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Identification of Plant Disease and Wetness/Dryness Detection

Dr. B. Swaminathan
Department of Computer Science, Rajalakshmi Engineering College, Chennai

B.Nivetha Department of Computer Science, Rajalakshmi Engineering College, Chennai

G.Nadarajan Department of Computer Science, Rajalakshmi Engineering College, Chennai

S.Nagarajan Department of Computer Science, Rajalakshmi Engineering College, Chennai

Abstract:- Plant diseases have become a major problem because it can considerably have an effect on both the quantity and quality of the agricultural products. It is very hard to identify and treat the plant disease with traditional methods. Automatic detection of plant diseases, growth of leaf and color change is an important research topic because it detects the symptoms of plant diseases as quickly as they are present on the leaves and helps in monitoring large fields of crops. Image processing techniques are used to solve the problem of identifying and extracting the affected plant parts in an effective manner. The proposed system gives a software solution for detecting the leaf disease, growth and color change.

Keywords:- *Classification, Feature Extraction, Plant Disease Detection, Segmentation, Neural Network.*

I. INTRODUCTION

Detection of plant disease is important for sustainable agriculture and it is very hard to spot the plant diseases through the usage of traditional methods. The main objective is to identify the disease of the infected leaf with the help of Image processing. This makes it easier to detect diseases in plants thereby allowing to take remedies and also detects the wetness and dryness of the leaves. It also deploys an effective system to determine best medicines/fertilizers to treat the leaf that is getting infected. Here the peanut, paddy and cotton leaf images are in consideration so as to get rid of unwanted distortion and to identify the diseases.

II. PROCESSING STEPS

The proposed scheme consists of 5 steps. Initially for the input RGB image, a color transformation structure is made. Then, the green pixels are masked and it is removed using a specific threshold value. This is followed by the K-Means segmentation and Watershed Transformation process where the useful segments are obtained by computing texture statistics. The Feature Extraction method obtains features such as color and shape using Gray-Level Co-Occurrence Matrix (GLCM). Finally, they are passed through the ANN Classifier to classify the leaf and identify the disease of the infected leaf. It also provides appropriate medicine recommendation to the farmer and determines the wetness / dryness of the plant so that the farmer can take necessary actions to increase crop yield.

III. RELATED WORKS

- This paper [1] discusses about diagnosing tomatoes that have been affected by diseases through camera assistance. An image capturing box that is motor-controlled is considered and it is used to detect and recognize the diseases in tomato. The system uses Convolutional Neural Network to determine which disease is present. In this paper, the researchers built a control system using deep learning in order to automatically detect the tomato diseases. In case of detection of any abnormality, the irregularity will be focused automatically and the desired image will be captured. This captured image is given as input in identifying the disease. The information regarding the oddity is produced as output by the system.
- In this paper [2], a method to identify and segment disease affected plants has been discussed. It involves the fuzzy approach for early detection of diseases. The paper proposes to analyze various images of leaves that might be affected by disease. CIELuv color space algorithm is the proposed color-based method and modified fuzzy C-means clustering algorithm is used to detect the disease.
- This paper [3], talks about the detection of diseases in grape leaves. The detection of the disease is done with an embedded processor such as Raspberry Pi. This is implemented using digital image processing algorithms such as edge detection, color transformation and segmentation. Raspberry Pi stores the input and output data on inbuilt memory cards. This gives the disease name as final result along with its intensity. Kohenen neural network is used in this paper to classify the diseases.
- This paper [4] proposes a system for identifying the diseases that occur in tea leaves with the help of Support Vector Machine (SVM). Support Vector Machine is beneficial for both regression and classification. It involves the application of two algorithms. Edge extraction is carried out with Particle Swarm Optimization method using skew divergence and Genetic Algorithm (GA). The image that is obtained is processed to eliminate background noise and the RBG-Gray scale conversion is done for further processing. Once the features of the image are obtained, they can be classified.
- In this paper [5], a system was proposed to identify the diseases that occur in lemon leaves. Before

segmentation, RBG-Gray conversion is made to the images. Canny edge detection is carried out on the segmented image of the diseased leaves in order to identify the disease infected regions. Then with the help of histogram, the region of disease can be found accurately. Once the images of lemon leaves have been acquired, they are subjected to pre-processing that allows to eliminate noise. Then the features of the image are determined and classified according to the type they belong.

- In this paper [6], a system was proposed to identify the diseases that occur in grapefruit peels. The color texture of the grapefruit was used to detect the diseases. The Hue Saturation Intensity (HSI) model is used in this system. The image of the grape fruit is captured with a setup which consists of two 13W high frequency sealed fluorescent lights, a zoom lens, a 3-CCD RGB color camera. Then the image is subjected to Color Co-occurrence Method (CCM) and with HSI model, the disease is detected.

IV. PROPOSED SYSTEM

In the proposed system, the objective is to help detect, identify and monitor the diseases of Cotton, Paddy and Peanut crops. Monitoring the health and disease in plants plays a vital role in the successful cultivation of crops. The processes such as segmentation of image, extraction of features and classification are performed one after the other. Firstly, the color transformation structure for RGB input is created. In the second stage, masking of green pixels is done using specific threshold value and then it is removed. This masking stage is followed by K-Means and Watershed Transform segmentation process where the diseased portion's pixel range is automatically segmented. Gray-Level Co-Occurrence Matrix (GLCM) feature extraction method is carried out so that the color and shape features can be extracted. Further, the Artificial Neural Network (ANN) classifier is developed to classify the leaf according to their growth and color change.

V. FRAMEWORK

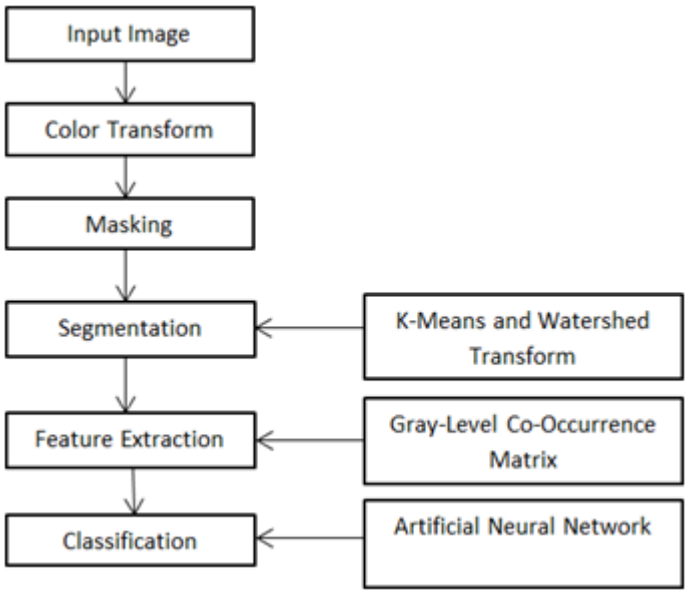

Fig 1:- Framework

VI. SEGMENTATION WITHK-MEANS AND WATERSHED TRANSFORM

Segmentation is the most vital part in Image processing. A whole image is fenced into several parts so that it becomes easier and meaningful to continue other process. The entire image is covered by all the parts that are re-joined. Segmentation can also depend upon various other features that are contained within the image. The features can either be color or texture. The aim of performing segmentation is to make the analysis easy by reducing the information. Segmentation is also useful in Image Compression and Image Analysis.

We use a clustering method and watershed transformation to carry out the image segmentation process. Watershed transformation method can produce over-segmentation phenomenon. Hence, the K-Means clustering method is used to segment the image at first and then the watershed transformation is applied. Using this particular combination of methods, will result in a reduced over segmentation.

VII. FEATURE EXTRACTION WITHGLCM

Feature extraction is a type of dimensionality reduction that gives important parts of an image as a compact feature vector. This approach is beneficial when the images are larger in size. Feature representation is required to carry out tasks like image matching and retrieval. Common computer vision problems like content- based image retrieval, object detection and recognition, face detection and recognition and texture classification can be solved by combining feature detection, feature extraction, and matching.

We use a matrix over an image to be the distribution of co- occurring pixel values (gray scale values or colors) at a given offset. This matrix is the co-occurrence matrix or co-occurrence distribution and is used to extract the features from the image.

VIII. CONCLUSION

In this paper, the proposed method involves the prime objective of identifying and classifying the leaf disease. The images of Paddy, Cotton and Peanut are processed and the system detects the diseases such as Cercospora, Bacterial blight and Boll weevil diseases. This system is fast, effective and accurate in identifying the disease and in providing solution. This paper concludes that the proposed system is very beneficial for automatic detection of disease and recommends remedies to the farmer. The determination of wetness/dryness of the leaf allows the farmer to take action in order to increase the crop yield.

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