Android Application for Leaf Disease Recognition

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Abstract:
The aim of this system is to design, implement and evaluate an android based image processing solution for detection and classification of plant leaf disease and suggestion to prevent from the same. We present more precise, fast and accurate image processing based solution which can be operated on any android smart phone. This solution is composed of following main stages. First the digital images are acquired from the field or environment using smart phone camera or other digital camera. Image preprocessing technique noise is removed by filtering technique. Next, in the second phase, the images are segmented using block segmentation. Next the histogram is generated for the input image. Finally; the extracted features are passed through a series of comparison using distance measures to detect disease in plant leaf

Keywords: Leaf **,** Disease, plant, Digital Smart phone Camera, Image.

I. INTRODUCTION

India is an agricultural country, where most of the people depend on agriculture. Farmers have wide range of diversity to select suitable crop. Diversity in crops causes various diseases which restrict the growth of the plants, quality, quantity and productivity of plants. In order to obtain more good products, a product quality control is basically mandatory. Diseases in plants caused by infectious organisms, can damage the normal state of plants leaves. The diseases may cause by pathogen such as fungi, viral, bacterial and environmental condition. Therefore, the early stage diagnosis of plant disease is an important task. Sometimes farmers call the experts for detecting the diseases but this also time consuming and expensive. The occurrence of the disease on the plant may result in significant lost in both quality as well as quantity of agricultural product. This can produced negative impact on country whose economies are primarily dependent on the agriculture. Hence the detection of the disease in the earlier stages is very important to avoid the loss in terms of quality. Usually the methods that are adopted for monitoring and management of plant leaf disease are manual. Accuracy and patience needed, manually it is a combustive process. One such major approach is naked eye observation. But the requirement of this method is continuous monitoring of the field by a person having superior knowledge about the plants and its corresponding disease. Moreover appointing such a experience person would be prove costly. Another approach is to getting advice from the expert which may add the cost. Also the expert must be available in time otherwise it may result in lost. Automate diagnosis of diseases reduces a lot of work and makes it reliable too. The main aim of this system is to design, implement and evaluate an android based image processing solution for detection and classification of plant leaf disease. The system will be an android application which can be run on any android based smart phone. The application will require an internet connection to detect the disease and suggest remedy for the detected disease. The system will also have an admin who will be responsible for handling the dataset of infected plant leafs and maintain the proper remedy for the same. The farmer can take live picture of infected leaf from his smart phone and submit it for analysis.

1.2 Motivation:

The methods that farmers are using today to detect disease of plants are necked eyes method that is the farmer guess the disease based on the symptoms on leaf of plant according to his experience. It sometimes not accurate and that causes huge damage to the system. According To some causes we can motivated for to develop this application.

1.3 Problem Definition:

"To develop an android application which can capture images of infected plant leaf, perform analysis and give farmer the information about the disease and remedy of that disease".

1.4 Objectives And Scope:

The main objectives of making this application is to reduced the farmers effort, time and money. The application should the produced the result accurately and quickly. The application should save the time that will reduced the damage to the crops.

-The system is very useful for the farmers so the farmers can adopt this system for automatic detection of disease. In the college of agriculture, the application is very useful. In plant pathology section ,it will be useful for detecting the disease & providing remedy.

II. LITRATURE SURVEY

2.1 Web Based Survey:

Some papers are describing to detecting leaf disease using various methods suggesting the various implementation ways as illustrated and discussed here:
This paper consists of four phases to identify the affected part of the disease. Firstly images collected from sources like digital camera etc. this phase is known as an Image Acquisition phase or image blurring to remove noise after that image segmentation phase was started, In image segmentation the image is divided into block of 8 pixels and processing is applied

on that blocks. then the image color conversion has done ,in that the RGB To HCI conversion has done. The RGB color model is not enough to recognize the natural colors accurately. So the HCI color model is used to recognize the leaf image color precisely. The next phase is Histogram Generation. Histogram is a 2 dimensional matrix in which the values of each block is stored. This histogram is stored and used for comparison. After that the Distance measurement is done We use Euclidean distance to evaluate the similarity between the input plant leaf image and the one stored in database.

III. SYSTEM ANALYSIS

3.1Proposed System :

To overcome the drawbacks of an existing system, We Proposed new system which is an "Android Application For Leaf Disease Reorganization". Automate diagnosis of diseases reduces a lot of work and makes it reliable too. The main aim of this system is to design, implement and evaluate an android based image processing solution for detection and classification of plant leaf disease. The system will be an android application which can be run on any android based smart phone. The application will require an internet connection to detect the disease and suggest remedy for the detected disease. The system will also have an admin who will be responsible for handling the dataset of infected plant leafs and maintain the proper remedy for the same. The farmer can take live picture of infected leaf from his smart phone and submit it for analysis.

IV. SYSTEM REQUREMENTS SPECIFICATION

4.1 Hardware Requirments:

Hardware	Specification
Processor	Intel Pentium 4 Onwards
Hard Disk	As per OS500MB of free Hard-disk space
RAM	512 MB

4.2 Software Requrements:

Software	Specification
Operating System	Windows XP ,Windows 7 etc.
Developing Tool	Net beans IDE, Android Studio
Database	Serilization

V. SYSTEM DESIGN

5.1 Block Diagram

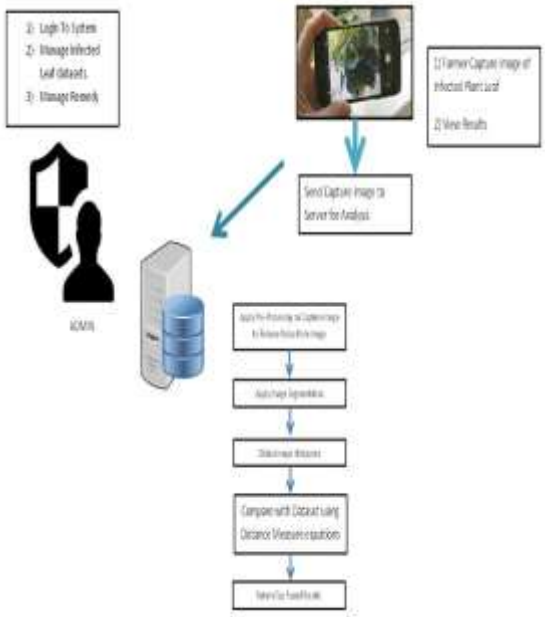


Figure 5.1.1 : Block Diagram of System

There are Three main Components in the System.
1] Admin
2] Farmer
3] Server

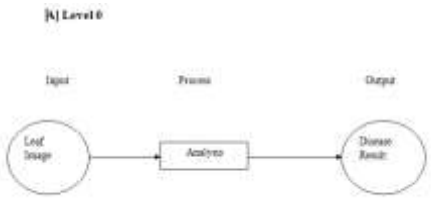
1] Admin:
The Admin can login to the system. The Admin will manage the infected leaf dataset.
The Admin will manage the remedy related to various disease.

2]Farmer:
The Farmer will capture image of infected leaf. The Capture image is then send to the server for analysis.

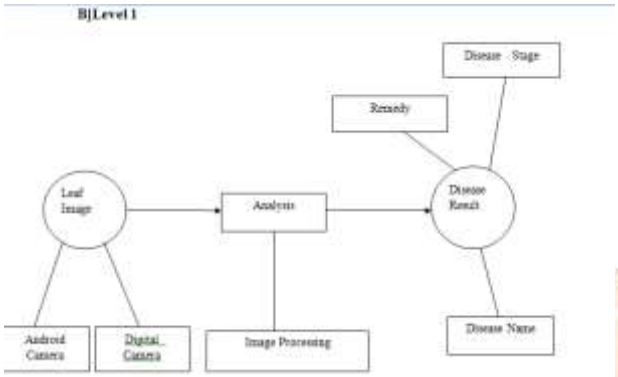
3] Server:
At the server side the processing on the infected leaf will be done.

In the first Image processing phase, the processing will applied on the infected leaf image to remove the noise from the image. Then the image will segmented into blocks of 8 pixels in image segmentation phase and the processing on each block will carry out. Then image histogram will generate in histogram generation phase. The histogram is a 2 dimensional matrix in which the value of each block will store. The histogram is stored and used for comparison. Then the distance measure equations will use to evaluate similarity between two input sets. Then the found result will return to the top.

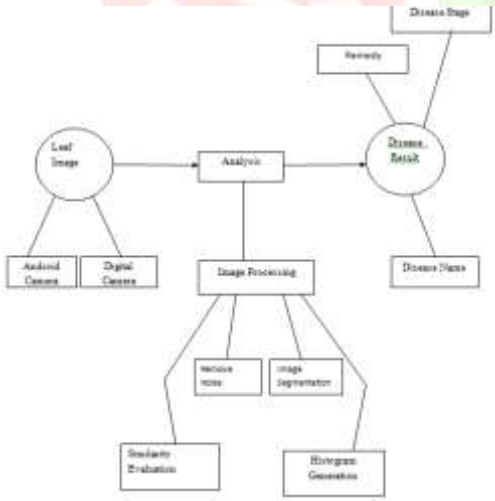
5.2 DFD Diagram



In level 0 DFD input is an leaf Image then analysis process is done on that infected leaf the output result is as disease result



In level 1 DFD input is an leaf Image is tacken by android camera or digital camera then analysis process is done by using some image processing techniques on that infected leaf then the output result is as disease result produced disease name ,remedy uses and disease deatails.



In level 2 DFD input is an leaf Image is tacken by android camera or digital camera then analysis process is done by using some image processing techniques which can remove noise, Image segmentation, similarity Evaluation and Histrogram Genration on that infected leaf, then the output result is as disease result produced disease name ,remedy uses and disease deatails.

VI. IMPLIMENTATION DETAILS

6.1 Flow of System Development:

6.1.1 Methodologies Used:

1) **Blurring of Image To Remove Noise**: The image captured from the android smart phone or any other digital camera may contain noise such as very sharp corners, dust particles etc. This noise in the image may reduce the analysis accuracy so using the blurring technique we remove the noise from the image. To blur the image we use Windowing technique (3*3). The technique takes the average of surrounding nine pixels and assigns the value to the center pixel from the window. It scans the pixels in raster scan pattern.
2) **Image Segmentation:** The image is first scaled in fixed dimensions to make processing fast. The image is then segmented that is divided in to block of 8 pixels and the processing is applied on this blocks.
3) **RGB TO HSV conversion:** The RGB color model is the most basic color model. It can be used for basic image processing techniques. But it is unable to detect the natural colors more accurately. So we use a more stable model which is HSV color model. HSV color model is more precise and gives more details about colors.
4) **Histogram Generation:** The segmented image is then scanned block by block pixel by pixel to generate the histogram of the image. Histogram is a 2 dimensional matrix in which the values each block is stored. This histogram is stored and used for comparison.
5) **Distance Measure:** The distance measure equations are used to evaluate similarity between the 2 input sets. We use Euclidean distance to evaluate the similarity between the input plant leaf image and the one stored in database.

6.2 Implementations Details:

6.2.1 RGB Splitting:

RGB Color Model: - Basic Color Model
The basic color model consists of RGB and alpha. Which makes it RGBA model?
R-Red-Green-Blue, A-Alpha-Transparency of image.
The pixel is of 32 bit.
R-G-B 8bits each
Alpha-8 bits.

6.2.2 Color Blur:

Image blurring is applied to remove noise from the image. It makes the images smooth for processing.
Image Blurring is of two types one is gray scale blurring and other is color blurring. We use windowing technique to blur an image.

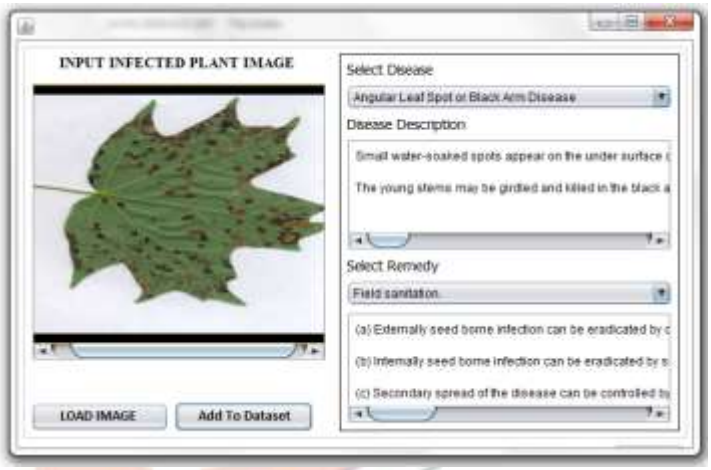
Window can be of 3*3 5*5 etc.

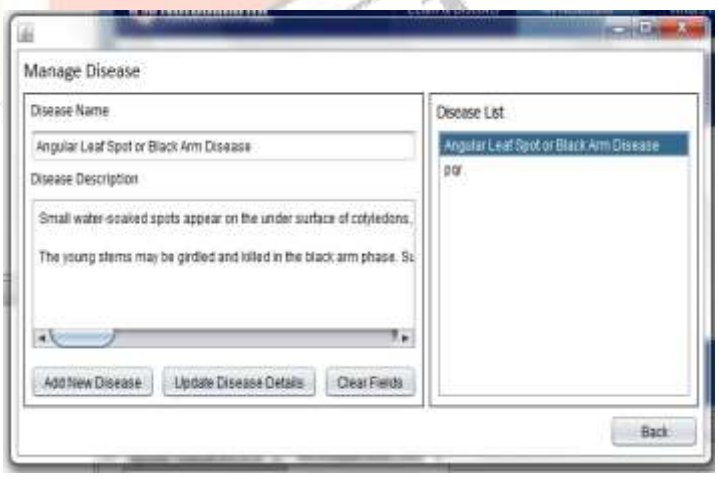
6.2.3 RGB TO HSV Conversion:

HSV Color Model: More Stable Color Model and very good for detecting natural colors.
H-Hue (Denotes the original color)
S-Saturation--(Concentration of color and mixture of white color)
V-Value/Luminous --Brightness

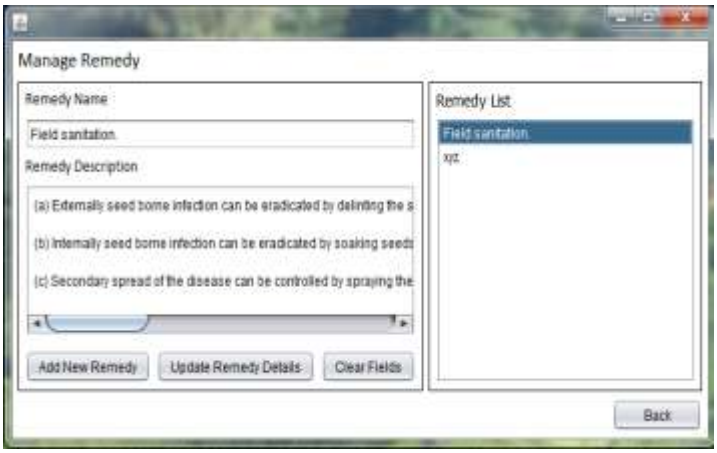
```
//Take a color value in a variable this value contains r, g, b
col = getRGB(x, y)& 0xffffff;
//Separate R, G, B components from that value
        r = (col >> 16) & 0xff;
        g = (col >> 8) & 0xff;
        b = (col >> 0) & 0xff;
//Find Min and Max from R, G, B Component.
        rgbMin = Math.min(Math.min(r, g), b);
        rgbMax = Math.max(Math.max(r, g), b);
//Assign max value to v variable
v = rgbMax;
//Convert  to hsv value
        if (v == 0) {
           hue = s = 0;
        } else {
           s = 255 * (rgbMax - rgbMin) / v;
           if (s == 0) {
              hue = 0;
           } else {
              if (rgbMax == r) {
                 hue = 0 + 43 * (g - b) / (rgbMax - rgbMin);
              } else if (rgbMax == g) {
                 hue = 85 + 43 * (b - r) / (rgbMax - rgbMin);
              } else if (rgbMax == b) {
                 hue = 171 + 43 * (r - g) / (rgbMax - rgbMin);
              }
           }
        }
        if (hue < 0) {
           hue = 255 + hue;
        }

        col = (hue << 16) | (s << 8) | (v);
```





VII. RESULT AND ANALYSIS



Scientific and Research Publications,Volume 6,Issue 2,February 2016.

VIII. CONCLUSION AND FUTURE SCOPE

8.1 Conclusion:

This paper shows automatic detection of disease on plants using android application. One of the important Characteristics of automatic detection are speed and accuracy. So it saves the Time required to recognize disease on plants. Hence this paper shows automatic detection of disease on unhealthy plants.

7.2 Future Scope

1) Prediction Algorithms can be used to detect the possibility of plant getting treated or not.

2) Prediction Algorithms can be used to predict which fertilizer can be used to treat the specific disease.

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