PADDY LEAF DISEASE RECOGNITION SYSTEM

Nan Yu Hlaing[(1)], Mie Mie Tin[(2)]
[(1)] Myanmar Institute of Information Technology, Mandalay
[(2)] Myanmar Institute of Information Technology, Mandalay
Email:nan_yu_hlaing@miit.edu.mm

ABSTRACT

Agriculture is an important role in our country, Myanmar. The most common crops are paddy, beans and pulses, and corns and so on. The production of crops per hectare is decreased due to weather conditions, atmospheric changes and loss of soil nutrition, wrongly used of fertilizer. Most of the farmers faces some challenges of infected crops. This system is implemented to predict results and to identify the paddy leaf diseases by capturing image of leaves and answered the questions of leaf symptoms. Paddy disease can be detected with image processing techniques and prediction can be enhance using K-mean clustering algorithm by identifying different kinds of cluster and capturing infected area of the paddy leaf. This system can provide some advice to the farmers, can solve the problems and to recover from these diseases.

KEYWORDS: *K-mean clustering, image processing, disease*

1. INTRODUCTION

Myanmar is an agriculture country and it has huge land area and wide variety of growing conditions. According to the United Nations Food and Agriculture Organization, 37.8% is the country's GDP, 70% are employed its labour force and generate the total amount export earning between 25 to 30%. The most agricultural exports of our country are rice, maize, black gram, green gram, pigeon pea, chick pea, sesame, onion, tamarind, raw rubber, vegetables, and fruits. However, the production of rice is decreased due to weather conditions, atmospheric changes and loss of soil nutrition, wrongly used of fertilizer. To solve this problems, farmers take care their paddy field. This system is aimed to help farmers and save time and cost, can get information quickly. This system can use easily and give accurate results and identify diseases on the paddy leaves. Paddy leaf diseases can be detected by using image processing techniques such that image pre-processing, transformation, segmentation, features extraction and so on. To enhance image prediction, it used K-mean clustering algorithm and gray level co-occurrence (GLCM) matrix to extract features. K- mean clustering algorithm is the unsupervised learning method and used to segment the interest area from the background by using enhanced image [6]. GLCM matrix is calculating the pixel intensity value that occurs in a spatial relationship. The number of gray level in the image can be determines by using size of the GLCM [7]. This system provides precise detection results that input image is infected of not.

2. TYPES OF PADDY LEAF DISEASES

There are some kinds of disease in paddy field

1) Nursery Diseases
   Eg; Blast, Bacterial leaf Blight, Tungro
2) Main field diseases
   Eg; Brown sport, Sheath rot, Sheath blight, False smut, Grain discolorationss, Leaf streak [4].

3. PROPOSE SYSTEM

In this system is intended for paddy leaf disease recognition system so some of the paddy leaves take with high resolution digital camera for effective prediction and produce accurate results. This system is aimed for providing the solution to recover from leaf diseases, show the infected area and identify the types of diseases. This system has some processing steps:

1) Paddy leaf image acquisition.
2) Image pre-processing with image transformation from colour image to grey scale image using HIS model.
3) Segment the paddy leaf image.
4) Detect the image discontinuities by using edge detection and point detection of the infected area of the image.

5) Extracting colour, shapes, boundary and features of paddy leaf by using some basic morphological algorithms.

6) Matching the paddy leaf image with training data set in the database.

7) Performance evaluation and produce expected results.

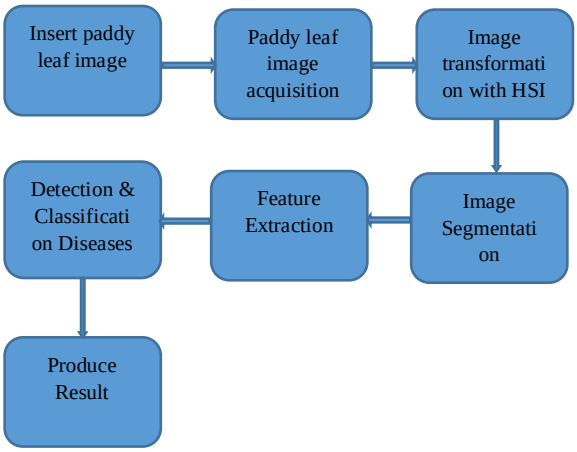


Fig1. Proposed diagram for paddy leaf disease detection system

4. IMAGE PROCESSING TECHNIQUES

4.1 Image acquisition

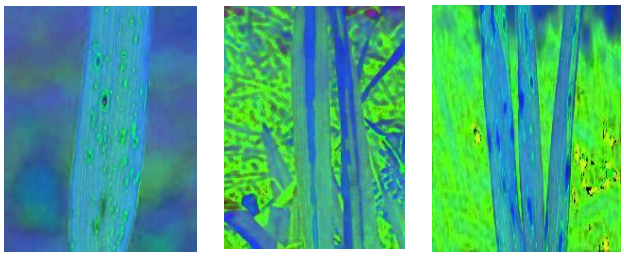
Paddy leaf image can be taken with high resolution digital camera or smart phone. If the resolution is not good, the image will not clarity and can cause some light intensity problems. So that the image must be taken certain amount of light and must be stored as a JPEG format and then load the paddy leaf image to the system [1].

(a) Brown sport **(b)** Bacterial blight **(c)** Blast

Fig2. Paddy leaves with diseases

4.2 Image pre-processing and Color Transformation

In image processing technique, image pre-processing process is carried out to enhance the image by removing noises form input image and transforming color image into grey scale. Many kinds of color models can be used to facilitate the specification of color in some standard. This system used HIS (Hue, Intensity, Saturation) model to describe and to interpret color to grey level information. So need to transform RGB to HIS.

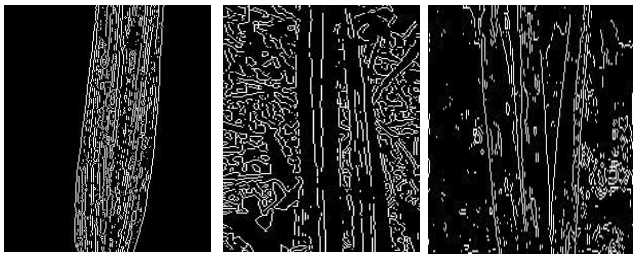


(a) **(b)** **(c)**

Fig3. After HIS Color Transformation

4.3 Image Segmentation

Image segmentation subdivides an image into constituent regions or objects. It has two parts: 1) Detect Discontinuity and 2) Detect Similarity. This system used edge detection and point detection of discontinuity. Edge detection can be detected a set of connected pixels that lie on the boundary between two regions. Point detection can be detected an isolated point [3]. Edge detection can be used in the field of image processing, computer vision, machine vision to segment the image and extract the features. Edge detection have some kind of methods that are Sobel, Canny, Prewitt, Roberts and Fuzzy Logic. In this system used Sobel Edge Detection method to extract the features [8].



(a) **(b)** **(c)**

Fig4. After Segmentation and Detection

4.4 Classification

Classification is used in capturing infected area of the paddy leaf and identifying different kinds of clusters**.** At

this stage, the system used K-mean clustering algorithm with Euclidean distance method for calculating the distance between the different cluster that are form in it [5].

4.5 Features Extraction and Matching with Training Data Set

Some of the suitable extracted features are predefined and stored as template image or trained data for comparing. The system must be match the input image of paddy leaf with extracted features of the training data set in the database. For extract the feature, this system calculated different values of contrast, correlation, energy and homogeneity by using gray level co-occurrence matrix (GLCM) [2]. It is the numerical method of examining texture that consider the spatial association of pixels. It measures the statistic value of contrast, correlation, energy and homogeneity.

5. EXPERIMENT

Two sample tables showed with different results between normal paddy leaf image and disease leaf image as an experimental result**.**

Table 1: Sample results of normal paddy leaves images analysis

Normal leaf	**Image 1**	**Image 2**	**Image 3**
Contrast	0.0877	0.0543	0.0445
Correlation	0.3673	0.4647	0.4124
Energy	0.9898	0.9785	0.8962
Homogenity	0.9507	0.9656	0.7810

Table 2: Sample results of paddy leaves with diseases images analysis

Leaf with disease	**Image 1**	**Image 2**	**Image 3**
Contrast	0.16440.	0.1627	0.1491
Correlation	0.2068	0.2051	0.2136
Energy	0.4888	0.5736	0.5834
Homogenity	0.9723	0.9310	0.9333

In table 2 showed sample results of diseases paddy leaves images with different values of contrast, correlation and energy. According to this values the system will detected more infected area than normal paddy leaf images**.**

To calculate the results of the paddy leaf image which have diseases or not, this system used image processing stages. Firstly, it used the paddy leaf images as input that images may be with diseases. After that transformed the input image RGB to HIS in preprocessing. At the image segmentation stages, it detected the features by using Sobel edge detectors and classified the infected area and clustered by using K-mean clustering algorithm. Gray level occurrence matrix (GLCM) is used to match the results of cluster images and training data set. The outcomes of this experimental testing is determining the contrast, correlation, energy and homogeneity of the paddy leaf images.

6. CONCLUSIONS

This system is implements to identify the infected area of the paddy leaf and provide information about the diseases of paddy leaves to the agricultural industry. Input image is transformed, segmented and analysis the infected region by using K-mean clustering algorithm and to extract the features GLCM is used as input to classify. This system can tell that the image has disease or not. By using this system, farmers can save time and cost.

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