

Computer Engineering Project Title

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Abstract

This is a mobile application which is capable to output the color percentages (Red, Green and Yellow) when the user input an image of a particular leaf. The application can take a instant photograph or browse an image from the memory of the mobile device.

This application also output the variations of the colors. Basically red, green and yellow also light red, medium red, dark red and likewise for all three colors.

CONTENTS

Abstract	1
Contents	2
CHAPTER 1 INTRODUCTION	3
CHAPTER 2 RELATED WORK	4
CHAPTER 3 OBJECTIVES AND SCOPE	5
CHAPTER 4 METHODOLOGY	6
4.1 OVERVIEW	6
4.2 ACHIEVEMENTS	7
4.2.1 ALGORITHM TO CALCULATE RED, GREEN AND YELLOW PERCENTAGES OF AN IMAGE	
4.2.2 ANDROID APPLICATION	
CHAPTER 5 CONCLUSION	9
References	10

LIST OF FIGURES

Figure 1	Interface of the application	7
Figure 2	After the color percentages are	7
Figure 3	After the three ranges of Red is displayed	8

CHAPTER 1

INTRODUCTION

Agriculture field is one of the most important and popular field in Sri Lanka. In this field, scientists do various tests for plants, fruits, leaves and etc. But in some tests they do not use modern technology. Usually they use their old complex methods yet. Therefor they waste their time and money but in many times they do not get accurate results also. So combining these tests with modern technology more accurate results can be achieved and the time can be saved.

Among those above mentioned tests they do considerable amount of tests for leaves to identify their variations and also to categorize them. The color variation, shape, size and the type of the edges in a leaf are mainly can be used for these classifications.

From Sri Lanka various types of plants and leaves are exported to lots of other countries for many purposes. When exporting the leaves, the variation of the colors in that leaf is very important. The exporters expect to export the leaves with uniform color variation. So they want to know the exact color variation of a sample leaf which they are exporting.

In present, people use their standard old methods to identify the color variation of the leaves. Usually they use color variation charts to match the colors of the leaves. In these papers the colors have been numbered according to their standards. But according to the person who test the leaves and due to the various light conditions which exist in the labs vary the results. It depends on the person because he/she do the testing by using his /her naked eye. As a result of this testing method it can be identified that the results are not accurate enough and not much efficient.

So the main objective of our application is to get an accurate color variation using a photograph/image of the leaf to be tested. In this application user can test the color variations according to a standard algorithm and it outputs trusted results to the user. Therefor the results is independent from the person who do the testing. By these results exporters can test the uniformness of the color variation.

This may be a good solution to overcome the issues for finding the color variation of the leaves in the agricultural field.

CHAPTER 2

RELATED WORK

There were no related android applications or pc software found in the internet.

But the intention of our application was done in real world just by using leaf color charts. That charts are very expensive and very rare. Plant researches and exporters use that chart to determine the color percentages. The same intention is fulfilled by this mobile plant detector application

CHAPTER 3

OBJECTIVES AND SCOPE

The main problems/weaknesses in old testing methods are wastage of time and non-accurate results. So we can reduce those weaknesses by combining modern technology with the so called tests.

So in this case, we have built an application which can be used easily in the mobile devices with a user friendly environment. In these type of problems there should be solutions which is effective and smart to use. Therefore this is an application that works in offline mode. Only thing required is a good quality image/photograph of the leaf. Other tasks will automatically be done by the application.

- Our main objective was to create an application that gives the red, green and yellow percentages of the captured image.
- As the second objective we wanted to separate a color into three parts, as light, average and dark.
- Third was to implement the application to work in offline mode without connecting to any server.
- Next one was to improve the application to work with different sizes of leaves.
- Final one is to develop this application to use in the fruit and soil testing.

This application helps to exporters to tell the accurate color variation of a leaf which they are exporting. So they can give very accurate details about the uniformness of the color variation of the whole stock which is going to be export. And also the buyers can use this application to test the details about the stock they delivered.

This can also be used in tests belong to fruit industry and soil industry as well. Because we only need a standard quality photograph to give the color variation. So when they wanted to do a test according to the color variation, they can easily use this application to get accurate results. The importance of using this type of application is the simplicity and the accuracy of the results.

CHAPTER 4

METHODOLOGY

4.1 OVERVIEW OF METHODOLOGY

Calculating of the leaf color percentages were done by using Java programming language. The user interface of the android application was done by using Android Studio which is a mostly used IDE (Integrated Development Environment) in developing android applications. Then the Java programme and the interface was combined together to build the final product.

Android Operating System was used as it is the most common mobile operating system.

After the input image is fed to the application the image processing part begins. Java program is the part which includes the image processing part. Following are the steps of the Java programme which calculate the color percentages of the leaf.

- Image was fed as an input to the programme
- Programme read the whole image pixel by pixel. There are inbuilt functions in Java to read the pixels and give the RGB (Red, Green, and Blue) values of each and every pixel.
- There the HSV (Hue, Saturation and Variation) values of the pixels were calculated. There are algorithms to calculate HSV values from RGB values.
- Selected the ranges of HSV values because there are many variations from one color.
- Determined that to which color the pixel belongs to by using HSV value ranges. Conditional loops were used for that.
- Since we have to determine the RED, GREEN and YELLOW percentages only these three colors were considered.
- Likewise three counts for Red, Green and Yellow colors were taken for the whole image
- Then the percentages were calculated
- Moreover the three ranges of a one specific color (such as light yellow, medium yellow and dark yellow) were considered and got the counts for that three ranges also.

HSV values had to be used rather than just taking the ranges by RGB values because ranges of RGB values were overlapped in some colors because of the wide variation.

In Android Studio the interface was created by adding buttons, text views, image views and etc. The XML language was used in this part.

Then the programme and the interface were connected together through Android Studio. When a button is pressed the relevant code for that action is executed. Then the user can do the expected action (ex: taking the photograph or browsing an image from gallery) or user can see the expected output (ex: color percentages).

4.2 ACHIEVEMENTS

4.2.1 ALGORITHM TO CALCULATE RED, GREEN AND YELLOW PERCENTAGES OF AN IMAGE

- Java programme was implanted to calculate the above mentioned percentages.
- That programme can be used in any application which calculate the above color percentages.
- The programme can be developed to find any color percentage by changing the HSV value ranges

4.2.2 ANDROID APPLICATION

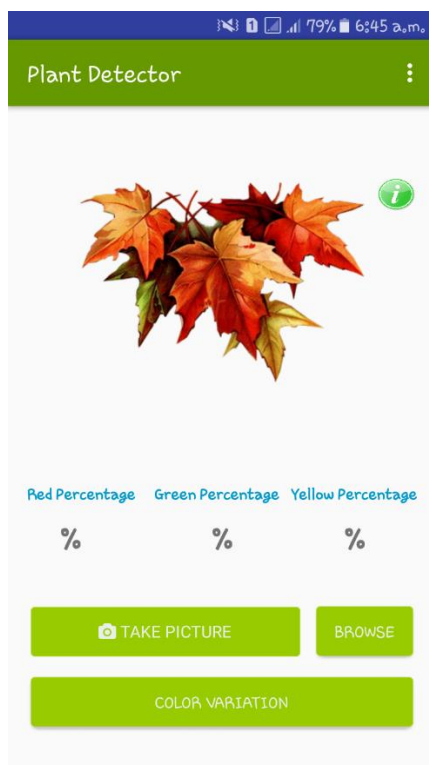


Figure 1: Interface of the application displayed

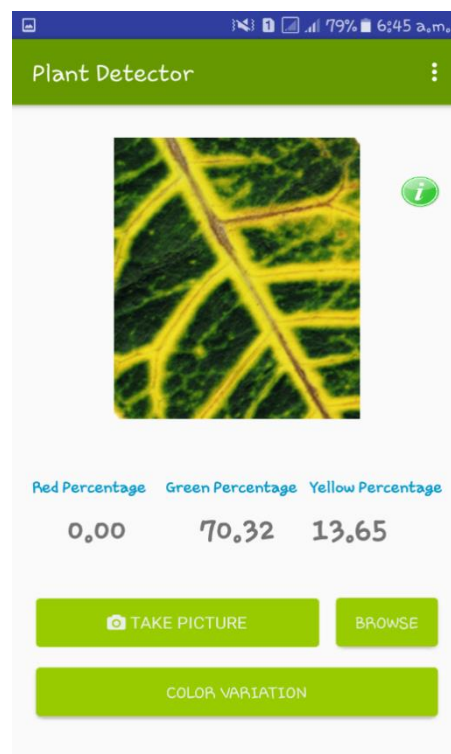


Figure 2: After the color percentages are

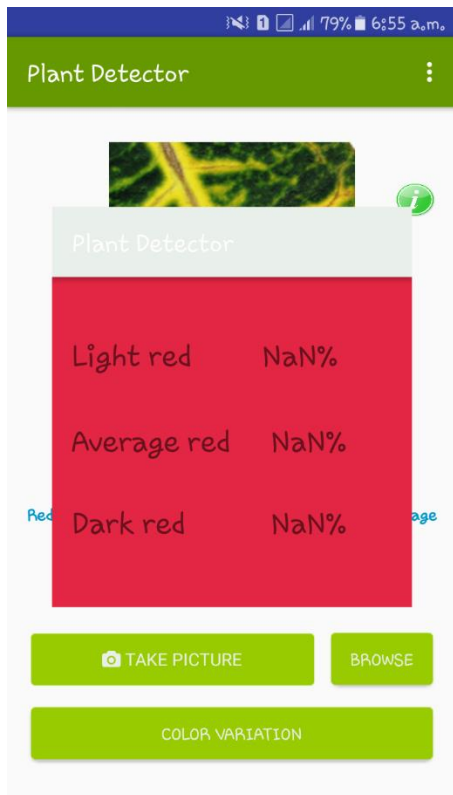


Figure 3: After the three ranges of Red is displayed

CHAPTER 5

CONCLUSION

In developing or implementing applications for certain problems, it could be identified that there are many types of projects. Some are limited to specified group of people and some can be used by any community in the world. We have built this application to take the color variation of a leaf when the user input an image to the system. This is not an android application which can be used by every person or community. This application has been developed for specified professionals to use for a particular activity.

The main achievement of building this application is to take more accurate results in more efficient way to the user. There are some further developments we have to achieve and the most important thing is this application should be tested in the real field (labs) and we have to do the further fine tuning parts to separate the colors better. When this application is developing to take the color variations of fruits and soil, a research should be done to find the colors of that creatures and then this application can be modified to do such things. The methodology is quite same and only the colors of that objects are different.

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