ANALYSIS OF DISEASES USING SUPPORT VECTOR MACHINE IN PADDY LEAVES

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Abstract— *The value of paddy is strongly related to the quality, types and sizes of paddy without any damage or disease of that leaves. Hence detecting the disease or damage area of the leaf is very important to improve the utilization rate. Though the crop production is well grown there is still lagging in visual inspection of diseases. Although it is done manually, it is not accurate in all the times. So, there is a need for technique to detect the diseases. The system proposed is based on this method which can detect the diseases using artificial neural network concept. This system involves image acquisition, converting the RGB images into HSI image and morphological process for removing noise. The block level feature extraction is used for extracting the features like mean and standard deviation. Finally, it is classified based on the diseases using artificial neural network and support vector machine. For more accuracy, the stem cells samples can be used for detecting the disease.*

Keywords— Image Acquisition; Grey level co-occurrence matrix; Artificial neural network; Support vector machine

1. INTRODUCTION

In an agriculture field, paddy is one of the major staple foods in the Asian countries like China, India, Indonesia, and Bangladesh etc. But paddy disease likes a Blast, Bacterial Leaf Blight, Rice tungro etc. stops the growth of the paddy. If the diseases are not detected at an early possible stage then there is a decrease in the production of paddy. The main scope of the project is that Agriculture contributing a major role of the National income of India. The industries like cotton, jute, textile, paper, sugar depend on the raw material produced by agriculture. It plays an important role in foreign trade attracting valuable foreign exchange, necessary for our economic development. And the objective is to identify the disease of the paddy leaf at different stages of growth with more accuracy and suggest the pesticides. The classification algorithms are used for identifying the similarities and dissimilarities of different paddy leaf diseases.

2. EXISTING SYSTEM

A. Image Acquistion

Image acquisition in image processing can be broadly defined as the action of retrieving an image from some source. Performing image acquisition in image processing is always the first step in the workflow sequence because, without an image, no processing is possible[1]. It is a preparation process to obtain paddy leaf images. The RGB color images of paddy leaf are captured using a Canon PowerShot G2 digital camera, with pixel resolution 768x1024. The digitized images are about 225KB size each. Those images are cropped into a smaller image with dimension of 109 x 310 pixels. There have collected about 94 data samples.

B. Feature Extraction

1) Shape Feature Extraction

General descriptors of shape are number of the object, width and length. Blob Analysis is used in the existing paper to get number of the object for labelled regions in a noise free binary image. Object is a lesion on the paddy leaf. Using 8-connected neighborhood technique, counting the object is determined to get characteristic of the shape[2]. This means that a pair of adjoining pixels is part of the same object only if they are both on and are connected along the horizontal, vertical, and diagonal direction. The width and height of the objects are common features to determine the type of the lesion. A simple approach of measuring the width and height of the object is to count the number of object pixels. Suppose that I is a noise free binary image then I(x,y) = 0 for the object pixels and I(x,y) = 1 for the background pixels. Every object in an image is analyzed to get height and width of the object. Hence the type of the lesion can be determined by agricultural experts through width and height of the object. Here nearly 20 lesion types were extracted.

2) Color Feature Extraction

Color always plays a most important role in image processing and an important sign in recognizing different classes. Digital image processing produces quantitative color measurements that are very helpful when investigating the lesion for early diagnosis. The pixel in a color image is commonly represented in the RGB space, in which the color at each pixel is represented as a triplet (R,G,B), where R, G and B are respectively the red, green, and blue value from a color image capturing device[3]. Other color spaces like the HSI and CIE color model are also used in many other segmentation methods where their benefits and limitations were analyzed. The color difference is evaluated using the distance between two color points in a color space [4].

C. Image Classification

Based on above characteristics, such as lesion type, boundary color, spot color, and broken paddy leaf color, paddy diseaseswere recognized using production rule method with forward chaining method[4]. The production rules have been developed through serial interviews with agricultural expert.

D. Limitations

The major drawbacks for detecting paddy leaves diseases efficiently are:

[1] There is no accuracy in prediction.

[2] It does not show the detailed information about classification techniques.

[3] Not for a single species.

3. PROPOSED SYSTEM

A. *Image Acquisition*

One of the forms of image acquisition in image processing is known as real-time image acquisition. This usually involves retrieving images from a source that is automatically capturing images. Real-time image acquisition creates a stream of files that can be automatically processed, queued for later work, or stitched into a single media format. One common technology that is used with real-time image processing is known as background image acquisition, which describes both software and hardware that can quickly preserve the images flooding into a system. Nearly 300 datasets have been collected from real time scenario and which are separated as defected and non defected datasets for efficient classification.

B. *System Architecture*

The system architecture diagram shows the process of image processing technique to identify the paddy leaves diseases.

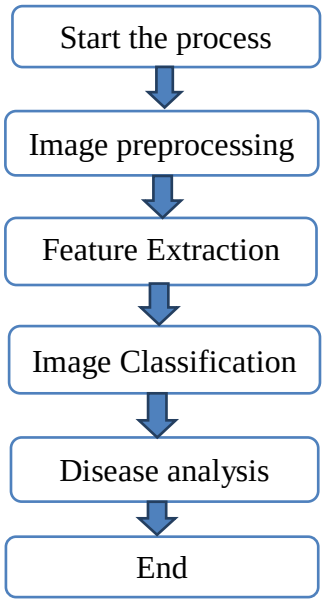

Fig.1: System architecture diagram

C. *Image Processing-Image Resizing*

The simplest method of image segmentation is called the thresholding method. This method is based on a clip-level (or a threshold value) to turn a gray-scale image into a binary image. It also involved in resizing the image into 128X128 for easy processing [4]. Here the resized image is separated into various blocks for easy feature extraction.

D. *Feature Extraction*

1) *HSI Method*

The HSI color space is very important and attractive color model for image processing applications because it represents color s similarly how the human eye senses colors. The HSI color model represents every color with three components are: Hue(H), saturation(S), intensity(I).The HSI colour space (hue, saturation and intensity) attempts to produce a more intuitive representation of colour.

The I axis represents the luminance information. The H and S axes are polar coordinates on the plane orthogonal to I. H is the angle, specified such that red is at zero, green at 120 degrees, and blue at 240 degrees. Hue thus represents what humans implicitly understand as colour. S is the magnitude of the color vector projected in the plane orthogonal to I, and so represents the difference between pastel colors (low saturation) and vibrant colours (high saturation).

2) *Block Processing*

The block processing is used for analysis, de-noising and compression of image. It is used for extracting the specific features for classification. Here it is used to extract the features such as mean and standard deviation from the paddy leaves for further classification. The resized image is again separated into [64X64] blocks. Among them the mean and standard deviation is extracted for each specific blocks. The features extracted were stored as [1xN] to form feature vector. The process is repeated to all the images and feature vectors are stored in the database.

E. *Image Classification-Artificial Neural Network*

A neural network for image classification is defined by a set of input neurons which may be activated by the feature values of an input image. After being weighted and transformed by a function, the activations of these neurons are then passed on to other neurons[7]. This process is repeated until finally, an output neuron is activated. Here it is a two class problem classification technique which involved in both defective and not-defective paddy leaves as training and testing classes respectively.The output of the classification for artificial neural network is given in Fig 2.

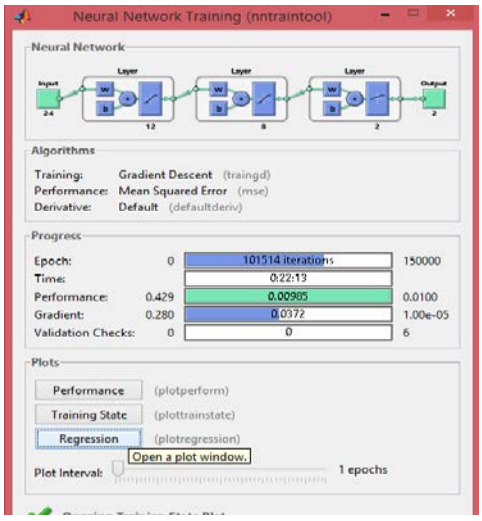

Fig-2: Classification using artificial neural network

F. *Performance Observation*

The number of defective leaves is classified is 9 out of 13 and the percentage is nearly 69% and the number of defect less leaves are classified is 4 out of 13 and the percentage is nearly 31%. Hence the overall percentage of the classification is 50%.

4. CONCLUSION AND FUTURE WORK

The paddy leaf diseaseshas been identified using various methodology. Initially the original image is converted into gray scale and binary images and then preprocessing steps are involved such as filtering and thresholding using Otsu method. The third step is feature extraction which involved in detecting the Hue, Saturation and Values separately and the GLCM method is used for extracting the features such as contrast, correlation, Homogeneity and energy. And the final step is involved in Image classification using artificial neural network. In future, the feature extraction technique should involved in extraction of more features for increasing classification and Support vector machine is used for performance improvement. It is also involved in finding accuracy of diseases by identifying both color and chlorophyll content on each stages of growth.

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