Plant Disease Analysis using Histogram Matching Based on Bhattacharya's Distance Calculation

Tejonidhi M.R
Department of MCA
Malnad College of Engineering
Hassan, Karnataka.
tejonidhimr@yahoo.co.in

Nanjesh B.R
Department of Information Science & Engineering
Adichunchanagiri Institute of Technology,
Chikkamagaluru, Karnataka.
nanjeshbr@gmail.com

Jagadeesh Gujanuru Math
Department of Computer Science & Engineering
Proudadevaray Institute of Technology
Hosapete, Karnataka.
jagadeesh4886@gmail.com

Ashwin Geet D'sa
Department of Information Science & Engineering
Adichunchanagiri Institute of Technology,
Chikkamagaluru, Karnataka.
win.12894@gmail.com

Abstract- **Farmers in rural India have minimal access to agricultural experts, who can inspect crop images and render advice, Delayed expert responses to queries often reach farmers too late. Many of the farmers will be unaware of the non-native diseases, and they cannot go to experts always and take suggestions from them if they are in some rural areas. So the image processing techniques can be applied to detect the healthiness of the leaf by acquiring the image of it and applying algorithms to detect the disease. It requires less cost and helps in increased production. We design a system which tells the farmer about the type of the disease present or occurring to their plants. We are considering paddy plant for the experimental purpose, later which can be implemented for other crops also. The diseases we are focusing are leaf blast (disease one), leaf blight (disease two). First the leaves are classified into healthy and the diseased samples. We use Bhattacharya's similarity calculation method for finding similarity in histogram of test image or sample imageswith respect to clinically proved healthy image(standard image).During the training phase, we used100 sample images of healthy, disease one, disease two leaves for obtaining standard values which represents respective types, based on which type of the test leaf is detected.**

I.INTRODUCTION

The image processing can be used in agricultural applications for various purposes. Predict plant disease from image of plants, Predict pest's attacks from image of plants. Plant disease is defined as any impairment of normal physiological function of plants, producing characteristic symptoms. A symptom is a phenomenon accompanying something and is regarded as evidence of its existence. Disease is caused by pathogen which is any agent causing disease. In most of the cases pests or diseases are seen on the leaves or stems of the plant. Symptoms of the pest or disease attack, plays a key role in successful cultivation of crops. Hence to conduct high throughput experiments, plant biologist need efficient computer software to automatically extract and analyze significant content. Here image processing plays important role.

The detection of disease in a paddy leaf through naked eye is the approach adopted by the experts for disease detection but it is not possible in the case of large forms to keep monitoring. It is time consuming and expensive too. Many of the farmers will be unaware of the non-native diseases, and they cannot go to experts always and take suggestions from them if they are in some rural areas. So the image processing techniques can be applied to detect the healthiness of the leaf by acquiring the image of it and applying algorithms to detect the disease. It requires less cost and helps in increased production. This paper is on detecting the presence of disease in a paddy leaf. Two main diseases concentrated are blast disease and burning disease in the paddy plant shown in Fig1 and Fig2 respectively.

II. RELATED WORKS

Many works are being carried out on plant disease detection using image processing. Mr. Viraj A. Gulhane and Naik et al. [5] proposed a suvey on disease detection methodologies in image processing and they considered cotton plant as the reference of study. Arti N. Rathod and Bhavesh Tanawal [4] proposed "Agricultural plant Leaf Disease Detection Using

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Image Processing" in which Masking and removing green pixels, color co-occurrence,texture feature were the methods followed. Sunil Deokule et al proposed "Plant Disease Detection Techniques Using CannyEdge Detection & Color Histogram in Image Processing" in which the comparison technique based on the histogram is done [6].

Fig 1. Appearance of blast disease in a paddy plant

Fig 2. Appearance of burning blight disease in a paddy plant

Sanjay et al. used masking and removing green pixels, color co-occurrence,texture feature for the detection of plant disease[1]. Pramod S et al. experimentally evaluated a software solution for automatic detection and classification of plant diseases through Image Processing. They used applications of color transformation and neural networks [2]. Manoj Mukherjee et al. proposed damaged paddy leaf detection using image processing [4].

They considered gray image of leaf and then extracted to histogram using MATLAB functions. After completing disease identification, and stage detection, a consultative treatment module of the disease was prepared with the help of agricultural experts. Kamaljot Singh et al. proposed Content-Based Image Retrieval (CBIR) ior identifying Image Based Plant Disease [7].

They used CANNY's edge detection technique on sample leaf. Phadikar et al. performed classification of rice leaf diseases based on morphological changes [8].Our work is detecting the presence of disease in a paddy leaf using histogram matching technique. Two main diseases concentrated are burning and the blast disease in the paddy

III. SYSTEM DESIGN

Input: RGB images with white background of 100 samples of healthy leaves, disease1 leaves, disease2 leaves which are collected from different regions of Karnataka. One clinically proved healthy images as the standard image. Histogram of standard image is compared with 100 samples of each type which gives 100 values and whose average value represents the particular type and it is considered as the standard value representing that type of the leaf. This is called as training phase. Test image is image of leaf whose disease/type has to be detected. Its histogram is also compared with standard healthy leaf image value. The overall procedure involved in detection of plant disease is shown in Fig.3. This is done in verification phase.

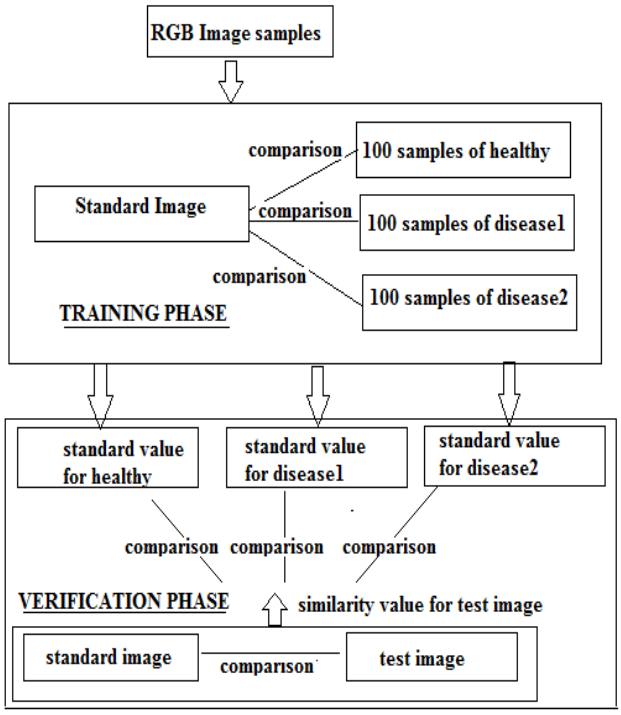

Fig 3. Plant disease detection system

The type of leaf is decided using below conditions.Sample images are shown in Fig 4.Average values/standard values obtained for different types of leaves:
0.92382 healthy image
0.85827 disease1 / Blast disease
0.74426 disease2/ Burning disease
Classification based on the average values

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>=0.92382 healthy image <0.74426 disease2 / Burning disease
<0.85827 &&> 0.74426 disease1 /Blast disease

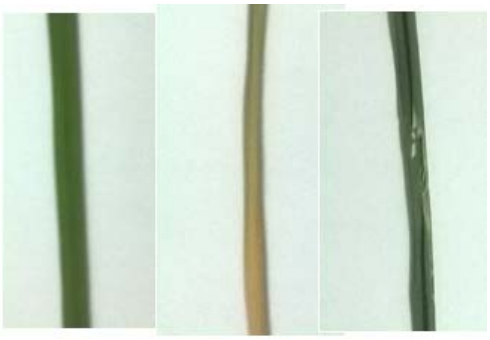

Fig 4. Healthy leaf, burning diseased leaf, blast diseased leaf

IV. RESULTS

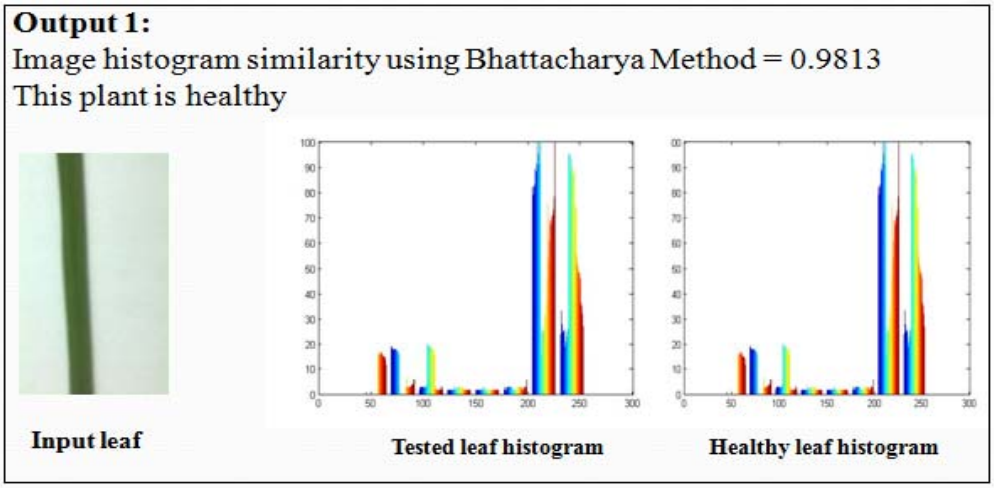

Fig. 5. Detection of type of test leaf as healthy

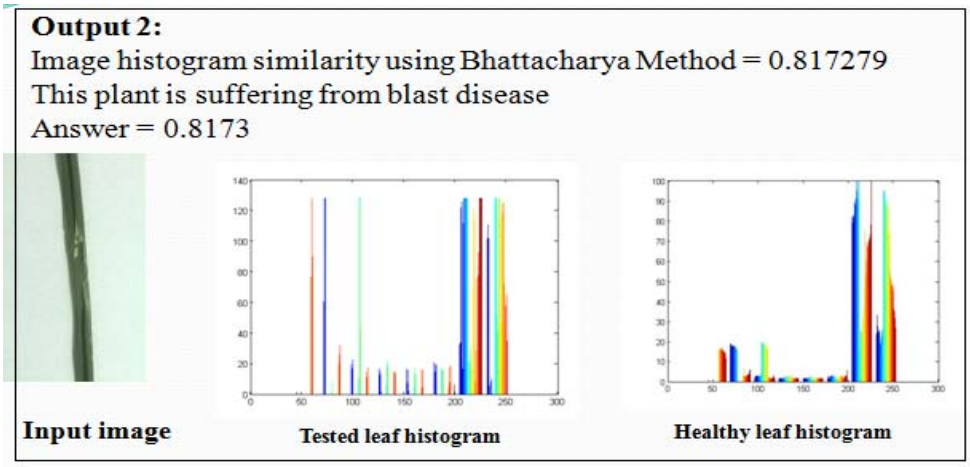

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Fig. 6. Detection of type of test leaf as blast diseased

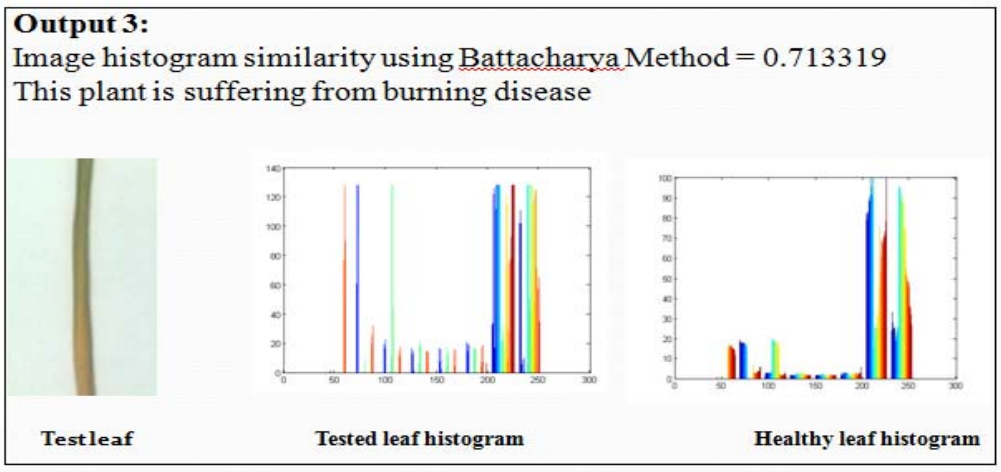

Fig. 7. Detection of type of test leaf as burning diseased

VI. CONCLUSIONAND FUTURE WORK

Rice is the main staple food of Indians. There are many diseases that affect the paddy crop such as sheath blight, bacterial blight, rice blast, rice yellow mottle virus, sheath rot, bakanae, brown spot, and narrow brown spot. Each disease has varying symptoms such as color variations on the leaves, stem and root. Here, with the help of image processing techniques we aimed at identifying the burning and blast disease which show symptoms on leaves. Using Bhattacharyya's distance technology of histogram we were successful in identifying these two types of diseases presence in the rice crop. In further enhancement this method can be used to find all kind of diseases in various leaves. This may help the farmers in identification of the disease in the leaf in feasible and accurate way, in short time span.

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