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Leaf disease detection using image processing

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ABSTRACT

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.

KEY WORDS: Contrast enhancement, HSI, SVM, RGB.

1. INTRODUCTION

India is fast developing country and agriculture is the back bone for the countries development in the early stages. Due to industrialization and globalization concepts the field is facing hurdles. On top of that the awareness and the necessity of the cultivation need to be instilled in the minds of the younger generation. Now a day's technology plays vital role in all the fields but till today we are using some old methodologies in agriculture. 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. So we can use image processing techniques for identification of plant disease. Generally we can observe the symptoms of disease on leafs, stems, flowers etc. so here we use leafs for identification of disease affected plants.

Literature Survey: The feature extraction is done in RGB, HSV, YIQ and Dithered Images. The feature extraction from RGB image is added in the suggested system. A new automatic method for disease symptom segmentation in digital photographs of plant leaves. The diseases of different plant species has mentioned. Classification is done for few of the disease names in this system. The disease recognition for the leaf image is performed in this work.

Study and analysis of cotton leaf disease detection using image processing work is carried on. The k means Clustering algorithm is used for segmentation. The k-means concept is added to the proposed system which will divide the leaf into different clusters. The survey of disease identification on cotton leaf is done. Comparison of different detection technique of leaf disease detection is mentioned. SVM and k-means clustering has used in this system.

An identification of variety of leaf diseases using various data mining techniques is the potential research area. The diseases of different plant species has mentioned. Classification is done for few of the disease names in this system. The concept SVM for classification is used in this system.

Proposed Methodology:

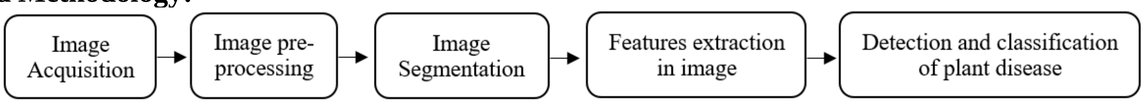

Figure.1. Flow chat for disease detection

Image Acquisition: First we need to select the plant which is affected by the disease and then collect the leaf of the plant and take a snapshot of leaf and load the leaf image into the system.

Segmentation: It means representation of the image in more meaningful and easy to analyse way. In segmentation a digital image is partitioned into multiple segments can defined as super-pixels.

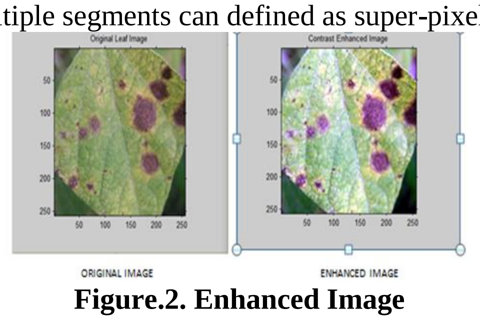

Figure.2. Enhanced Image

Low Contrast: image pixel values are concentrated near a narrow range.

Contrast Enhancement: In figure.2, the original image is the image given to the system and the output of the system after contrast enhancement is Enhanced Image, this is the image after removing the sharp edges.

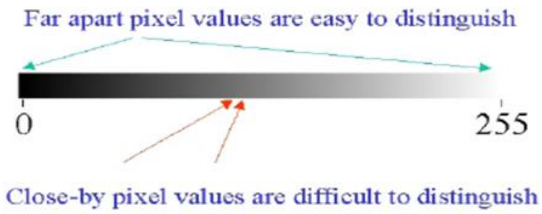

Figure.3. Pixel range

Converting RGB to HSI: The RGB image is in the size of M-by-N-by-3,where the three dimensions account for three image planes(red, green, blue).if all the three components are equal then conversion is undefined.

Generally the pixel range of RGB is [0,255] in his the pixel range is [0, 1].Conversion of pixel range can be done by calculating of the components; Hue, Saturation, Intensity.

HUE:

$$numerator = 1/2[(R - G) + (R + B)]$$

$$denominator = ((R - G)^2 + ((R - B) * (G - B)))^\wedge 0.5$$

Now find theta value for

$$h = acosd(numerator/denominator)$$

Saturation:

$$s = 1 - \left(\frac{3}{R + G + B}\right) * \min[R, G, B]$$

Intensity

$$I = \frac{(R + G + B)}{3}$$

Then combine the three results into one single value then the HIS image is formed.

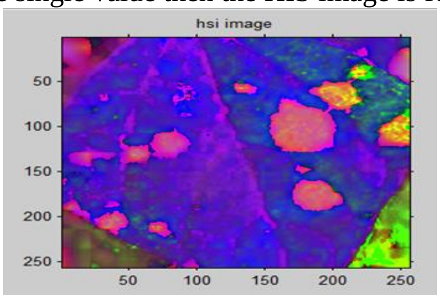

Figure.4. HSI image

k-means clustering algorithm: This algorithm is used to cluster/divide the object based on the feature of the leaf in to k number of groups. This is done by using the Euclidean distance metric.

The algorithm of k means

- Initialization: User should select the value of k. k means the number of clusters/groups, i.e. the image is divided in to k number of clusters.
- Every pixel is assigned to its nearest centroid (k).
- The position of centroid is changed by means of data values assigned to the group. The centroid moves to the centre of its assigned points.

Out of these three clusters classification is done for only one cluster which has affected area.

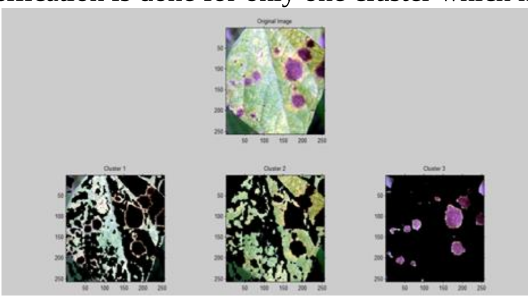

Figure.5. Clustered image

Support Vector Machine (SVM): SVM is a statistical learning-based solver. Statistical is a mathematics of uncertainty.it aims at gaining knowledge, making decisions from a set of data.

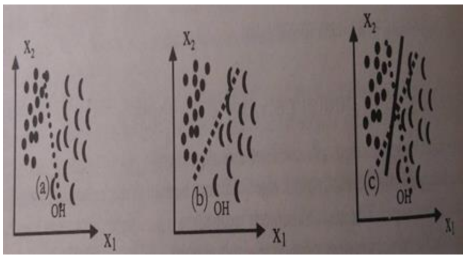

Figure.6. SVM

In the above figure a simple classification problem is given in two dimensional input space. 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 figure (b) is better classified than figure (a) because there is less error. Figure (c) may be the optimal line of separation. A line becomes a plane if we have three attributes variables instead of two, and becomes a hyperplane if there are more than three attributes. Figure (c) represents what is known as the optimal hyper plane (OH). Another name of OH is maximal margin hyperplane.

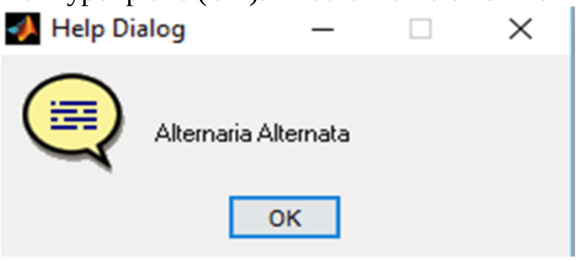

Figure.7. Disease name

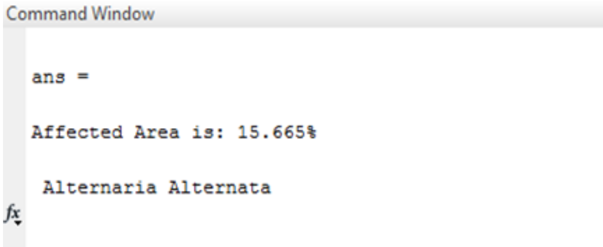

Figure.8. Output

2. CONCLUSION

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. 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. We 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 by identifying the disease properly the user can rectify the problem very easy and with less cost.

REFERENCES

Barbedo, Jayme Garcia Arnal, A new automatic method for disease symptom segmentation in digital photographs of plant leaves, European Journal of Plant Pathology, 2016, 1-16.

Bhong, Vijay S and Pawar B.V, Study and Analysis of Cotton Leaf Disease Detection Using Image Processing, International Journal of Advanced Research in Science, Engineering and Technology, 3 (2), 2016.

Lumb, Manisha, and Poonam Sethi, Texture Feature Extraction of RGB, HSV, YIQ and Dithered Images using GLCM, Wavelet Decomposition Techniques, International Journal of Computer Applications, 68 (11), 2013.

Reena Tijare, Pawan Khade, Rashmi Jain, The Survey of Disease Identification of Cotton Leaf, International Journal of Innovative Research in Computer and Communication Engineering, 2015.

Sasirekha N, Swetha N, An Identification of Variety of Leaf Diseases Using Various Data Mining Techniques, International Journal of Advanced Research in Computer and Communication Engineering, 4 (10), 2015.

Zhang S. W, Shang Y.J, and Wang L, Plant Disease Recognition Based on Plant Leaf Image, Journal of Animal and Plant Sciences, 25 (1), 2015, 42-45.