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Disease Symptoms Identification In Paddy Leaf Using Image Processing

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Abstract

Nearly 70% of population of India depends on agriculture. The paddy leaf disease like Blast, Brown spot, Narrow Brown Spot is identified in this paper. Paddy can be infected at different stages of growth and also at neck and node. Leaf gets damage due to weather, chemical and nutritional problem. A software prototype system for rice disease detection depending on infected image of various rice plants is described in this paper. Digital camera is used to capture the images of infected leaves which are then processed using preprocessing image segmentation, feature extraction, classification of image. The possibility of human error is eliminated using completely automatic system. The future scope of the prototype has a very great potential.

Keywords: Image aquisition; segmentation; image preprocessing; classification.

I. INTRODUCTION

There are two types of plant disease problem, they are plant disorder and plant disease. The disruption and distraction of normal states of the plant is plant disorder which is affected by soil problems environmental stress and physical affect. The disease can't be transfer from affected plant to unaffected plant. In case plant disorder, the occurrence worsening of normal functioning of a plant due to fungi,

bacteria, virus, nematodes is called as plant disease. Acquisition of image, preprocessing of image, Feature extraction, Classification are the technique involved in the identification of paddy disease. Different types of format like jpeg, jng, gif, bmp can be used. Acquisition of image is a early stage of system, after that various processing techniques are performed as RGB images are converted into gray image during preprocessing. Various techniques like histogram equalization and control management are used to enhance the contrast of the image. K-means FCM, PCA, PSO and MPSO are the techniques used for processing. Image depicts one or more features in the assumption for classification algorithm. SVM, ANN and fussy classification are the different types of classification features. Features like texture feature, structure feature and geometric feature are the different types of feature extraction.

BLAST

Fungus magnaporthe oryzae is responsible for the paddy disease called Blast. Leaf collar, leaf node, collar node and neck parts of the panicle are affected by Blast.

A. BROWN SPOT

The most common paddy disease is Brown spot. It infects the coleoptiles, panicle, leaf sheath and seed which leads to unfilled grains. It can kill the whole leaf.

B. NARROW BROWN SPOT

The fungus sphaerunlina oryzina is responsible for the narrow brown spot, it infect leaves and leaf sheaths, premature ripening of grains and lodging of plants in severe case.

II. EXISTING WORK

To identify disease in paddy leaf from the image captured. After pre-processing and segmentation using spastically region merging the distortion from the image is removed. Using automatic threshold based on entropy method, the RGB image is converted into binary image. [1]J.B cunha analyzed the pathological stress condition and plant leaf characteristics using the recognition techniques. Using supervised learning the plant leaf disease were identified by parveize zearean [2]. He used maximum likelihood algorithm to identify the crop size and crop area. Disease classification and detection were identified by neural network techniques,[3].jingup yuanhas identified the relative region under SAR image processing using land image processing

III. PROPOSED SYSTEM

For detecting paddy disease of Blast, Brown spot, Narrow Brown spot the techniques like image acquisition, image segmentation, pre-processing feature extraction and classification of image.

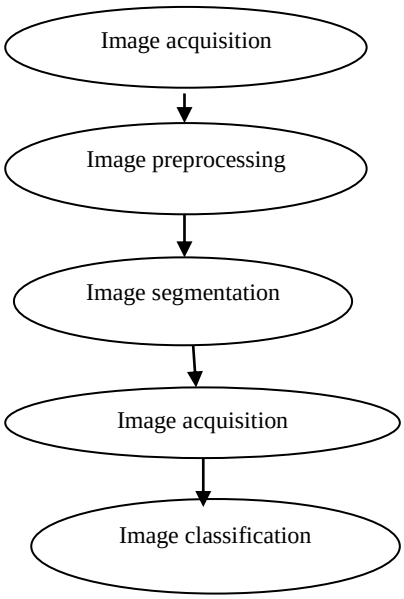


Image acquisition

To get paddy leaf images the process of image acquisition is used. Paddy leaf images with the RGB colour is obtained by using digital camera. Sample images can also be sourced from the internet with the pixel resolution of 109*310 with the size about 225kb each. Using matlab image processing library images are stored in bmp or jpeg format

Image preprocessing

The primary aim of the process is to enhance the image data, resizing image. Image resizing is indispensable for displaying, storing and transmission off image. The image pre-processing results in image enhancement that the paddy leaf image has dimensions of 109*310 pixels. It is in RGB colour format

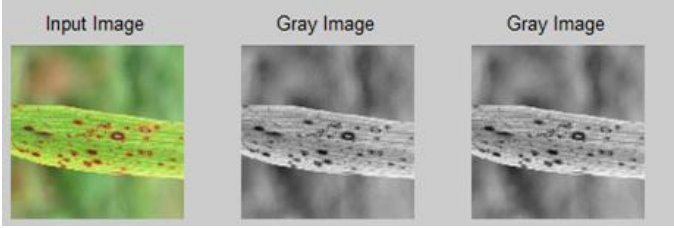
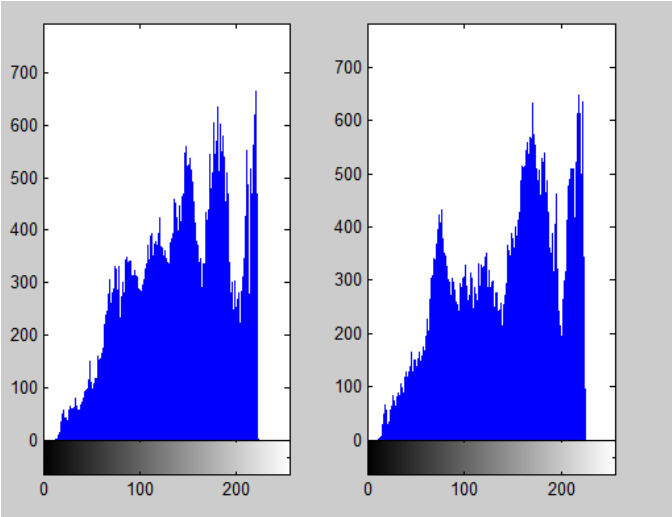


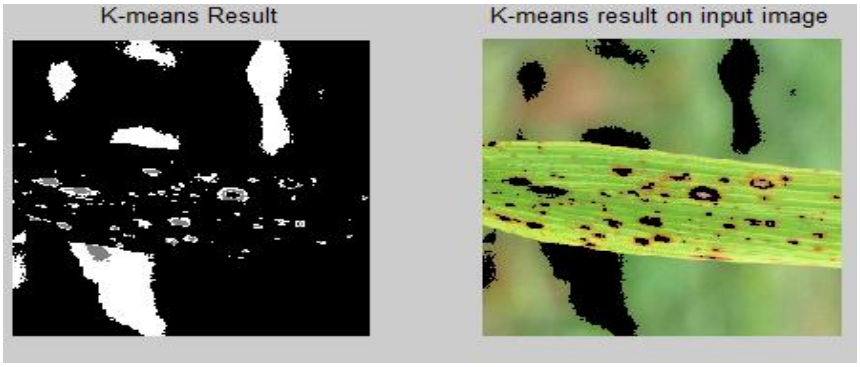
Image segmentation

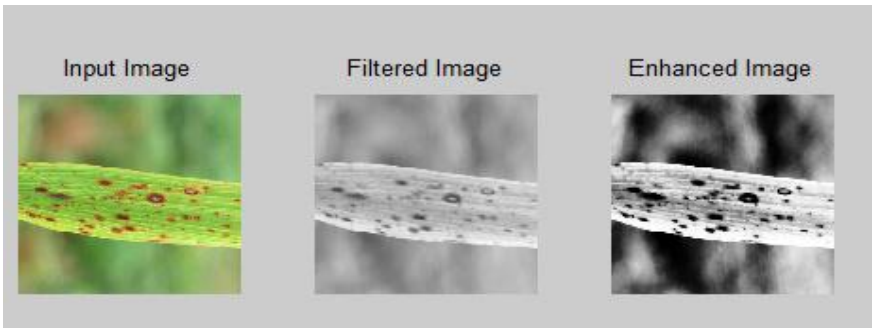
The image quality is affected by camera flash which acts as noise the noise is removed by using the k-means algorithm. Noise free image is obtained from binary image with noise. Noise free images are called filtered images. Enhanced image is obtained from filtered image by k-means algorithm.



K-means clustering

The non-parametric method used for classification and regression is k-nearest neighbour algorithm. The k- closest training example in the feature space contribute the input. The possibility of k-NN to be either classification or regression contribute the output. The output in the class membership majority vote of neighbour is used to classify the object, in which the object being assigned to the class . If k=1, then the object is simply assigned to the class of the single nearest neighbour





Feature extraction

As the paddy leaf disease consists of several types of disease blast, brown spot and narrow brown spot that had different lesion shape and lesion color.

Shape feature extraction

Shape is one of the important parameter of the image. Breadth and length of the image are significant characteristic to describe the shape. A simple approach is to measure the breadth and height of the image is to measure the count of the object pixel.

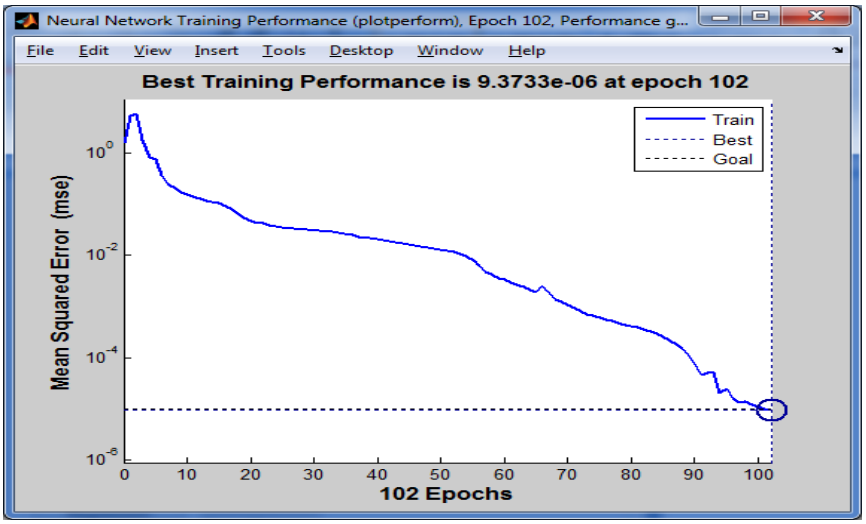
Color feature extraction

Color plays an important role in image processing. Digital image processing produce

quantitative color measurement that are useful for the work of inquring the lesion for early diagnosis. The pixel in the color images are commonly represented in RGB format, where RGB are RED GREEN BLUE values respectively from the color images capturing device, Grey-Level Co-occurrence Matrix (GLCM).

Grey-Level Co-occurrence Matrix texture measurements have been the workhorse of image texture 'Correlation' Returns a measure of how to correlate a pixel to its neighbor over the whole image.The GLCM is a tabulation of how often different combinations of pixel brightness values (grey levels) occur in an image

Range=[-1 1] Correlation is 1 or -1 for a perfectly positively or negatively correlated image. Correlation is NaN for a constant image. Energy Returns the sum of squared elements in the GLCM. Range = [0 1]Energy is 1 for a constant image. 'Homogeneity' Returns a value that measures the closeness of the distribution of elements in the GLCM to the GLCM diagonal. Range = [0 1]Homogeneity is 1 for a diagonal GLCM.



Glcm for mean

Image classification

Different types of classification features like SVM, artificial neural network [ANN], fuzzy classification are proceed. Based on lesion type, boundary color, spot color and paddy leaf color, of the leaf paddy disease which is recognized using ANN or fussy logic method. SVM [support vector classification] classification is only classified into two stages as the leaf is defected or not defected. But using ANN and FUZZY classification ,It can identify the disease of the paddy plant.

Artificial neural network(ANN)

An ANN is comprised of a network of artificial neurons (also known as "nodes"). These nodes are connected to each other, and the strength of their connections to one another is assigned a value based on their strength: inhibition (maximum being -1.0) or excitation (maximum being +1.0). If the value of the connection is high, then it indicates that there is a strong connection. Within each node's design, a transfer function is built in. There are three types of neurons in an ANN, input nodes, hidden nodes, and output nodes.

Newff:

newff Create a feed-forward backpropagation network.

Syntax

net = newff(P,T,S)

net = newff(P,T,S,TF,BTF,BLF,PF,IPF,OPF,DDF)

Description

newff(P,T,S) takes, P - RxQ1 matrix of Q1 representative R-element input vectors.

T - SNxQ2 matrix of Q2 representative SN-element target vectors.

Si - Sizes of N-1 hidden layers, S1 to S(N-1), default = [].

(Output layer size SN is determined from T. and returns an N layer feed-forward backpropo network.

newff(P,T,S,TF,BTF,BLF,PF,IPF,OPF,DDF) takes optional inputs, TFi - Transfer function of ith layer. Default is 'tansig' for hidden layers, and 'purelin' for output layer.

BTF - Backprop network training function, default = 'trainlm'. BLF - Backprop weight/bias learning function, default = 'learngdm'. PF - Performance function, default = 'mse'. IPF - Row cell array of input processing functions.m Default is {'fixunknowns','remconstantrows','mapminmax'}.

OPF - Row cell array of output processing functions. Default is {'remconstantrows','mapminmax'}.DDF - Data division function, default = 'dividerand'. and returns an N layer feed-forward backprop network.

The transfer functions TF{i} can be any differentiable transfer function such as TANSIG, LOGSIG, or PURELIN. The training function BTF can be any of the backprop training functions such as TRAINLM, TRAINBFG, TRAINRP, TRAINGD, etc.

WARNING: TRAINLM is the default training function because it is very fast, but it requires a lot of memory to run. If you get an "out-of-memory" error when training try doing one of these:

(1) Slow TRAINLM training, but reduce memory requirements, by setting NET. Efficiency. memory Reduction to 2 or more.

(2) Use TRAINBFG, which is slower but more memory efficient than TRAINLM.

(3) Use TRAINRP which is slower but more memory efficient than TRAINBFG.

The learning function BLF can be either of the backpropagation learning functions such as LEARNGD, or LEARNGDM. The performance function can be any of the differentiable performance functions such as MSE or MSEREG.

Examples

```
[inputs,targets] = simplefitdata;
net = newff(inputs,targets,20);
net = train(net,inputs,targets);
outputs = net(inputs);
errors = outputs - targets;
perf = perform(net,outputs,targets)
```

Algorithm

Feed-forward networks consist of Nl layers using the DOTPROD weight function, NETSUM net input function, and the specifie transfer functions. The first layer has weights coming from the input. Each subsequent layer has a weight coming from the previous layer. All layer have biases. The last layer is the network output. Each layer's weights and biases are initialized with INITNW. Adaption is done with TRAINS which updates weights with the specified learning function. Training is done with the specified training function. Performance is measured according to the specified performance function.

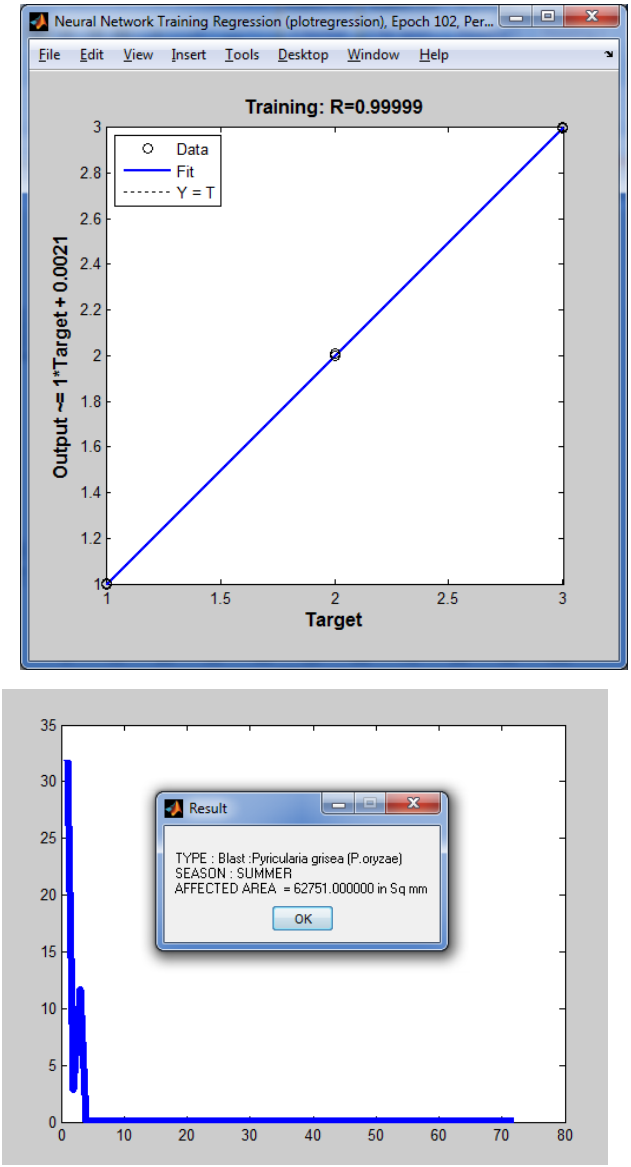


Image classification

V. REVIEWS OF LITERATURE

Nonik Noviana kurniawati and Salwani Abdullah in [1] proposed a method for identifying the paddy diseases. The techniques involved are image acquisition, converting the RGB images into gray scale images. Then converting the gray scale images into binary images with noise. Further, the region filling techniques in the morphological algorithm to remove the noise is used. The paddy disease is recognized about the accuracy of 94.7 percent. By using this system the crop leaf disease can be detected automatically.

Arnal barbedo and Jayme Garcia in [2] proposed a method for detecting, quantifying and classifying the crop leaf diseases from the magnitudes in digits images. This system is classified as according to the detection of objective in severity classification and classification. There are many approaches to detect plant pathologies. Some of the diseases that does not have any visible symptoms. Remote sensing techniques are used to explore multi and hyper spectral image captures. This system proposed the trained rates and efficient to recognize, identify and quantifying the diseases

Shenweizheng and wcyachun in [3] proposed a system on eyeballing techniques based on the computer image processing. Sobal operator is used to extract the disease spot edges. The system is proposed that the plant diseases are identified by calculating the ratio of two quantities to be divided of the disease spot and leaf area. The method is too graded to identify the leaf spot diseases are speed and accurate.

Manoj Mukherjee and Titan Pal in [4] proposed an automatic method to identify and measure the paddy leaf disease symptoms using digital image processing. A conventional color digital image is a method used to identify the symptoms of the paddy leaf. This method was proposed by automatically and removing the possibility of the mistakes created by human and then reducing the time, for identifying disease severity.

P.Tamije seivy & kowsalya.N in [5] proposed a method of detecting the plant diseases in monitoring the large fields of crops. Identifying the paddy leaf disease by capturing the images through the smart phones by mobile application. The noise over the images is removed by using the pre processing and segmentation using the stastical region merging (SRM) method.

IV. CONCLUSION AND FUTURE WORK

A system for diagnosing paddy diseases, including BD, BSD and NBSD mainly based on Matlab application has been developed in this study. The image processing techniques were used to establish the classification system. Four characteristics of lesion type, boundary colour, spot colour, and broken paddy leaf colour were tested for used to establish the classification system. The ratio of height and width of the lesion spot provided a unique shape characteristic for determining the type of the lesion.

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