PLANT DISEASE IDENTIFICATION THROUGH IMAGE PROCESSING AND PROVIDING SOLUTION THROUGH EMBEDDED SYSTEM

P Kishore Kumar[1], M Aswin[2]

[1]*Electronics and Communication Engineering, Prince Shri Venkateshwara Padmavathy Engineering College, TamilNadu, India*

[2]*Electronics and Communication Engineering, Prince Shri Venkateshwara Padmavathy Engineering College, TamilNadu, India*

ABSTRACT

*Rice is the most important and a primary source of food in Asia especially in the India. However, rice may lose its quantity and quality when rice is attacked by different insect pests. Therefore, it is a top priority to find effective methods to reduce the level of their infestation in the paddy fields. In agriculture, pest control has always been considered as the most challenging task for farmers. Most of the farmers used the traditional pest management methods which is the regular spray program based on schedules rather than the presence of insect pests on the paddy fields. This project deals with the design and implementations of Identification of plant diseases and providing the necessary solution using hardware design. Various Algorithms like HSI color modulation , L*a*b* Color model , k-means clustering algorithm and GLCM algorithm to detect the disease and calculate the total defective part .The classification is done by comparison of the extracted feature and the trained dataset using a SVM Classifier. Then the classified disease output is imported into an Embedded System to provide the necessary solution.*

Keyword *:- Pest control, HSI color modulation , L*a*b* Color model , k-means clustering algorithm, GLCM algorithm.*

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1. INTRODUCTION

Identification of plant disease is very difficult in agriculture field. If identification is incorrect then there is a huge loss on the production of crop and economical value of market. Leaf disease detection requires huge amount of work, knowledge in the plant diseases, and also require the more processing time. So we can use image processing for identification of leaf disease in MATLAB. Identification of disease follows the steps like loading the image, contrast enhancement, converting RGB to HSI, extracting of features and SVM. The crop technicians identify and segregate the insects manually according to their species and count the major pests separately. The resulting counts are used to estimate the pest density in the paddy fields. However, multiple site and frequent counting of rice pests is time consuming and tedious for a crop technician. This can lead to low count accuracy and delays in obtaining accurate counts that can lead to poor decisions on rice pest management.

2. EXISTING SYSTEM

Identifying plant disease wrongly leads to huge loss of yield, time, money and quality of product. Identifying the condition of plant plays an important role for successful cultivation. In olden days identification is done manually by the experienced people but due to the so many environmental changes the prediction is becoming tough. Generally we can observe the symptoms of disease on leafs, stems, flowers etc. so here we use leafs for identification of disease affected plants. The two types of pattern indicate the images of crescent-shaped and oval objects. We can draw a line separating the two classes and many such possibilities exist. It is clear that is better classified than because there is less error. A line becomes a plane if we have three attributes variables instead of two, and becomes a hyper plane if there are more than three attributes.

This study summarizes major image processing used for identification of leaf diseases are k- means clustering, SVM. This approach can significantly support an accurate detection of leaf disease name. There are five steps for the leaf disease identification which are said to be image acquisition, image pre-processing, segmentation, feature extraction, classification. By computing amount of disease present in the leaf, we can use sufficient amount of pesticides to effectively control the pests in turn the crop yield will be increased. It can extend this approach by using different algorithms for segmentation, classification.

By using this concept the disease identification is done for all kinds of leafs and also the user can know the affected area of leaf in percentage. It can be identifying the disease properly the user can rectify the problem very easy and with less cost.

3. PROPOSED SYSTEM

In an existing system Sampling is done by collecting, counting or inspecting a small part of the population. It determines the trends in population of organisms. The sampling should be done in a proper manner so that it would reflect the condition of the whole population. For example, the population of insect pests and the damage on the crop are generally randomly distributed that later aggregate into clumps. This may be caused by the behavior of adult immigrants or by concentration of eggs laid on a plant before the insect moved to the next. Such situation is also pertinent in insect transmitted virus diseases. Therefore, estimate of population density depends on taking enough samples and systematic random sampling from a field. It is important to remember that sampling is only an instrument to achieve a goal and not an end to itself India Rice Self-Sufficiency Plan (PRSSP).

3.1 Method of classification in the proposed system

In this proposed system the image is preprocessed using a HSI model to enhance the contrast of the image then the colors with higher densities are clustered using k-means classification and the feature is selected which is then processed using a set of performance parameters .The performance parameters are then used to classify the disease after comparing the datasets with the trained datasets. The process has been showed in the fig 1.

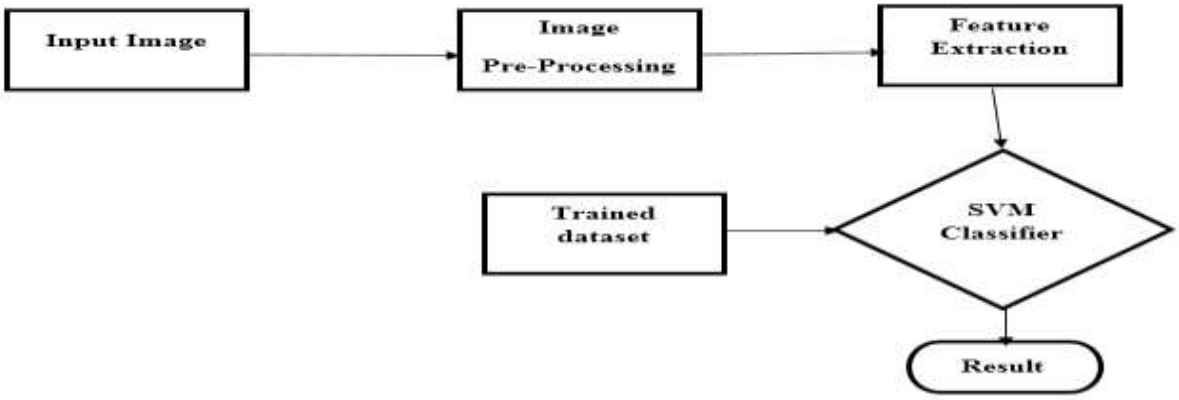

Fig 1 Simplified block diagram

3.2 Feature processing and disease classification

The Performance Parameters like Mean , Variance , Standard Deviation , Energy , Entropy , Homogeneity , Kurtosis, Skewness , etc., are calculated using the functions in matlab. The Acquired output is then compared with the developed dataset to classify the disease .These are the process are shown in fig 2.

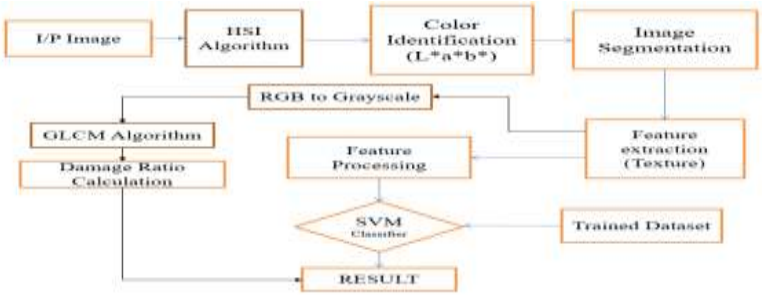

Fig 2 Process flow diagram

4. RESULT AND DISCUSSIONS

Disease Considered : Alternia Alternata

Initially HSI color model is used to increase the contrast of the image as shown in the fig 3 .

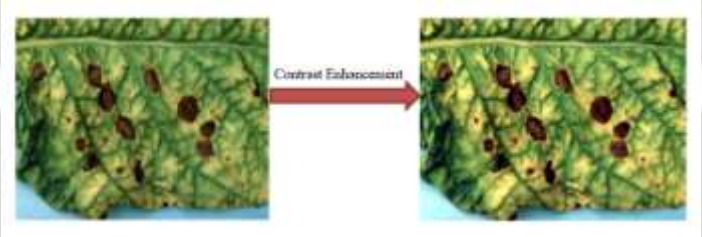

Fig 3 Contrast Enhanced Image

4.1 CIE L*A*B Algorithm

The CIELAB color space also known as CIE L*a*b* expresses color as three numerical values, *L** for the lightness and *a** and *b** for the green–red and blue–yellow color component. Now this Algorithm is applied to the contrast enhanced image which classifies the different types of colors that are present in the image and then select the first 3 colors with higher densities.

4.2 k-Mean clustering

The 3 colors with the most densities are now used to generate clusters of the image respectively and the image with the actual feature of the disease is selected and its shown in fig 4.

Fig 4 Clustered Image

4.3 Feature extracted image

The Feature extracted image provides the cluster with minimal population using indices representation and the segmented image is then subjected to a list of feature processing methods like Mean , Standard Deviation , Energy Homogeneity , Entropy , etc. Thus the segmented ROI is shown in fig 5 and it is obtain an diseased leaf.

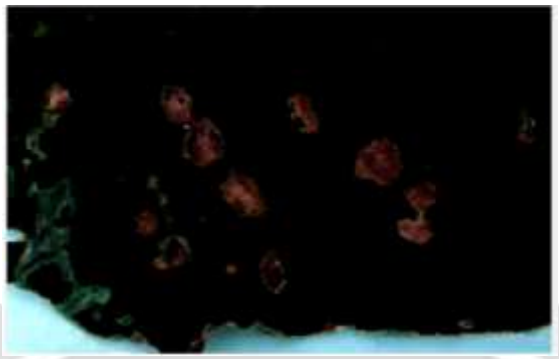

Fig 5 Segmented ROI

Then the image characteristics is used to obtain the disease classification which then triggers the embedded system is shown in fig 6 and it provide the necessary solution.

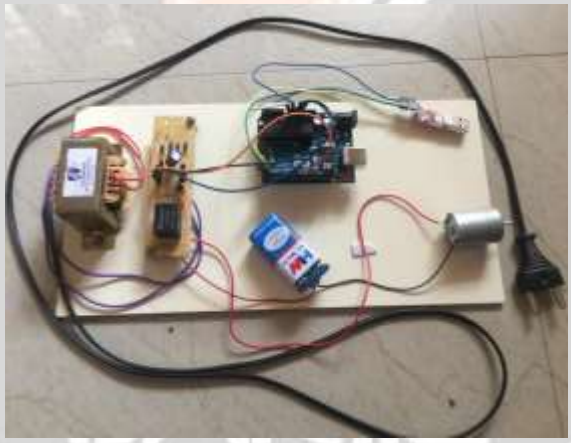

Fig 6 Hardware Display

5. CONCLUSION

The architecture for a smart way of implementing image processing to identify the disease in a plant and to provide a solution in an automated way using an embedded system. This system makes use of a trained dataset which can be improved by giving inputs of new environments and it is highly feasible when compared to the existing system in place. And in a future perspective the system can also be upgraded with new different algorithm to obtain more accurate outputs.

6. REFERENCES

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