thus automatic detection of plant disease with the support of image processing techniques provide more exact and direction for disease management. Comparatively, pictorial identification is less perfect and time consuming. Hence, it is required to plan and develop a machine learning method to spot disease of banana plant leaves in timely manner to help the farmers to upturn more yield of banana.

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II. ADVANCES IN IMAGE PROCESSING FOR PLANT DISEASE FINDING

Literature Survey:

In order to distinguish about the previous investigation work done in this direction, several studies devoted to the matterwasmentioned. The literature survey is done in sequential order from year 2007 to 2016.

Stephen Gang Wu et al in 2007, has developed a leaf acknowledgment algorithm to removed features and highly resourceful algorithms for recognition purpose. A Probabilistic Neural Network (PNN) was used for recognition of plant foliage. The exactitude of recognition observed was 90%.

A.Meunkaewjinda et al in 2008, has advanced a system for empathy of leaf diseases of the grape plant. The suggested system consists of three steps:

1) grape leaf colorremoval from composite background,
2) Grape leaf disease color extraction and
3) grape leaf disease organization.

In this examination, back-propagation neural network with a self-organizing feature map together used to identify colors of grape leaf. Further Modified Self Organizing Feature Map (MSOFM) and Genetic Algorithm (GA) advanced for grape leaf disease separation and SVM for organization. Finally percolation of resulting segmented image is done by Gabor Wavelet and then SVM is again pragmatic to categorize the types of grape leaf diseases. This system can classify the grape leaf diseases into three classes: “Scab, rust and no diseases”. Average disease discovery rate was 97.8 %.

ShenWeizheng, et al in 2008, has measured an image processing based method for classifying the leaf spot disease in plant leaves. They done an investigation on all the manipulating factors that were present in the process of separation. Otsu Method was used to segment the leaf regions. In the HSI color system, H component was chosen for segmentation of the diseased spot. Further, Sobel machinist was taken into function in order to examine the boundaries. Finally, categorizing was done by assessing the measure of the diseased region and leaf areas.

Dheeb Al Bashish et al in 2010,has learned images that are segmented using the K-means techniques and segmented images are passed from end to end pre-trained neural network .The images of leaves taken from Al-Ghor area in Jordan. There are 5 common diseases are in leaves were selected for study; they are: Early scorch, Cottony mold, Ashenmold, late scorch, tiny whiteness. The trial result shows that the neural network classifier that is based on statistical classification support exact and automatic finding of leaf diseases with a precision of around 93%.

Yuan Tian et al 2010, has presents a SVM-based Multiple Classifier System(MCS) for pattern recognition of wheat leaf diseases. Additional author has used stacked generation structure and Mid-level feature generation to progress the performance of credit of disease of the wheat plant. The plannedattitude has obtained improved success rate of credit.

Basvaraj S. Anami et al in 2011, have planned better machine vision system in the part of disease recognition, both the feature color and texture are used to recognize and categorise different agriculture product into usual and unnatural using neural network classifier.

Sanjeev S Sannakki et al in 2011, plant pathologists mainly rely on naked eye calculation and a disease counting scale to grade the disease. It suggests an image processing based method to automatically grade the disease blowout on plant leaves by employing Fuzzy Logic. The results are showed to be accurate and suitable.

SuhailiBeeranKutty et al in 2013,have measured an artificial neural network based system to classify the watermelon leaf diseases of Downney Mildew and Anthracnose. This organization is based on the color feature extraction from RGBcolor model which is found from the recognized pixels in the region of interest. The true classification results also depict the value of 75.9%.

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P.R. Rothe et al in 2014**,** haveindustrialized a graph cut based method for segmentation of images of diseased yarn leaves. The Gaussian filter was used to eliminate the noise present in the images for separation. The color layout descriptor was used for satisfied filtering and imagining. Mainly there are three diseases in cotton leaf like Bacterial Blight, Myrothecium and Alternaria.

Godliver Owomugisha et al in 2014, has struggled to spot diseases in the banana plant such as banana bacterial wilt (BBW) and banana black sigatoka (BBS) that have initiated a huge loss to many banana cultivators. There are various computer vision techniques which led to the growth of an algorithm that contains of three main phases.

- The pictures of banana leaves were learnedby a standard digital camera;
- It involves use of unlike feature removal techniques to obtain related data to be used
- Images are classified as either healthy or diseased.
  Extremely Randomized Trees performed best in identifying the diseases achieving 0.96 AUC for BBW and 0.91 for BBS.

Sanjeev S Sannakki et al in 2015,has used Back Propagation Neural Network (BPNN) classifier for detection of plant diseases based on visual symptoms occurring on leaves. Two diseases of pomegranate plant namely Bacterial Blight (BB) and Wilt Complex (WC). Images of healthy and unhealthy leaf samples are captured by digital camera, enhanced and segmented to detect infected portions. Color and texture features are extracted and passed through BPNN classifier which correctly classifies the disease being occurred, thereby helping farmers in effective decision making. The accuracy in classification was 97.30%.

Sachin D. Khirade et al in 2015, hasdebated about subdivision and feature removal algorithm that can be used for the discovery of plant diseases by using the images of their leaves. Author has made 5 steps to spot the diseased plant leaf. The five steps are: image gaining, pre-processing, separation, feature extraction and final classification of diseases. Image gaining used the alteration structure for RGB leaf image. Then image is pre-processed to remove the noise and enhance the image contrast. Separation is done for the dividing of image into various feature parts using k-means clustering, ostufilters, etc. This segmented image is further used for feature extraction and finally organizations are done using various classifications techniques. In this way, plant diseases can be efficiently identified.

K. Muthukannan et al in 2015, hasindustrialised a neural network algorithm for diseased plant leaf organization. The neural network techniques such as feed forward neural network (FFNN), learning vector quantization (LVQ) and radial basis function network (RBF) were verified for two different diseased leaf image classifications such as bean and bitter gourd leaves. The act is measured using classification parameters such as Accuracy, Precision, Recall ratio and F_measure. With these four parameters the performance is analyzed and based on the analysis the FFNN classification approach provides better result

. P.R. Rothe et al. in 2015**,** has used a pattern recognition system for identification and classification of three cotton leaf diseases i.e. Bacterial Blight, Myrothecium and Alternaria. The images vital for this work istaken from the fields at Central Institute of Cotton Research Nagpur, and the cotton fields in Buldana and Wardha district. Active contour model is used for image segmentation and Hu's moments are removed as features for the training of adaptive neuro-fuzzy inference system. The organization accuracy was found 85%.

Aakanksha Rastogi et al in 2015, haveindustrialised a Machine Vision Technology and Artificial Neural Network (ANN) is of great use for automatically spotting the leaf plant as well as for leaf disease detection and grading. The planned system uses Euclidean distance technique and K means clustering technique for segmentation of image to segment the leaf area, disease area and background area of the input leaf image in order to calculate the percentage infection of the disease in the leaf and to grade them into various classes. Then it helps to identifying correct pesticide and its quantity to overcome the problem in an effective manner.

2.2 Summary of Literature Survey

As per overheadprose survey it is found that the subsequent machine learning methods are used by different scientists for plant disease discovery and examination:

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1. Probabilistic neural network (PNN).
2. BPNNs used for observing shades of the grape leaves; MSOFM & GA use for grape plant leaf sicknessseparation; Gabor wavelet based image processing technique.
3. The Otsu Method was used to section the leaf regions and HSI color system used for segmentation of the diseased spot. Further, Sobel machinist was taken into function in order to inspect the boundaries of the disease spots.
4. K-means based image processing technique and neural network.
5. SVM-based Multiple Classifier System.
6. Neural network classifier.
7. Naked eye prediction and fuzzy logic.
8. Artificial neural network and RGB.
9. Image segmentation and Gaussian filter.
10. Color histograms were extracted and transformation was from RGB to HSV and RGB to L*a*b*.
11. BPNNs.
12. Image segmentation, RGB and K-means clustering.
13. Neural network techniques.
14. Active contour model is used for image segmentation.
15. The combination of Artificial Neural Network (ANN), Euclidean distance technique and K means clustering technique used.

III. MACHINE LEARNING METHODS

Machine learning is the subfield of computer science. It changed from the study of pattern recognition and computational learning theory in artificial intelligence, machine learning discovers the study and building of algorithms that can learn from and make calculations on data. Machine learning methods are:

3.1 k-Nearest Neighbor: k-Nearest Neighbor is a modest classifier in the machine learning techniques where the organisation is achieved by classifying the nearest neighbours to enquiry examples and then make use of those neighbours for resolve of the class of the query .

3.2 Support Vector Machine: Support Vector machine (SVM) is a non-linear Classifier. This is a new movement in machine learning algorithm which is used in many pattern recognition problems, with texture classification. In SVM, the input data is non-linearly mapped to linearly disconnected data in some great dimensional space provided that good organizationpresentation. SVMmaximizes the marginal distance between different classes .

3.3 ANN: The feature vectors are measured as neurons in ANN. The yield of the neuron is the function of weighted sum of the inputs. The back propagation algorithm modified SOM; Multiclass Support vector machines can be used.

3.4 SOM: SOMs operate in two modes: training and mapping. "Training" builds the map using input examples (a competitive process, also called vector quantization), while "mapping" automatically classifies a new input vector. The self-organizing map defines a mapping from a higher-dimensional input space to a lower-dimensional map space. The process for placing a vector from data space against the map is to discovery the node with the closest (smallest distance metric) weight vector to the data space vector.

3.5 GA: The genetic algorithm is a method for resolving both unnatural and free optimization problems that is based on natural selection, the process that drives biological progression. The genetic algorithm modifies a population of individual solutions.

IV. CONCLUSION

The survey of unlike papers deliberate has given different empathy and organization techniques which have been summarized above. As per the review, this paper has made an effort to study machine learning methods which are

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second-hand by scientists for disease empathy and organization of plants. These machine learning methods support agricultural specialists in finding of disease in the plant in timely manner, and then the specialists will recommend the remedies to the farmer. As per recommendations of agricultural specialists, the farmer will give the usagefor the diseased plant in a timely manner which will increase the crop yield.

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