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# Detection and Classification of Plant Leaf, Fruit Disease and Detection of Agent using Android Technology

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***Abstract:*** *Most of the population in India is engaged in cultivation of crops. The challenging task is to prevent crop from disease. This paper aims to offer solution for automatic detection, classification, prevention and computation of texture statistic for plant leaf, fruit diseases. The highlighted information and data are formed from images in biological sciences with the help of Content Based Image Retrieval (CBIR) system. Due to this we can change the visual range from microscopic to telescopic for image analysis. With the help of color, shape and texture of image we can obtain its features. By using color co-occurrence matrix method, the texture feature of image is obtained like correlation, homogeneity, inertia and energy. Main steps used in the proposed system for detection and classification of images for fruits and leaves, first capture the image and convert RGB to HIS format, then using threshold value green pixel are hide and take off, after this images are segmented and only the useful segments are obtained, finally the color co-occurrence method is used for extracted features and result is obtained.*

***Index Terms:*** *Color, Co-occurrence, HSI, Leaf and Fruit Disease, Texture.*

## I. INTRODUCTION

Most of the population in India is engaged in cultivation of crops. The production of crop is also depending upon health of plants. There is the most challenging question for farmer to select the crops for cultivation to earn the maximum profit within the available environment. Even after selecting the appropriate crops for the suitable environment, it's a problematic task to prevent the crops from diseases. Even after consulting the agricultural expertise they may face many problems:

1. Experts may be at long distances.
2. At that time they may or may not be available.
3. Sometimes experts may or may not be aware about those particular diseases.
4. Even the expert advice is very time consuming and costly.

In the proposed paper, we introduce such a technology which will reduce the work load of the farmer to detect, classify and recommend prevention of diseases for leaves and fruits. For the detection of diseases for leaves and fruits, we use image processing technology. This technology of digital image processing, converts the microscopic to telescopic images and for analysis it offers better scope.

The grand challenge for computer vision is to recognition of the system. Images are important in retrieval of data and information in agricultural sciences. The quality, stability and quantity of yield are determined by different diseases on fruits, leaves. The disease in fruits and leaves reduces the withdrawal from cultivation. The crop health can facilitate by detecting diseases on the leaves and fruits in early stages.

## II. LITERATURE REVIEW

Work done by the researcher in the domain of image processing and fruits, leaves diseases detection are mainly focused here. In image processing recently, Kim et.al has implemented for classification of apple, grape peel diseases from extracting texture features and color features. Bayesian classification uses comparison of pixel with pre-calculated model for detection of defected area which is used by researchers Destain (2005) and Leemans, Magein and Kleynes, Leemans [1][2][3]. The accuracy achieved by Kim et.al is near about 96.7%.Fuzzy C-mean algorithm is used to segment input image which is transferred to HIS image using Helly et.al 1method . In this neural network technique is used for classification and feature extraction which involve shape, size and color [4]. The accuracy achieved by Helly et.al is accurately 97% [2]. For the

 

detection of symptotic and asymptotic plant, fruit and leaves diseases different imaging technique and spectroscopic have been studied. Following are the methods: Spinelli, Noferini, and Costa (2006) used the infrared spectroscopy, Bravo et.al (2004) used fluorescence imaging, Chen et.al (2008) used hypospectral or multispectral imaging and Choi et.al (2004) used nuclear magnetic resonances (NMR) spectroscopy, Yang used visible/multiband spectroscopy [1].

Using neural network based classification and K-means based segmentation Al-Bashish, Bani Ahmed and Braik developed accurate and fast method for fruits and leaves diseases detection. In this high resolution multispectral and stereo images used for automatic classification of leaves diseases. This strategy is used in sugar beet leaves [2,5]. Moushou (2005) developed a ground based real-time remote sensing system for diseases detection of arable crops within field condition [1].

## III. PROPOSED SYSTEM

Using digital camera the images of various fruits and leaves are acquired. To extract the useful feature of acquired images the images processing technique applied on them. The following figure gives the flow of leaf disease identification.

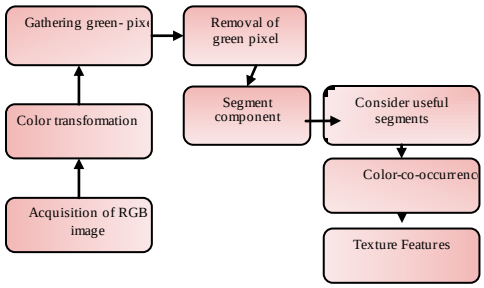


**Fig1. Proposed System Block Diagram for leaf disease identification**

- ***Steps for proposed system***

1. Acquisition of RGB image.
2. Conversion of images RGB to HIS.
3. Hiding of green-pixels.
4. Removal of hidden green pixel.
5. Segmentation of component.
6. Consider useful segment.
7. Using color-co-occurrence methodology the features are computed.
8. Finally texture statistics are evaluated.

### *A. Structure for color transformation*

Firstly the images are captured and that RGB images are converted into Hue Saturated Intensity (HSI) color model. The color model is use for representation of colors in some standard way. The HIS color model is use because it is easily understood by human being. The pure color of light is given by the hue, the amount of white light in hue is given by saturation and amplitude of light is given by intensity. The only H component is consider for further processing after transformation becaus e H component contain more information as compared to S and I component [2][6].

### *B. Hiding of Green Pixel*

In this the mostly green color pixel are identified and that are also hide using threshold value as follows: The Red, Green and Blue component of this pixel is assigned to zero, If the pixel intensity of green component is less than the threshold value. This is done because the green pixel represents the healthy area of the leaves [2].

### *C. Removal of Hidden Green Pixel*

The pixel which are having Red, Green and Blue values are zero were removed completely. It reduces processing time and gives accurate classification and detection[2].

### *D. Segmentation of component*

 

After performing the above step the infected region is obtained then the segmentation is done in number of patches of equal sizes, so that important information should not loss. The 32*32 patch size is considered. The segments which contain most useful information i.e. above the 50% are only considered for further process.

### *E. Color-co-occurrence*

The Spatial Gray-level Dependence Matrices (SGDM) was used to developed color co-occurrence texture analysis method. Statistical way to describe the shape by statistically the gray level color-co-occurrence methodology is used [7].

### *F. Texture Features*

The features like contrast, homogeneity, and cluster shade, energy and cluster prominence are computed. The above approach is also used for fruit disease identification with the following differences:

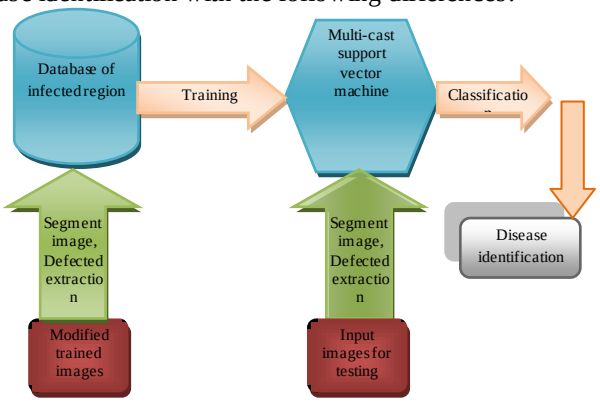


**Fig2.Proposed System Block Diagram for fruit disease identification**

The major tasks to be performed are defect segmentation, extraction of feature, training and classification. The segmentation of image is needed to be done very precisely for the identification of disease else, the domination of non-infected region over the infected region will increase the processing time. For detection of infected part K-mean based defect segmentation is used. In this approach there are mainly two phases, training and classification. The characteristic of different type of disease is understood by training. Feature extraction of segmented portion is done for the training and stored in feature database. The feature stored in database is used to train support vector machine. Finally the disease is identified for the input image.

## IV. DETECTION OF AGENT

In this paper using android technology we trace the nearest agent using GPS system.

- By using this application seller would list the products details as shown in fig 3, 4.
- The listed products will be viewed by the customers as shown in fig 5.
- The details consist of product details like, type, weight, expire date, etc and also the seller details like contact number like contact number, address as shown in fig 5.
- Once the product has been sold, the seller can delete the products from the list of items to be sold.

 


**Fig3.** Advertisement of product

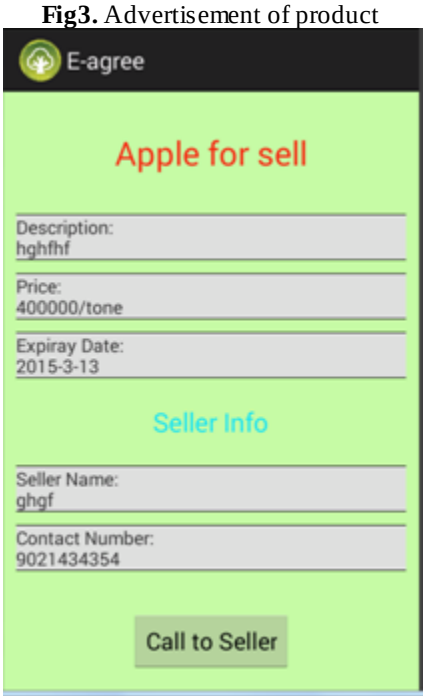


**Fig4.** Example of Advertisement of product

 


**Fig5.** List of product for sell

We help the farmer for buying and selling the product and also making the advertisement of product. This would help the farmer to reduce the workload, time and cost. By using this we can also make call to nearest agent. This will be the easiest way to create an interaction between seller and buyer.

## V. DETECTION OF SOIL TYPE AND WEATHER

In this paper we capture the image of soil and compare it with database to determine the type of soil like mountain soil, black soil, red soil, etc as shown in fig 6, and also we determine weather information like temperature, wind speed, humidity, etc as shown in fig 7.

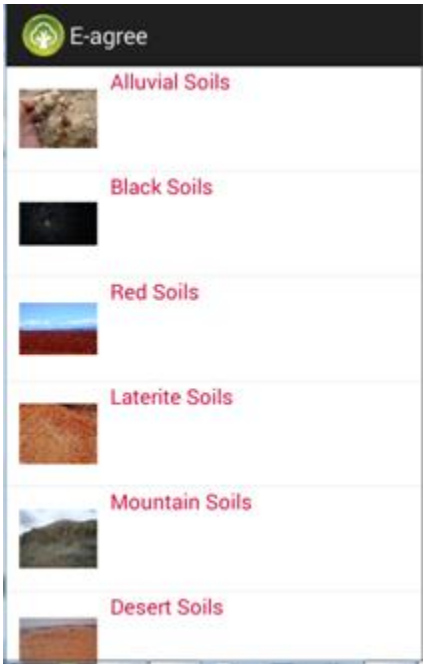


**Fig6.** Type of soil

 


**Fig7.** Weather information

## VII. RESULT AND ANALYSIS

In this we first capture the image then upload the image, then calculate RGB value of image and convert the image from RGB to HIS and then consider only the Hue component of image. After considering Hue component we mask and remove green component of image and finally got most defected area of image as shown in fig 8. After processing this image we get the values of energy, contrast, Homogeneity etc which will help us to determine the diseases of input image as shown in fig 9.

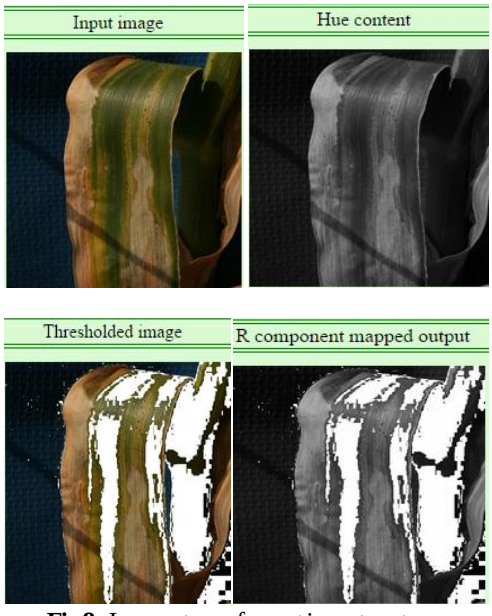


**Fig8.** Image transformation structure

 

| | |
|---|---|
| Contrast | 1.810092528769004E9 |
| Energy | 6.7826967523704195E9 |
| Homogeneity | 6.2868013839E10 |
| Cluster_Shade | 92.77343160391709 |
| Cluster_Prominence | 170.8231594193344 |

**Fig9.** Calculated values after processing

In this we also get the review from expert this will help us in perfection of result as shown in fig 10.

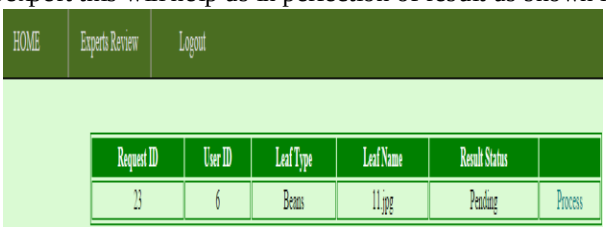


**Fig10.** Expert review

In this we compare the image of soil with the inputed images and determine the type of soil that is whether it is black soil or mountain soil etc.and it also gives some additional information about detected soil as shown in fig 11.

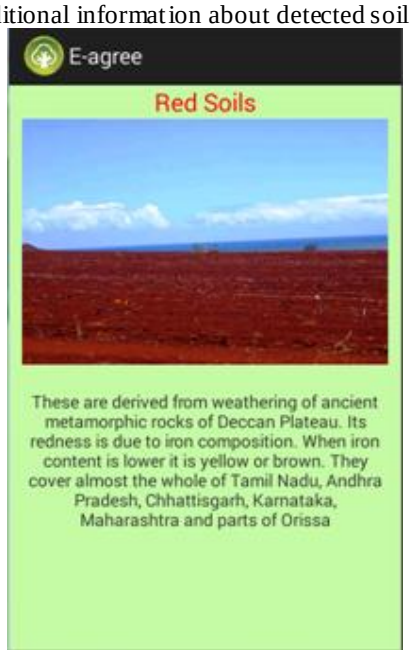


**Fig11.** Example of soil

## VI. CONCLUSION

In this paper for leaves and fruits identification problem we uses image processing approach. Extraction is done from the low level image considering the features like color and texture. This approach is used for detection and classification of diseases like leaves and fruits for the agricultural purpose. Using CBIR system the image is retrieved.

## VII. FUTURE ENHANCEMENTS

For fruit we only detect the disease on external part, cannot detects the internal diseases. In future we will use 4D technology to detect the internal diseases of fruits.
In this application we list only the types of soil. In future we may detect the N, P, K values of soil.

 

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