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DISEASE DETECTION OF TOMATO PLANT LEAF USING ANDROID APPLICATION

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ABSTRACT

Detecting diseases on leaf of plant at early stages gives strength to overcome it and treat it appropriately by providing the details to the farmer that which prevention action should be taken. Economic development and food security in India is significantly depend on agriculture production. Despite progresses made in agricultural techniques, farmers in India still face difficulties in determining required levels of fertilizer and detecting different diseases during cultivation period. Using adequate fertilizer during specific periods of production and early detection of diseases ensure effective and efficient use of fertilizers and good harvest of crops. On the other hand, mobile phone has increased exponentially among population of India. People from all walks of life are using mobile phones and different associated applications for gaining economic and social benefits. However, very few mobile phone applications benefit agricultural production and specially aim farmers. In this project, with the development of an Android application that provides the users the capability to identify the plant leaf diseases based on the images of plant leaf taken from an android application and provide the user with the basic treatment in the application itself. Detecting diseases on leaf of plant at early stages of its growth gives it strength and resistant power.

Keywords: Diseases, Plant Leaf, Farmers, Fertilizers.

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I. INTRODUCTION

India is an agricultural country and the position of any country in the world depends on its agricultural production. India is a country where the farmers have a wide variety to select their plant for agriculture to produce maximum yield depending on environment available. Then also the production gets affected by diseases of the crop**.**

The diseases of the plant are caused by pathogens, insufficiency of nutrients, fungus etc. Detecting diseases at early stages enables to overcome it and treat it appropriately. For this an expert is required for identifying the diseases ,to describe the method of treatment, protection, it requires the knowledge of plants and their diseases. It also requires correct result in describing the symptoms of plant diseases.
An excellent farmer precisely catches the change of the crops in the growing process and they manage the cultivation in proportion to the change in order to cultivate the agricultural products of high quality. Since sensing the delicate change of crops is obtained through the observation by the visual sense in their long cultivation experience, it is difficult for them to transmit the understood technique to future generations as a general cultivation one. If farmers decide to take advice from agricultural expert regarding the treatment of incidence of pest /disease/trait to their crop/plant in order to increase the crop productivity then he may face following situations:

Sometimes they have to go long distances for approaching the expert.

Expert may not be present at that time even though they go long distances.

Sometimes, the expert whom a farmer contacts, may not be present in that location to give opinion to the farmer with the information and knowledge.

II. LITERATURE SURVEY

Lots of researches have been done on the use of digital image processing for detection of plant leaf diseases in agricultural applications. Visual recognition of diseases on leaves is less accurate and it requires more experienced knowledge.

A. The photograph[1] is converted into a grey image and two thresholds are used to separate background (BG), the healthy and the lesion regions of the leaf (TH). If the grey level of a pixel is g then, if g>BG the pixel is assumed to belong to the background. If BG≥g>TH and the spots are darker than the normal leaf color, the pixel belongs to the leaf while if g≤TH it belongs to the dark spot. If the lesions have lighter color than the normal leaf, then a pixel belongs to the normal leaf if g≤TH and to the lesion if BG≥g>TH.fig1.

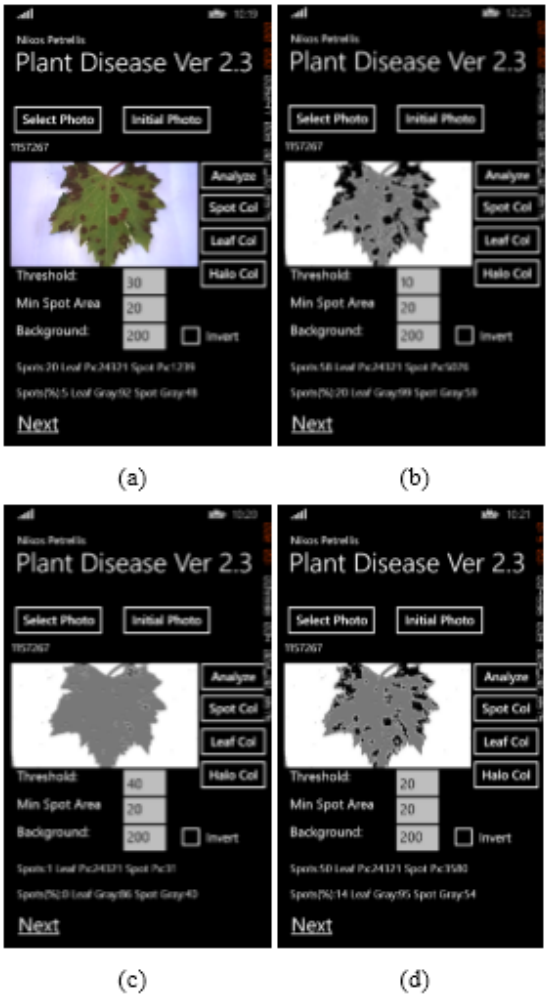


Figure 1. Original grape leaf photo (a). Displaying the BGW1 matrix with *TH* equal to 10 (b), 40 (c) or 20 (d).

GPS localization is used in this paper to dertermine the specific rural region and then historical weather data can be retrive to verify disease.

B. The method proposes segmentations on leaf images, the background as well as the green region of the leaves. Then the extraction of region of interest (ROI) that only contains visible diseases symptoms. For a particular disease, these regions demonstrate specific color and texture properties. By training a multiclass support vector machine (SVM) classifier with these properties (features). Fig 4 and fig 5[2].

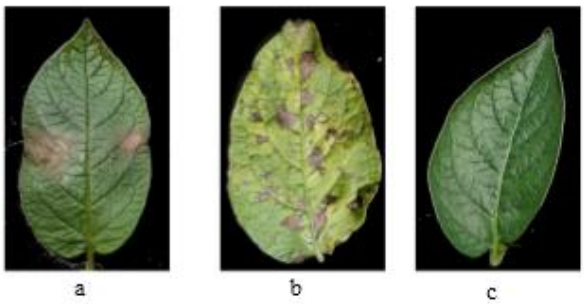


Fig. 4. Segmented leaf only image after masking background: (a) Late Blight affected (b) Early Blight affected (c) Healthy

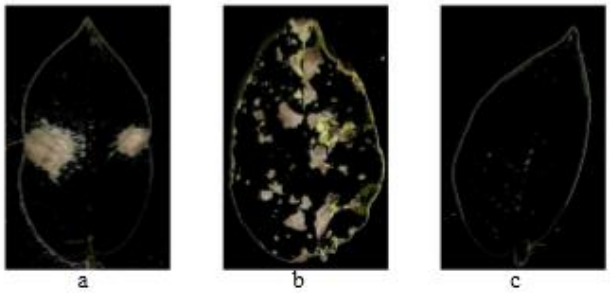


Fig. 5. Segmented region of interest by greenness removal mask (a) Late Blight affected (b) Early Blight affected (c) Healthy

C. In this method shape of leaves determines the quality and species of a plant by the shape identification.

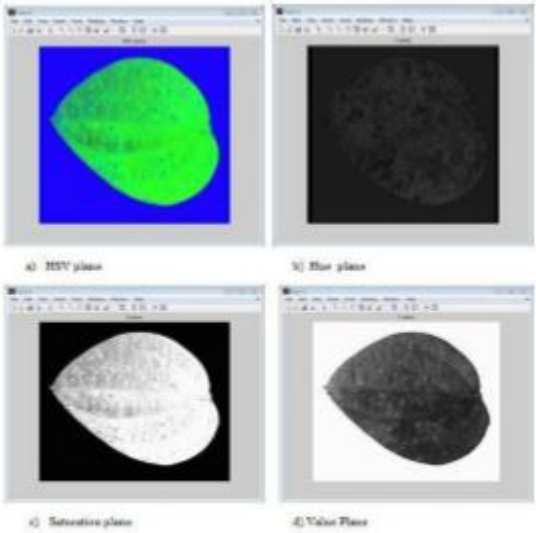


Fig. 2 RGB to HSV conversion

Fig 2:[3] shows the conversion of the input RGB image into the Hue, saturation and value planes. The HSV image is future subjected to masking.

D. In this system the Linear Support Vector Machine(LSVM) is used for classification of leaf diseases. SVM is a binary classifier which uses a hyper plane called the decision boundary between two classes. This hyper plane tries to divide, one class containing the target training

vector which is labeled as +1, and the other class containing the training vectors which is labeled as −1. Using the labeled training vectors, SVM optimizer finds the hyper plane which maximizes its margins of separation between the two classes as shown in Fig. 2

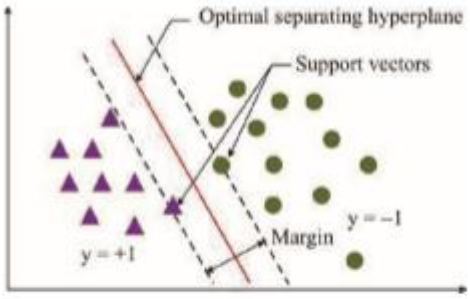


Fig. 2. SVM in Linearly Separable Condition [9]

Segmentation is done using K-means Clustering technique as shown in fig 4.[4]

Fig. 4. Segmentation using K-means Clustering.

III. EXISTING SYSTEM

The plant disease recognition method described in the previous system was implemented as a Windows Phone application in the Visual Studio 2015 using the Silverlight library. The existing implementation uses a large amount of iteration that might be avoidable, and the low frame rate and slight delay of the current viewfinder overlay can make it difficult to point precisely at skinny leaf regions.

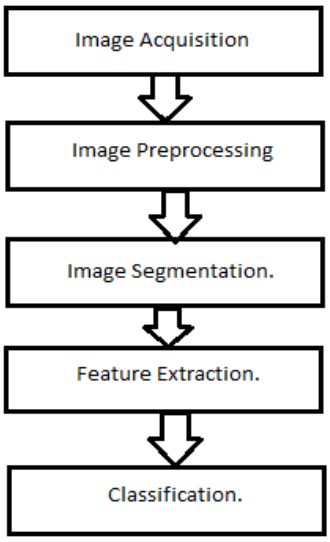


Fig.1. Existing System

Disadvantage of Existing System:

- User had to wait for the response of the call made for the appointment.
- Existing system did not provide the offline help and SMS scheme.

IV. PROPOSED SYSTEM

First the leaf set images are taken with an image acquisition module and then desired preprocessing steps starts. The images under analysis were then segmented by using threshold based methods. The segmented results were used for deciding whether the pepper plant under observation are healthy or not.

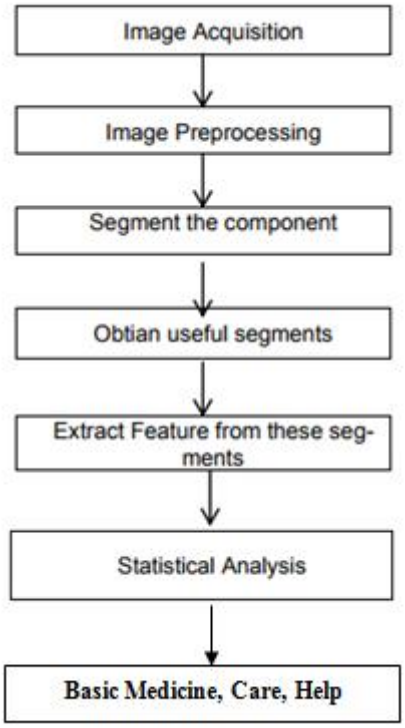


Fig.2. Proposed System

Image acquisition: To test the leaf images are taken using a digital camera. Then different image processing techniques are applied to the leaf which is captured by the camera. Proper illumination should be provided at the time of illumination. The images of leafs are taken from the same distance. Image acquisition module should be placed at a constant distance with the plant during the time of capturing the images as it affects the accuracy of the system.

Image Preprocessing: The Damaged Area Mask was multiplied with the resized RGB image obtained in these step. This mask contains only 1's and 0's and in the mask the diseased portion of the leaves are having the value of 1's. When this image is multiplied with the RGB image, only the diseased portions will come out as a result of multiplication.

Segmentation of components: The segmentation process is done with the help of 2 steps,

(i)The masking process and
(ii)threshold based segmentation.

(i)Masking of green pixels: To Mask the green pixels the pixel value in image is set to zero or some other value. The green color indicates the healthy region of the plant leaf, to find the diseased portion it is better to avoid green region to increase the speed of processing. When the intensity of the green pixels is greater than the predefined value, then all those values set to zero. After masking, pixels with zeros values are discarded. In masking process diseased portion of the leaf is identified using the H and S plane values and a value of "1" is allocated to the particular portion. Rest of the regions a value of "0" is given. As a result a binary image containing only ones and zeros is obtained. Thus the diseased area of the leaf can be extracted out.

(ii)Threshold based Segmentation: Similarity based segmentation is adopted to segment the input images on the basis of similarity in the intensity or gray levels in an image. Threshold based algorithm will choose a proper threshold value T to divide image's pixels into several classes and separate objects from the background. Then the binary image is multiplied with the original RGB color image. In this way, the infected portion of the leaf is extracted

Obtain useful segments:

The green color indicates the healthy region of the plant leaf, to find the diseased portion it is better to avoid green region.

Feature Extraction:

In Feature extraction set of features or image characteristics are defined, which will meaningfully represent the information that was important for analysis and classification. Feature extraction also reduces the amount of resources required to describe a large set of data. The extracted features contains the relevant information from the input data, so that the desired task can be performed by using the reduced representation instead of using the complete initial data. An approach used to region description is to quantify its texture content.

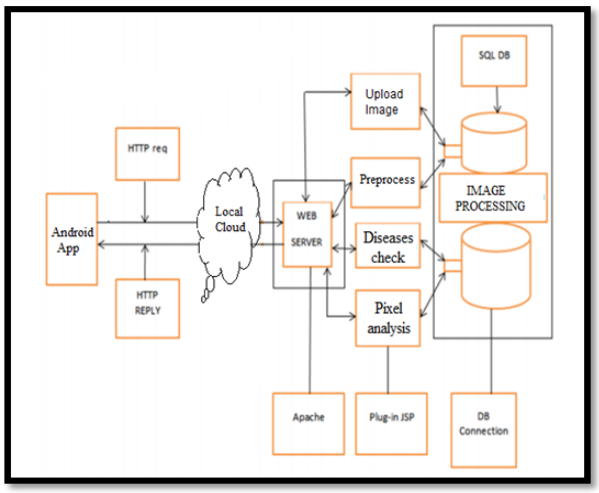
Statistical Analysis:

Statistical analysis is component of Data analytics. Statistical analysis involves collection of every data sample in a set of items. From the texture statistics the presense of disease on the plant is evaluated.

Basic Medicine Care and Help:

In this last step disease is detected and related help is provided to the user(farmers),along with it, if user wants any additional information related to the disease detected, the user can take the appointment via SMS.

System Architecture:



Advantages of proposed system:

- Fully Automatic.
- Notification to the farmers via SMS.
- Mobile cameras are used for capturing the diseased leaf image.

V. ALGORITHM

- **Classification Algorithm:**

Step 1: start
Step 2: acquire the leaf image
Step 3: convert color image to gray scale
Step 4: convert gray scale to binary
Step 5: count number of pixels in the leaf vicinity
Step 6: multiply pixel count with one pixel value
Step 7: compare with database image
Step 8: Stop

- **Image Processing Techniques**

Step 1: Shows the input image.
Step 2: On the input image color transformation structure is performed.
Step 3: Analysis specific threshold value.
Step 4: Then the R, G, B components are mapped to the threshold image.
Step 5: Compare with DB.
Step 6: Stop

VI. FUTURE SCOPE

In future, proposed system can be used for different plant leaves using same android application. Performance of the system can be improved in the future by using advanced background separation methods to separate the leaf object from a complex background.

VII. CONCLUSION

A smart phone application for plant disease recognition will be presented. It is based on image processing that analyzes the color features of the spots in plant leaf. The algorithm that we would be using helps in identifying the presence of diseases by observing the visual symptoms seen on the leaf of the plant.

REFERENCES

[1].IJREAS Volume 2, Issue 2 (February 2012) ISSN: 2249-3905 International Journal of Research in Engineering & Applied Sciences 763 http://www.euroasiapub.org DETECTION AND CLASSIFICATION OF PLANT LEAF DISEASES S. Ananthi* S. Vishnu Varthini

[2].Journal of Signal and Image Processing ISSN: 0976-8882 & EISSN: 0976-8890, Volume 3, Issue 1, 2012, pp.-60-63. Available online at http://www.bioinfo.in/contents.php?i d=48 IJISET - International Journal of Innovative Science, Engineering & Technology, Vol. 2 Issue 4, April 2015. www.ijiset.com ISSN 2348 – 7968 626

[3].IEEE TRANSACTIONS ON INFORMATION THEORY, VOL. 59, NO. 3, MARCH 2013 FEATURE EXTRACTION OF DISEASED LEAF IMAGES .Armand M. Makowski, Fellow, IEEE

[4].Applications of image processing in biology and agriculture J. K. Sainis, Molecular Biology and Agriculture Division,R. Rastogi, Computer Division, and V. K. Chadda, Electronics Systems Division, BARC news letter.

[5]. Jean Williams-Woodward, Extension Plant Pathologist, (2009)- Georgia Plant Disease Loss Estimates, www.caes.uga.edu/publications.

[6]. H.Al-Hiary, S. Bani-Ahmad, M.Reyalat, M.Braik and Z.AlRahamneh, Fast and Accurate Detection and Classification of Plant Diseases, International Journal of Computer Applications (0975-8887), Volume 17-No.1.March 2011.

[7].Dae Gwan Kim, Thomas F. Burks, Jianwei Qin, Duke M. Bulanon, Classification of grapefruit peel diseases using color texture feature analysis, International Journal on Agriculture and Biological Engineering, Vol:2, No:3,September 2009. Open access at http://www.ijabe.org.

