Fruit Maturity Detector Application Implementation and Result

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ABSTRACT

In the current era, accurate maturity detection of fruit is very important for fruit cultivators and fruit vendors. A fruit maturity detector is a application consisting of android device and server. This system works as an assisting application for fruit maturity estimation. The specialty of this system is, it can tell the number of remaining days for ripening of the fruit. One of the three main modules, user will store his information in the system as well as he will click the image of the fruit for its maturity detection. Database will contain the training dataset of fruit. It will also store the user information. Server will pre-process the image given by user and compare its characteristics with characteristics of fruit images stored in database. This system is easy and cost effective technique for maturity detection of fruit. Other fruit maturity detection techniques like use of infra red rays and chemical testing are harmful, it can damage the fruit. This system uses image processing to store the characteristics of fruit. Gaussian blur and sobel edge detection algorithm are used to acquire the characteristics of the fruit.

Keyword : - ***Image processing, blur, Histograms.***

1. Introduction

There are some fruit maturity detection techniques like use of near infrared ray, chemical testing and traditional hand picking are present. Among them use of near infrared rays and chemical testing are costlier methods. These techniques may damage fruit also. Traditional handpicking technique is not appropriate for large number of fruits. This technique may not yield proper output. There is need of simple, easy and cost effective technique for fruit maturity estimation. Therefore we have designed a project 'Fruit maturity detector'. This application will estimate that whether the fruit is mature or not and if fruit is not mature, it will tell remaining days left for maturity.

This paper presents the new economical solution by an implemented fruit maturity detector system. This project uses android platform and netbeans server architecture. This project contains three modules user, database and server. MySQL is used for database design. Wi-Fi is used for connectivity purpose.

2. Literature review

In year 2014, an IEEE paper on Classification of oranges by maturity, Using image processing techniques was authored by Caro Prieto Diana Carolina and Nieto Tapias Deivis David. This project uses image processing to determine maturity of oranges. This project specifies criteria of the commercial varieties of oranges.

In year 2015 , an IEEE paper on Estimation of volume and maturity of sweet lime fruit using image processing algorithm was authorized by Poshit Raj Gokul, Shoraya Raj, Poornapushpakala Suriyamoorthi. This paper describes image processing techniques to identify volume and maturity of sweet lime fruit. Volume of the sweet lime is carried out with the help of radius of fruit and Maturity of sweet lime is determine with the help of RG ratio.

In year 2015, an ICISP paper on orange sorting by applying pattern recognition on colour image was authorized by Jyoti Jhawar. This paper proposes automated grading of orange fruits. This paper proposes two techniques such as edited multi seed nearest neighbour techniques and linear regression based techniques. According to this paper, linear regression based technique can explicitly predict the maturity of fruits. 90% plus is the success rate of this project according to experimental results.

In year 2015, an IEEE paper of Fruit maturity detection using neural network and odour sensor was authorized by Hiroshi Kinjo, Naoki Oshiro and Sam Chau Duong. This paper uses concept of odour sensor to estimate maturity of fruit. This paper presents quick maturity detection method in a few seconds of the rising signal of odour sensor network.

3. System Implementation

There are three main modules in proposed systems that are user, database and server. User module is responsible for registering his information, giving input to system, adding feature of fruit images, managing features. An android application must be installed on user's device. Database stores the training dataset of fruit as well as their characteristics. Connection to server can be provided by Wi-Fi. For implementation purpose of the core project, we have used Java J2SE and JDK J2SE (Java 2 Standard Edition). Java is the language for development of the project. JDK is the development kit used to compile java programs

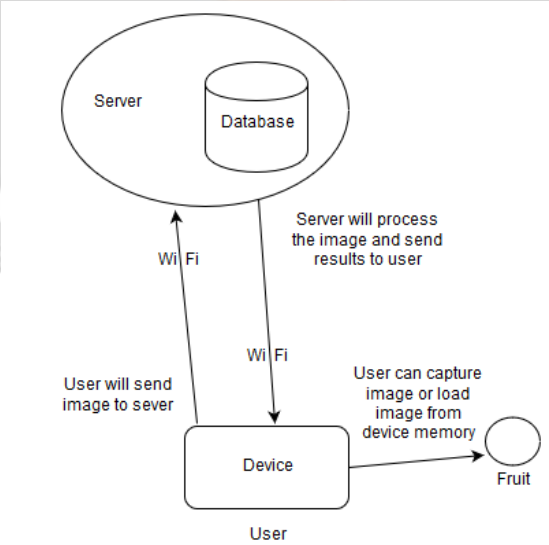

Fig.1 Block Diagram

. We have implemented Android application module in the eclipse platform and the server module is implemented in NetBeans platform. The Glassfish server is designed using various web services. Admin GUI is designed using NetBeans IDE. MySQL is used for designing database. Modules are connected using JDBC. Implementation of all the GUIs are shown below

Fig.2 User Registration

Fig.3 Main Menu

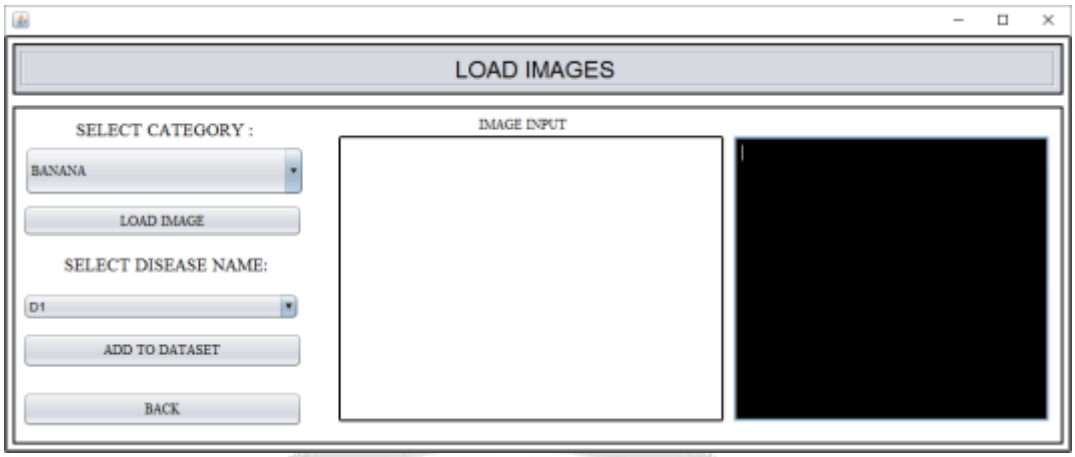

Fig.4 Add Features

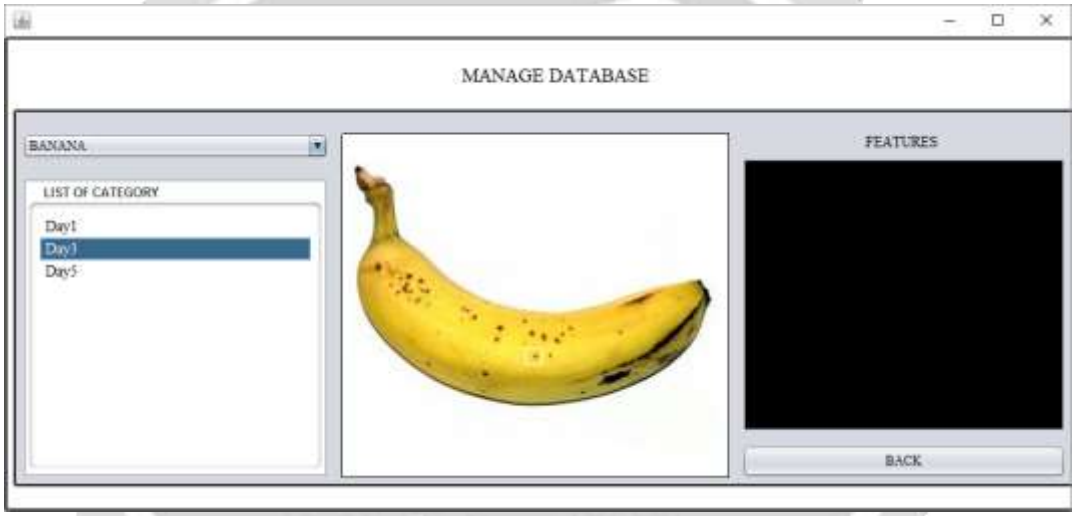

Fig.5 Manage Features

4. Methodology

The input image given by user is copied in buffer for further processing. After copying the image, Gaussian function is applied on image in order to blur it. This is done for the smoothening of the image. It is applied to each pixel of the image.

$$G(x) = \frac{1}{\sqrt{2\pi\sigma^2}} e^{-\frac{x^2}{2\sigma^2}}$$

is the equation Gaussian function.

Gray scaling an image reduces the sharpening effect; this makes the detection more accurate. In order to make grayscale pixel, we are averaging red, green, blue channel values of surrounding pixels and replacing original values of pixel by average values. Then the next process is thresholding. This is nothing but segmentation of image. This is done in order to apply remaining image processing technique. Next process is sobel edge detection process. It used to find out which image area will belong required object i.e. fruit. In this method we are calculating gradient of each pixel.

The magnitude of the vector Δf is denoted as,

$$\Delta f = mag(\Delta f) = [G_x^2 + G_y^2]^{1/2}$$

where Gx is for x direction and Gy for y direction.

After calculation of this, we get object area in the image. This cropping is then applied to original image. Then HSV values of cropped area are calculated. Hue represents the pure color type. Saturation refers to vibrancy of the color and value represents the brightness of color. This values are then stored in histograms. The same whole process is applied on each image in the training dataset and their calculated HSV values are stored in database. Later these values are compared with HSV value of image which was given by user as a input. It will calculate that the given fruit's day. Then it will show, image is mature or not.

5. Result and Discussion

There are three main modules in implemented system. User module is going to add user's information, add training dataset, manage it as well as analysis it with the help of database and server. Database is going to store the information of user, training dataset of fruit and their characteristics. Glassfish server is going to apply image processing techniques on the image.

All the modules in the implemented project work fine and smooth and are error free. Running of the project is shown below:

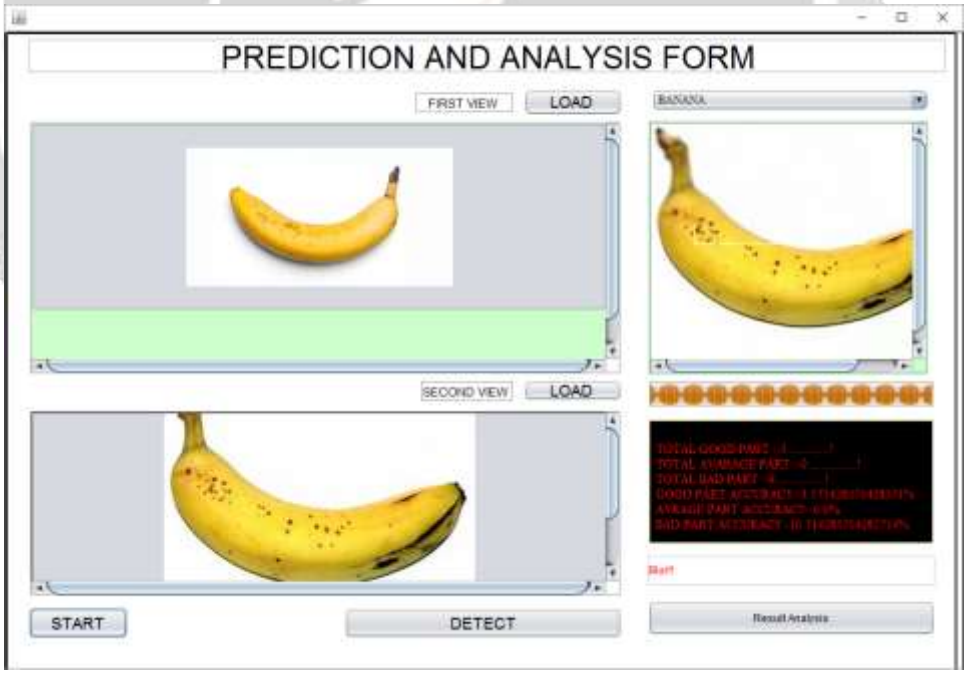

Fig.6 Prediction Form

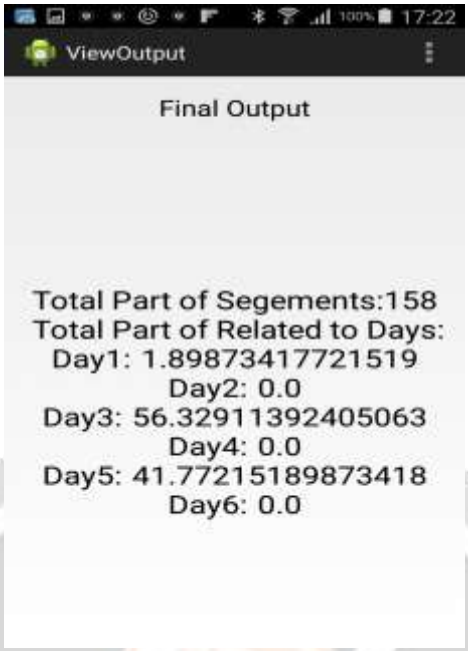

Fig.7 Final Output

6. Acknowlegement

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