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DAMAGED PADDY LEAF DETECTION USING IMAGE PROCESSING

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***Abstract*:** 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 trees. If the diseases are not detected at an early possible stage then there is a decrease in the production of paddy. In this paper a noble methodology i.e. image processing of the paddy leaf by histogram is proposed, to avoid large scale effect of these diseases. By this approach one can detect the disease at a very primary stage and thus can take necessary steps in time to minimize the loss of production. At first, an image of a paddy leaf is captured, and then processed for enhancement. Later, the image is converted from RGB colour image to gray image and then extracted to a histogram using MATLAB functions. The resultants of images are given as input to identify disease from classification of diseases and grading the diseases. After completing disease identification, and stage detection, a consultative treatment module of the disease was prepared with the help of agricultural experts.

Keywords: paddy; leaf; detection; image; processing

INTRODUCTION

In a third world country like India where the major staple food -, "Rice", where life of many people, economy of the country is related to the production of paddy. Any negative effect on the yield in unwanted. The paddy production can be hampered as effect of some mechanical damage, nutritional deficiency, genetically disorder, climatic conditions etc. But the major problem is disease causing by macrobes and microbes. Diseases remain a major cause of yield loss and lower profits in Arkansas rice production. Diseases are estimated to cause annual yield and quality losses of 8 to 10 percent. Production costs are also increased by the use of chemical and cultural methods of disease control. [1]

Today's adverse environmental conditions facilitate the growth of many diseases which hampers the proper growth of paddy. The disease is easily recognized by their symptoms- changes of the plants [4]. Now a days there are a lots of paddy diseases, but in this paper we have taken three diseases as our experimental model.

a. Blast
b. Bacterial Leaf Blight
c. Rice tungro

Traditionally, the paddy farmer's manually identify the disease by their experience and then treat the identified diseases. But in manual identification of disease sometimes error occurs. However in traditional methods time complexity is high and it is laborious, as it is impossible to accurately identify the disease and estimate its infected area in serving large scale of farming. This time authors have proposed an advance computer system, that provides an automatic detection of a flaw through "IMAGE PROCESSING" and then process it accordingly.

PROPOSED METHODOLOGY

The proposed methodology aims to set a genuine disease grading system for plant leaves. For experiment purpose, various leaf samples are considered. For diagnosis, the following steps are followed: (A) Image Enhancement, (B) Image pre-process, (C) Image segmentation, (D) Transformation to Histogram, (E) Paddy Disease Detection.

The flow chart represents the chronological steps by which the whole process is done. This method provides a very lucid way of identifying the various diseases of plant, and also determines that the disease is in which stage. All these are done through different image processing techniques.

***Image Enhancement*:**

Image enhancement is the process of adjusting digital images so that the results are more suitable for display or further analysis. For this purpose authors have visited and captured images from several farms from Burdwan district.

Image Pre-processing:

Image pre-processing can significantly increase the reliability of an optical inspection. Several filter operations which intensify or reduce certain image details enable an easier or faster evaluation. Users are able to optimize a camera image with just a few clicks. [5] It involves cropping, rotating, normalizing, contrast enhancement, filtering, angle correction and various graphical operations.

Image segmentation:

The segmentation of image states to represents an image into another meaningful format that is easier to analyze. RGB color image converted to a gray scale image by algorithm of 'converts RGB values to grayscale values by forming a weighted sum of the R, G, and B components: 0.2989 * R + 0.5870 * G + 0.1140 * B'.

Histogram Draw:

Usually, in image processing resolution of an image is the total number of pixels in the image. The original resized image is converted to gray image such that the pixels corresponding to the leaf image are same. Then we plot the histogram for calculating the change in the pick value.

Histogram Equation:

Let, a moment that intensity levels are continuous quantities normalized to the range [0, 1], and let Z_i (i) denote the probability density function of the intensity levels in a considered paddy image, where the subscript is used for differentiating between the PDFs of the input and output considered paddy images. Let, we perform the following transformation on the input levels to obtain processed intensity levels, m,

$$M=A(i)=\int_0^i Z_i(x)\,dx \text{ ----------(1)}$$

Where x is an example is a example variable of integration. It can shown PDF of the processed levels is uniform, i.e.

$$Z_m(m)=\begin{cases}1 \text{ for } 0\le m\le 1\\ 0 \text{ else where}\end{cases} \text{ ---------(2)}$$

The considered paddy image pixel is represented by $Z_i(i_k)$ where k=1, 2,……,N, denote the histogram associated with the intensity level of the images.

$$m_v = A(i_v)$$
$$=\sum_{k=1}^{v} Z_i(i_k)$$
$$=\sum_{k=1}^{v} l_k / l \text{ ----------(3)}$$

For v=1,2,……..,N where m_v is the intensity value in the processed image corresponding value i_v in the considered paddy image.

A histogram based System is developed for disease grading by referring to the disease scoring scale in Table I. The main grading system depend on

$$G_{Paddy}=\sum_{x=0}^{n-1}\sum_{y=0}^{m-1} A_{iv}(n,m)\log Z_i(x,y) \text{ ------(4)}$$

Where G_{Paddy} G = grade value, $Z_i(x,y)$ = Image matrix function, n=row value and m=Colum value

DISEASE GRADING VALUE BY PICKS VALUE

Table: 1

Disease Grade	Training Sample	Testing Sample	Classifier Accuracy
Blast	196	82	87%
Bacterial Leaf Blight	205	83	92%
Rice tungro	210	71	90%

PROPOSED WORK FLOW DIAGRM

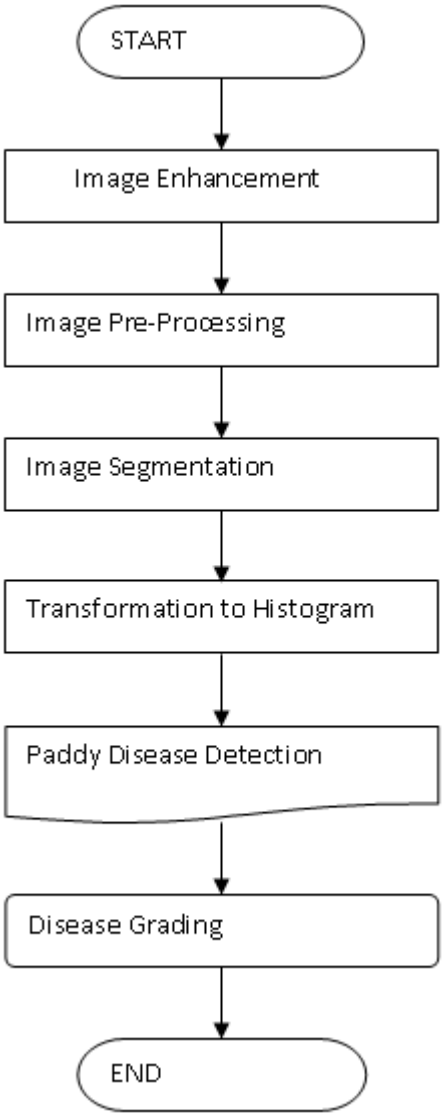


Figure.1. Flowchart of Methodology Process

RESULT AND DISCUSSION

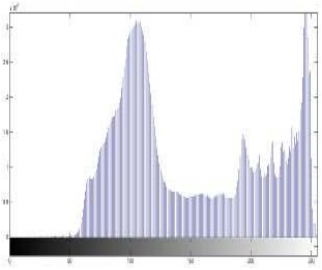
In this thesis work, we have considered paddy leaf images from several farms from Burdwan district in West Bengal, India. Here we show the original Paddy leaf images and gray images with disease grading based on Histogram Technique.

Original disease free leaf

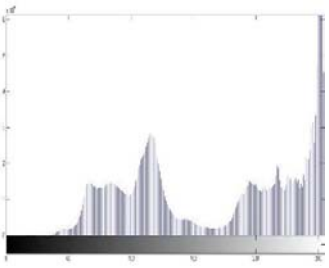
Original affected free leaf

Gray Image

Gray Image

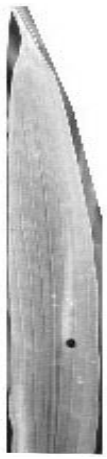


Histogram

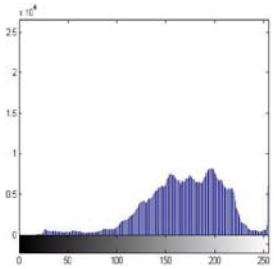


Histogram

Original affected free leaf



Gray Image



Histogram

Figure 1

CONCLUSION

In this paper we have proposed a new histogram based concept of detecting damaged paddy leaf. From histogram we extract the difference between the intensity among the original paddy leaf and the diseases affected paddy leaf. We have consider three paddy leaf diseases vis. - Blast: Pyricularia grisea (P. oryzae), Bacterial Leaf Blight: Xanthomonas oryzae pv. Oryzae, Rice tungro disease: Rice tungro virus (RTSV, RTBV). As more no. of image samples are produced accordingly, three is more scope of identifying the various errors during the simulation. The primary result of the proposed methodology indicates a strong and systematic way of assessing disease intensity by plant pathology more precisely. The result of the preliminary test shows the better result of disease extraction.

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