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Rice Leaf Disease Detection Using Image Processing based on GLCM Feature Extraction and Hybrid Classifier

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ABSTRACT: An automatic evaluate method for the determination of the quality of rice leaf. The quality of rice leaf samples is to be determined with the help of colors and geometric features. A model of quality grade testing and the identification is built which is based on appearance features such as area, major axis length, minor axis length, aspect ratio, the morphological and colors with technology of computer image processing and Hybrid Classifier. The color and morphological features are presented to the hybrid learning network for training purposes. The trained network is then used to identify the unknown grain types and its quality. This proposed method gives good results in evaluation of rice leaf quality and also classifying types of defects like Rice bacterial blight, Rice blast, and Rice brown spot. The system which found reasons for defects in rice leaf such as Soil PH, Temperature, Sunshine, Soil moisture, Soil conductivity and Leaf wetness.

KEYWORDS: Rice leaf disease detection, GLCM Feature Extraction, Hybrid Classifier

I. INTRODUCTION

The request for quality of food products, we are consuming food day by day, it is increasing gradually. As the literacy rate is increasing in India so it is the need for quality of food products is increasing. India is the second largest producer of rice leaf, now first being China. As the production of rice leaf is increasing so is the demand for its quality. This demand for quality of food leaf is increasing because some of the traders cheat the shopkeepers by selling poor quality food leaf which contains the particles like stones, sand, leaf, broken and damaged seeds etc. Therefore it will be a problem for both consumers and sellers.

Now a day we are using the chemical methods for the identification of rice leaf seed varieties and quality. These can be avoided by using a machine vision or the image processing system. This method is a non destructive, very fast and cheap compared to the chemical methods and also an attempt to overcome the inconvenience of manual process. An image processing technique is applied to extract various features of rice leaf and classifies the leaf based on morphological features. The images have been properly enhanced to reduce noises and blurring in image. Finally the image segmented by applying proper segmentation methods so that edges may be detected effectively and thus rectifies of the image has been done.

II. DISEASE SYMPTOMS

- Rice Bacterial Blight(RBB)

Rice Bacterial Blight causes a serious blight of rice, other grasses and sedges. The growth stage contains angular lesions, which begin as small yellow to brown spots on the leaves. The center of the spots will turn a dark reddish brown and dry out. Shown in Fig.1 (a)

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- **Rice Blast (RB)**

It is appear as a white to gray-green lesion or dots, with pitch-dark green borders. The injury leaves are spindles-shaped and whitish to gray center with red to brownish or necrotic borders. It reduces leaf area for grain fill and grain yield. Shown in Fig.1 (b)

- **Rice Brown Spot (RBS)**

The Rice Brown Spot is a fungal disease. It is infected seedlings have circular, small, yellowish brown or brownish lesions that may girdle the coleoptiles and caused by the toxin produced by the fungi. Brown Spot causes both quantity and quality losses. Shown in Fig.1 (c)



(a)



(b)

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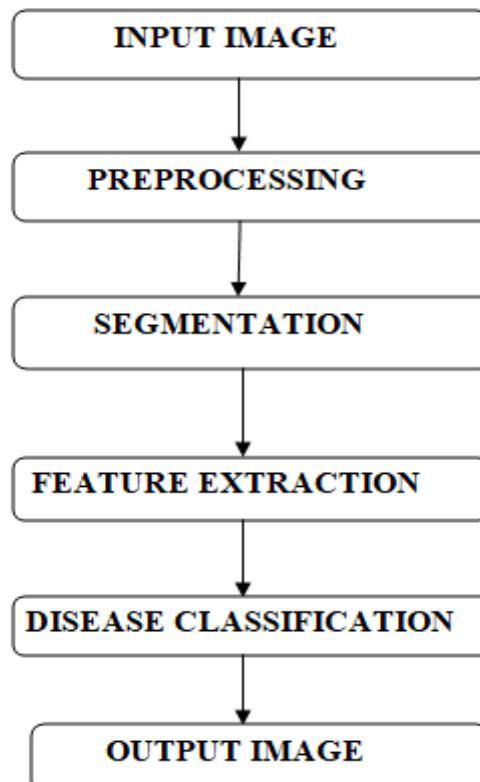


(c)

Fig.1 Rice leaf disease signs (a) RBB, (b) RB and (c) RBS

III. PROPOSED METHODOLOGY

These proposed works are more focus on Detection of defects on the Rice leaf using Matlab. Firstly capture the image from digital camera (mobile camera). Most probably the camera with some limitations and criterias will be considered. The captured images will be considered for further feature extraction, using one of the above algorithms. There are many features of images that are to be extracted, but we in our proposed method are going to consider some of them. The main focus of this proposed work is to help the farmers, suffering from loss due to incomplete knowledge of many diseases. The below system architecture shows the actual work flow of the concept that we are working on.



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- Rice leaf Input Image

In this work, we have taken some images of plant in real time. We took some other pictures in internet to make up for this situation that has various sizes compared to collected pictures. It collects a total of 125 pictures of diseased rice leaves.

- Pre-processing

In this work, Pre-processing is used to enhance of the image data. To remove noise, sharpening, brightness and darkness of an image.

- Segmentation

It is the process of partitioned an image into various subgroups and it work becomes more purposeful and easily while processing the image.

- Feature Extraction

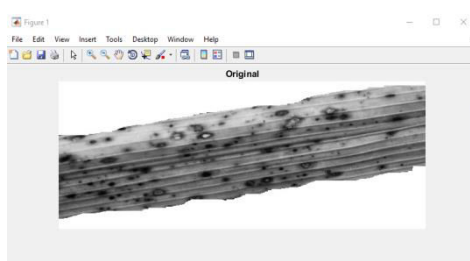
After the rice leaves being identified with illness, the rice leaf color changes and various sizes spots are produced on the leaves. It is used to detect the spots, colors and shapes geometry of the unhealthy leaves is selected to define the diseases.

- Classification of diseases

Two classifiers such as Multi-class Support Vector Machine and Minimum Distance Classifier are used to classify the disease. The aim of our project work is to classify and detect the image of rice leaf disease and identify the reason for occurring diseases of rice leaf. Disease can be identifying based on the changes in soil PH, soil moisture, soil conductivity, leaf wetness, temperature, sunshine. Owing to easy usage and taking some small amount of output time.

IV. THE EXPERIMENTAL RESULTS

Fig.2 Original Image (Disease)



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Fig.3 Segmented Image

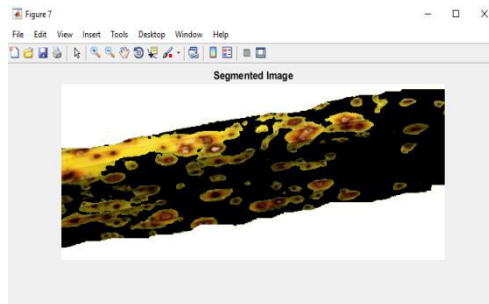


Fig.4 Histogram

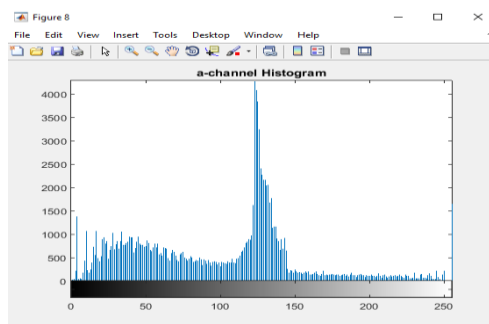


Fig.5 Result

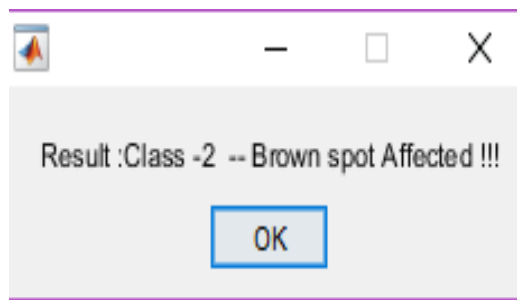


Fig.6 Affected Range Values

```

Command Window
New to MATLAB? See resources for Getting Started.

soil_ph =
5.5

soil_moisture =
70 %

leaf_wetness =
12 h

sun_shine =
30 mm
    
```

(a)

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(b)

Fig.7 Original Image (Good Leaf)

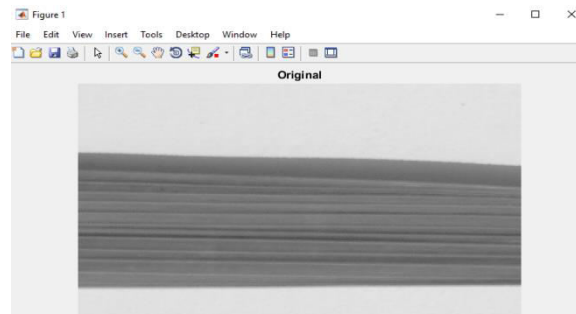


Fig.8 Histogram

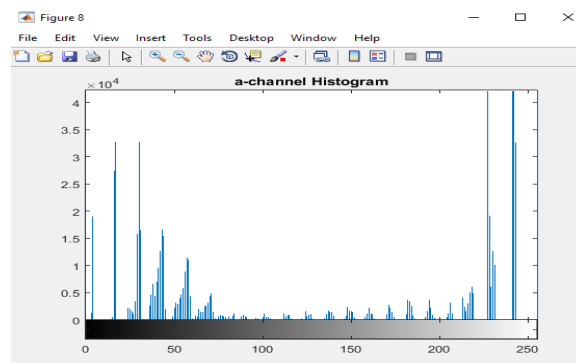
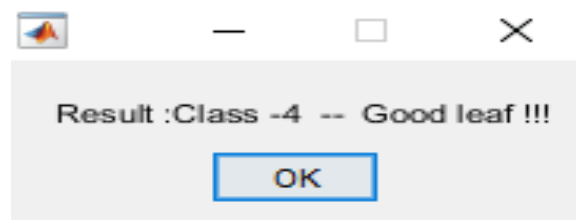


Fig.9 Result



V. RESULT

An automatic evaluate method for the determination of the quality of rice leaf. Using a novel dataset of 120 rice leaf disease images and 5 rice good leaf images, the hybrid classifier for trained to indentify three common rice leaf

diseases and The system which found reasons for defects in rice leaf such as Soil PH, Temperature, Sunshine, Soil moisture, Soil conductivity and Leaf wetness. The proposed model achieves the highest accuracy of 98.09%.

VI. CONCLUSION AND FUTURE SCOPE

Quality of a grain is an important requirement for today's market, to protect consumers from substandard products. There are so many inferior quality leaves arriving to the market day by day. Today in rice leaf trade, rice leaf of low quality is sold without being noticed. However, there is no convenient method to identify this inferior quality leaves in the market. Therefore, this has become a serious issue for both the consumers and the governments. The proposed system identifies the quality of leaf which is based on appearance features such as the shape and color, with technology of image processing and neural network consumption. An efficient method is proposed for classification of food leaf which requires limited features and thus overcoming the disadvantages like tediousness and time. A lot of research work can be further explored for significant feature subset selection and optimization of classifiers for further enhancing the performance of rice leaf disease detection. In Future, we can also consider various features of the leaves and can extend our work. Other rice illnesses are discussed in this project except of three mentioned diseases. Some other rice diseases may be covered by future work. With few changes, this work should be extended to classify the disease affected leaves using the same methods that can be applied to fruits, vegetables, commercial crops etc.

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