Leaves Disease and Damage Rate Classification based on Features

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***Abstract*— All of the leaves are attacked by many diseases and insects in their life. The leaf symptom are transform different colors when the face of disease attack This paper uses the image processing techniques to detect transform of color on the leaf and classify the disease based on the color values. This paper uses region base segmentation based on RGB color value. Paddy leaf is segmented on color feature value and classify these color values to support decisions for disease type. Image enhancement process start to eliminate noise in an image and next is object extraction. The system uses median filter technique and segment the object in color regions. Analysis of color region value and the texture of leaf classified the damage rate and diseases.**

Keywords—Segmentation, HSV Colour, Texture, Image, Feature

I. INTRODUCTION

Myanmar is an agricultural country and the basic crop is paddy. Rice is a main provender of this country, and 95% of the population use the rice for two times per every day. It is one fact of the most essential economic crops in Myanmar. It contributes to the high ratio of Gross Domestic Product (GDP) of the country. All types of paddy are faced by the different diseases and insects in their progress lifetime. Some diseases are Blast disease, Black spot disease, Brown spot Disease, Narrow Brown spot disease and so on. By prevention and protection of diseases and insects, this protect the farmers life and will improve income of the country. Some researchers used HSV color value in the stages of image pre-processing, image segmentation and image analysis. By classifying the infection stage, spreading stage and worst stage of Rice Leaf Blast (RLB) disease, the system can protect the leaf area[1]. Tested results are shown using threshold on color range from green to red component of the CIELAB color model in all cases disease spots are detected accurately and results are independent of background[2]. Researcher discussed feature-based disease protection from four types of disease, and used PCA and GLCM technique based on different features. To classify paddy leaf disease, used Support Vector Machine (SVM) and tested on grayscale level image[3]. Some researchers used noble methodology based on histogram to classify three different diseases, and they tested gray image and compare based on histogram and support the classification of disease and defining of disease grade[4]. Navonand group used color image segmentation to divide the image into homogeneous regions. Object extraction, object recognition and object-based compression are used to segmentation as a low-level image processing. They use different threshold values to divide the image into homogeneous regions [5].

II. PROPOSE METHOD

This research has three different steps. First is the acquisition of image and prepare this image to the analysis stage. Second is the feature extraction stage based on RBG color features and texture feature. The third is analysis of feature value to decide disease types. The final step is extracting relevant information for the user to support their decision. To define the disease, leafs symptoms are needed to support analysis stage. These are shown table 1. This research is ongoing research. Myanmar is a great producer with different qualities of rice and other crops. That fact is very significant for our country. This paper helps to agricultural sector.

The processing steps are discussed in figure 1.

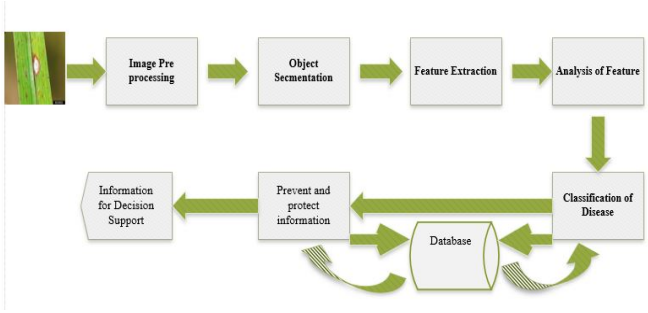

Fig. 1. System Processing Steps

A. Image Acquisition and Pre processing

The input image will come from many different areas and different format to the system. All data are transformed into the same dimensional formatted image and pass image enhancement step. It supports to easily process and to remove noise in the image. To remove noise, system uses media filters, noise remove technique and it is suited for dealing with impulse noise.

B. Object Segmentation

To extract paddy leaf object from the image, the system will use a background subtraction method by using a

threshold. The threshold is an important method for image segmentation based on image space region.

Fig. 2. Image Segmentation On Color

Figure 2 shows segmentation on color value. The system count the segment regions color value on different color with different segmentation.

TABLE I. SYMPTOMS OF PADDY DISEASE

No	Disease Name	Symptoms
1	Blast Disease	-lesions - elliptical or spindle shaped - brown borders, gray center - and coalesce eventually killing the leaves
2	Black spot disease	- lesions-ellipse or length more longer than width, black color -center is white color and black color round
3	Brown spot disease	-round / oval shaped -reddish brown / dark brown
4	Bacterial Leaf Blight	- pale-green to grey-green, water-soaked streaks near the leaf tip and margin. -lesions coalesce, yellow-white
5	Cotton mold disease	- lesions- white color , like snow size and length more longer than width
6	Narrow Brown Leaf Spot	-Short, narrow, elliptical to linear brown lesions - length> wide, narrower, short, dark, brown

That technique is support to small storage space, easy calculation and first processing speed. For subtraction background from an image, system use predefine threshold and the values of the threshold are chosen from the lower and upper of the image histogram. All disease regions classified on color value as yellow area, brown area and black sports area; and other regions are healthy region. The system calculates percentage of disease areas based on leaf green color area. That technique used multi-level threshold based on pixel-based segmentation techniques for a color image.

C. *Feature Extraction*

Feature extraction step is used to extract pixel counts of color pixel values. The system collects pixel count based on color pixel value on HSV color features. By using of HSV color value, H channel is represented for the leaf ability lighting condition and H channel will be checked between specific regions used on threshold value. System extracted H channel values based on RGB colors and these values support to analysis stage the percent of color value of the leaf. That is an iterative process and based on multi threshold values and that threshold are defined based on a color value. The analysis result gives the include rate of color value of a leaf and these values are analyzed to define leaf diseases. The system calculates the area of leaf based on color values to estimate the damage area. These damage areas are calculated based on lesions dimension. The disease symptom different based on disease types and these value are considered to define disease type. The features of color values are used to define disease and the stage of that disease. The pixel value on different color are calculated these color area on leaf. To define disease types, some basic features are predefined and the system calculates feature values based on these training dataset. The system use decision tree method to decide paddy disease on color area features values. This information are shown in Table II.

TABLE II. DISEASE DEFINING BASED ON COLOUR VALUES

No	Disease Name	Colors area on leaf (%)				Lesions length/ width
		Yellow	Brown	White	Black	
1	Blast disease	>10	<20	>10	<1	L >W
2	Black spot disease	<20	>10	<3	>10	L≈W
3	Brown spot disease	>35	>15	<5	<5	L≈W
4	Bacterial leaf Blight disease	>40	<10	<1	<1	L >W
5	Cotton mold disease	<10	<5	>20	< 2	L >W
6	Narrow Brown spot disease	>25	>20	<5	>10	L ≈W

III. EXPECTED RESULT

This paper tests training data150 image from public data set. To extract paddy leaf information, system use color value feature, texture feature and symptoms of image from database. The result is image information such as disease types, damage rate, insect types, prevent methods and protect methods information. This system extract information based on feature extraction method and decision tree method.

IV. CONCLUSION

This system extract disease information based on disease sympton and damage rate based on RGB color features and texture feature. Feature on Color Pixel Method(FCPm) can support to define disease on color image and system sypport different image types on different camera. The system use decission tree algoritham on disease symptoms and consider combination of features results to define disease types.

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