Detection of Leaf Health to Increase the Crop Yield Rate in Agriculture Field Using Digital Image Processing

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***Abstract*- Agriculture not only provides food and raw material but also employment opportunities to a very large proportion of population It's important wherever in additional than seventieth population of an Asian country is depends on agriculture. Which means it feeds nice range of individuals. The foremost necessity is to consider the crop quality because of disease. The key to stop agricultural losses is to detect the disease at its early stage. The aim of our project is to develop a software system answer that mechanically find and classify disease. The step like loading an image, Preprocessing, Segmentation, extraction and classification are involved. The leaves pictures are used for detecting the plant diseases. Therefore the use of image processing technique to find and classify the diseases in agricultural application is useful.**

***Index terms*- Image Processing, Support vector machine, Masking, Segmentation, Feature Extraction**

I.INTRODUCTION

Agriculture is the backbone of our country. Farmers have excellent selection of crops for their farm. The Crops cultivation for maximum profit and standard Manufacture is usually scientific. This might be developed technically. The supervision that continually recurring crops needs power especially for the disease management that might have a result on factors of production to make an economic profit. Detect the illness from images of plants. This effect can be mitigated with the Aid for agricultural development most of the symptoms are microscopic, so the identification disease is restricted by human visual capabilities.

In industrial sickness which refers to waste of inventory disease is clearly shown as traditional process physical performance of plant kingdom. From the existing system a symptom might be determined. Illness is caused by Microscopic organism that is any agent inflicting illness. Illness management may be a difficult task. Large varieties of diseases are seen on the leaves of plant, fruits or stems.

Due to the difficulty of visual patterns the exact quantification of those diagnosed diseases, pests has not studied. Diseases are detected on the leaves or stems in most of the cases. Booming cultivation of crops the recognition of plants, leaves and finding the diseases, symptoms of the illness, plays a necessary role. To avoid human interference we are developing a computer vision system to find, recognize, and to classify illness affected on crops and therefore finding solution in proper unbiased call regarding illness infection.

To avoid human interference we are developing a computer vision system to find, recognize, and to classify illness affected on crops and therefore finding solution in proper unbiased call regarding illness infection. Farmers to avoid consultation, the event of an automatic system helps. Automatic detection might be success in looking huge fields of crops and the leaf disease detection is most significant analysis and then from the symptoms that are on the leaves, it can automatically notice the diseases. Image processing plays vital Role. The MATLAB image process is started by capturing of digital high resolution pictures. Both Healthy and unhealthy pictures are captured for experiment. Then pictures are sent for preprocessing for image improvement.

II.RELATED WORKS

[1]Diseases Detection of Various Plant Leaf by Image Processing Techniques :– In this paper, they have done survey on different plants disease and various advance techniques to detect these diseases. The disadvantages of this paper is no possibility for automatic disease identification.

[2]A Color and Texture Based Approach for the Detection and Classification of Plant Leaf Disease Using KNN Classifier. This paper proposed a technique for leaf disease detection and classification using K-nearest neighbor (KNN) classifier. The texture features are extracted from the leaf disease images and classified various plant diseases. The disadvantage of this paper is that KNN is lazy learner and also sensitive to noisy data.

[3]Automatic Recognition of Soybean Leaf Diseases Using UAV Images and Deep Convolutional Neural Networks. It consists of using Sequence and Ligation Independent Cloning (SLIC) method to segment the plant leaves in the top-view images obtained during the flight. they tested our data set created from real flight inspections in an end-to-end computer vision approach. The disadvantage of this paper is that classifier will take more time to classify accurately and also increases complexity.

[4]Bacteria foraging optimization based Radial Basis Function Neural Network for identifying and classifying the plant leaf diseases: An automatic approach towards Plant Pathology-In this paper, they introduced a method named as (BRBFNN) for identification and classification of plant leaf diseases automatically .The disadvantage of this paper is that classifier will take more time to classify accurately and SLIC increases complexity.

[5]Plant leaf disease detection and classification based on Convolutional Neural Network with Learning Vector Quantization (LVQ) algorithm-It contains 500 images of tomato leaves with four symptoms of diseases. It modeled CNN for automatic feature extraction and classification. Using CNN, it is easy to detect the tomato leaf diseases. The disadvantage of this paper is that though this method is efficient but it is used to detect only the tomato leaves diseases. CNN algorithm require more steps to detect the disease

[6]An individual grape leaf disease identification using leaf skeletons and KNN classification. Using Grey Level Coo occurrence Matrix (GLCM) features ,KNN algorithm detects the grape leaf diseases effectively .Therefore this method is used to detect only grape leaf diseases. KNN algorithm needs exact value to detect the disease

[7]An Investigation into Machine Learning Regression

Techniques for the Leaf Rust Disease Detection using Hyper spectral Measurement. The disadvantage of this paper is that it is conducted in a green-house under controlled conditions to study the different disease symptoms effects on reflectance of the leaves. The combinations of disease symptoms at each disease severity level resulted in very complex spectra.

III. EXISTING SYSTEM

To detect the plant diseases, K-means segmentation algorithm was used. Segmentation means partitioning an image into various parts of having same feature or same similarity. Different preprocessing techniques are considered. Random Forest Classifier are used in the existing method. CONS: The segmentation is not clear, could not predict exact disease, Random Forest Classifier is complex.

IV. PROPOSED SYSTEM

In our proposed system, an RGB image will be converted into gray Image. In order to remove the noise in image we are making use of median and Gaussian filter. Image is segmented into various parts based on similarity. The segmentation can be performed using Masking technique to identify diseased part. Then features will be extracted. SVM is used for classification and it also suggests the fertilizer to improve the profit

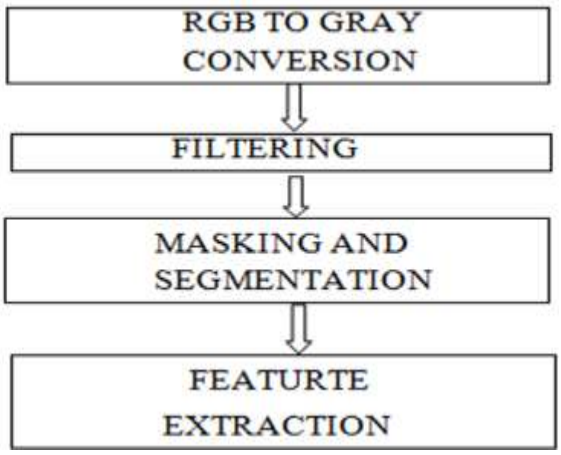


Fig:1 FLOW DIAGRAM

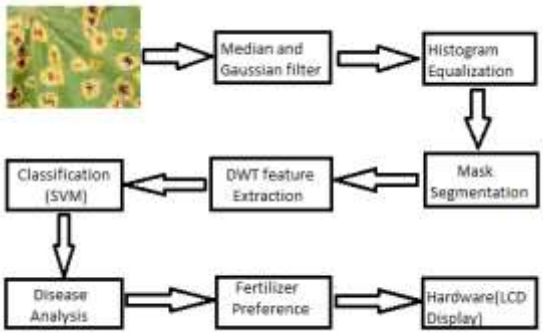


Fig:2 BLOCK DIAGRAM

RGB TO GRAY CONVERSION:

The grayscale is the value of every pixel is a single sample representing an amount of light and it carries only intensity information. Gray image carries only intensity information. Both black and white are composed exclusively of gray shades, varying from black which is known to be the weakest intensity to the strongest intensity which is white. Due to this process there is no loss of data.

MEDIAN AND GUASSIAN FILTER:

The median filter is a nonlinear digital filter, used to remove noise from an image. When the median filter is applied to gray images, a neighborhood brightness ranking algorithm comes into play by first placing the brightness values of the pixels in ascending order. The median value of the ordered sequence is then selected as the representative brightness value for that neighborhood. Gaussian filter is often used to smoothened the image.

MASKING AND SEGMENTATION:

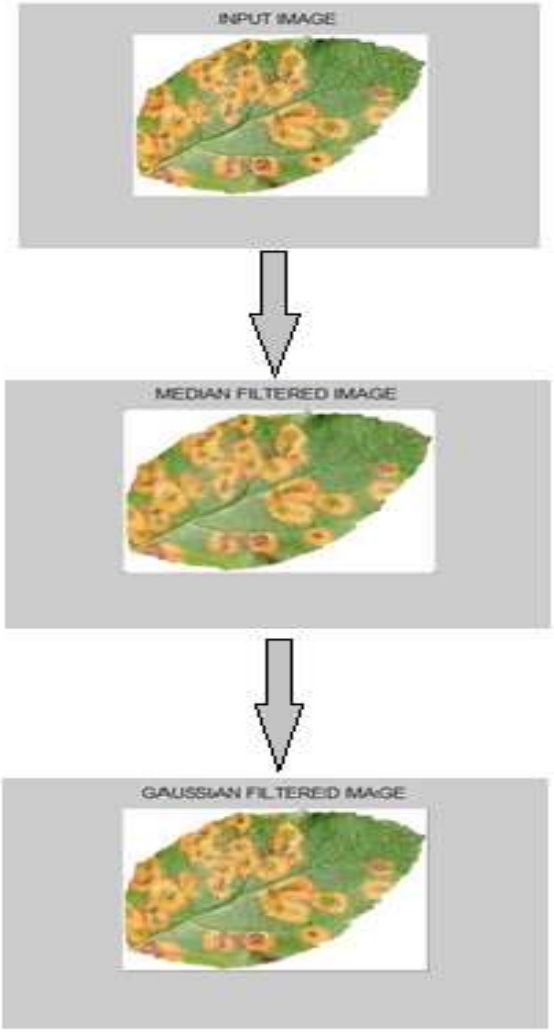
This segmentation is used to identify diseased part of the leaf. RGB planes will be separated first. Later based on the green plane abnormal part will be segmented out. Using an image as a mask. A masked image is simply an image where some of the pixel intensity values are zero, and others are non-zero. When the pixel intensity value is zero in the mask image, then the pixel intensity of the resultant masked image will be set to the background (normally zero).

FEATURE EXTRACTION:

Feature extraction is a dimension reduction that effectively represents interesting parts of an image. This method is useful when image size is large and a reduced feature representation is needed to quickly complete tasks such as image matching and retrieval. In order to accomplish above objective Support Vector Machine (SVM) is used. It has much flexibility in choosing the similarity function with ability to handle large feature spaces and sparseness of solution when dealing with large data sets.

IV.PERFORMANCE ANALYSIS

The performance of the proposed system has proved to be better than existing system in both accuracy and speed. The detection of diseases and suggesting the required fertilizer is up to the mark. The software used to obtain the simulations is MATLAB 2013a.The following are results obtained when a infected leaf image is processed



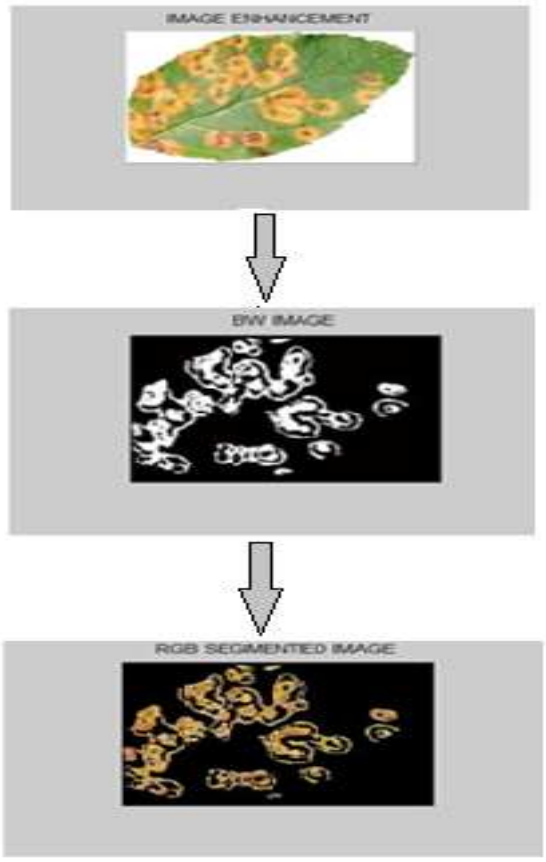


Fig:3 Simulated Output Images

After the process of masking and segmentation the Support Vector Machine (SVM) helps to identify the type of disease by producing a warning dialog box with the information of the disease name.

Fig:4 Simulated Warning Dialog Box

Once the detection of the disease is completed the suitable fertilizer is suggested which is seen in simulated recommended to use box , given as:

Fig:5 Recommendation of Fertilizer

HARDWARE USED:

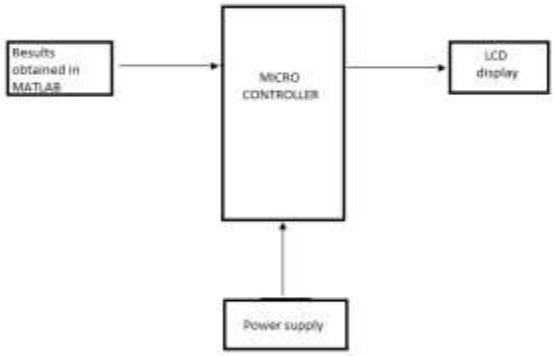


Fig:6 Hardware Block Diagram

1 MICRO CONTROLLER-PIC16F887
2 POWER SUPPLY
3 LCD DISPLAY

With an intension to display the detected disease we use LCD display ,initially the code is dumped in to the microcontroller .Once the microcontroller gets the information from the software its sends its signal to the LCD to display the exact disease that is being detected.

Thus we can look in to the output both through software as well as hardware.

V. CONCLUSION AND FUTURE WORK

We can find diseases from plant leaf using masking segmentation and SVM algorithm which provides better segmentation and classification. Using this technique, noise can be removed as well as it segments the diseased part accurately and takes less time to process. The proposed system gives an accuracy of about 96%.In future, further development in masking and segmentation technique may help in detecting the diseases with accuracy of 98-99%, making system more efficient.

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