Color Sorting Based On Image Processing

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Abstract- *This paper gives an approach to recognize colors in a two dimensional image using color thresh-holding technique in MATLAB with the help of RGB color model to detect a selected color by a user in an image. The methods involved for the detection of color in images are conversion of three dimensional RGB image into gray scale image and then subtracting the two images to get two dimensional black and white image, using median filter to filter out noisy pixels, using connected components labeling to detect connected regions in binary digital images and use of bounding box and its properties for calculating the metrics of each labeled region. Further the color of the pixels is recognized by analyzing the RGB values for each pixel present in the image. The algorithm is implemented using image processing toolbox in MATLAB. The results of this implementation can be used in security applications like spy robots, object tracking, segregation of objects based on their colors, intrusion detection.*

Keywords- Microcontroller, Camara, Servo motors.

I. INTRODUCTION

Image processing is a method to convert an image into digital form and perform some operations on it, in order to get an enhanced image or to extract some useful information from it. It is a type of signal dispensation in which input is image, like video frame or photograph and output may be image or characteristics associated with that image. Usually Image Processing system includes treating images as two dimensional signals while applying already set signal processing methods to them.

It is among rapidly growing technologies today, with its applications in various aspects of a business. Image Processing forms core research area within engineering and computer science disciplines too.

Image processing systems are becoming popular due to easy availability of powerful personal computer, large size memory devices, graphics software etc.

II. RELATED WORK

The purpose of Image processing has 5 types,

- Visualization - Observe the objects that are not visible.
- Image sharpening and restoration - To create a better image.
- Image retrieval - Seek for the image of interest.
- Measurement of pattern – Measures various objects in an image.
- Image Recognition – Distinguish the objects in an image.

Types of Image Processing

The two types of Image Processing are

- Analog image processing
- Digital image processing

1.1.1 Analog image processing

Analog or visual techniques of image processing can be used for the hard copies like printouts and photographs. Image analysts use various fundamentals of interpretation while using these visual techniques. The image processing is not just confined to area that has to be studied but on knowledge of analyst. Association is another important tool in image processing through visual techniques. So analysts apply a combination of personal knowledge and collateral data to image processing.

1.1.2 Digital image Processing

Digital image processing is the use of computer algorithms to perform image processing on digital images. As a subcategory or field of digital signal processing, digital image processing has many advantages over analog image processing. It allows a much wider range of algorithms to be applied to the input data and can avoid problems such as the build-up of noise and signal distortion during processing. Since images are defined over two dimensions (perhaps more)

digital image processing may be modeled in the form of multidimensional systems.

Many of the techniques of digital image processing, or digital picture processing as it often was called, were developed in the 1960. The cost of processing was fairly high, however, with the computing equipment of that era. That changed in the 1970s, when digital image processing proliferated as cheaper computers and dedicated hardware became available. Images then could be processed in real time, for some dedicated problems such as television standards conversion. As general-purpose computers became faster, they started to take over the role of dedicated hardware for all but the most specialized and computer-intensive operations.

With the fast computers and signal processors available in the 2000s, digital image processing has become the most common form of image processing and generally, is used because it is not only the most versatile method, but also the cheapest.

Digital Processing techniques help in manipulation of the digital images by using computers. As raw data from imaging sensors from satellite platform contains deficiencies. To get over such flaws and to get originality of information, it has to undergo various phases of processing. The three general phases that all types of data have to undergo while using digital technique are Pre- processing, enhancement and display, information extraction.

Applications of Image processing

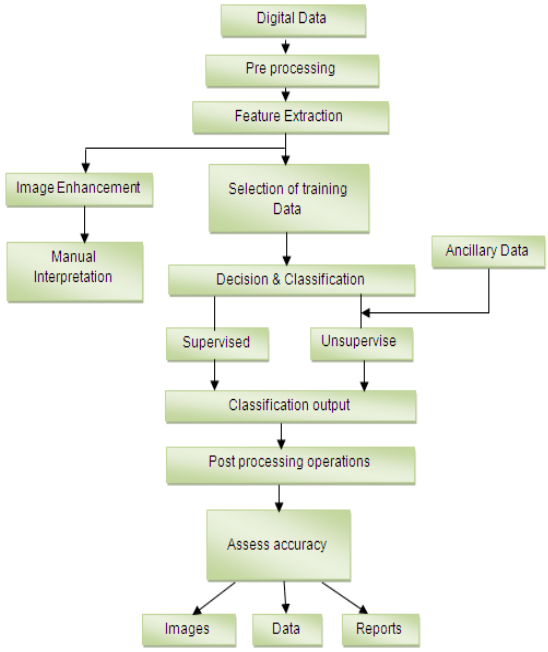
- Remote sensing
- Medical imaging
- Forensic Studies Textiles
- Material science
- Military
- Film industry
- Document Processing

The common steps in image processing are image storing, scanning, enhancing and interpretation. The following Figure 1.1 shows image processing.

Figure 1.1 Image Processing

In the above Figure, an image has been captured by a camera and has been sent to a digital system to remove all the other details, and just focus on the water drop by zooming it in such a way that the quality of the image remains the same.

III. SYSTEM ARCHITECTURE AND SYSTEM COMPONENTS



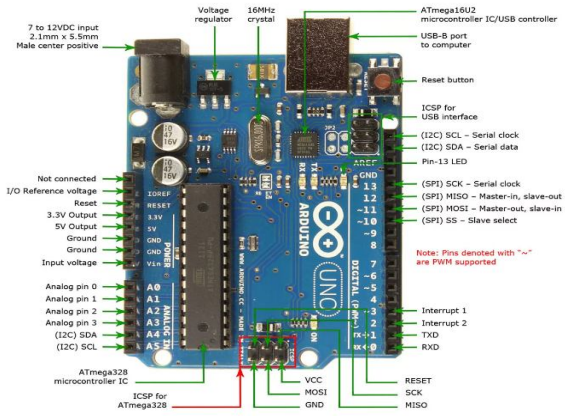
System components

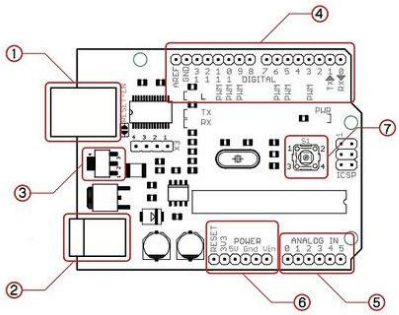
3.1 Arduino Uno

The Arduino Uno R3 is a microcontroller board based on the ATmega328. It has 14 digital input/output pins (of which 6 can be used as PWM outputs), 6 analog inputs, a 16 MHz crystal oscillator, a USB connection, a power jack, an ICSP header, and a reset button. It contains everything needed to support the microcontroller; simply connect it to a computer with a USB cable or power it with a AC-to-DC adapter or battery to get started.

The Uno differs from all preceding boards in that it does not use the FTDI USB-to-serial driver chip. Instead, it features the Atmega16U2(Atmega8U2 up to version R2) programmed as a USB-to-serial converter.

Revision 2 of the Uno board (A000046) has a resistor pulling the 8U2 HWB line to ground, making it easier to put into DFU mode.





The most important parts on the Arduino board high lighted in red:

1: USB connector
2: Power connector
3: Automatic power switch
4: Digital pins
5: Analog pins
6: Power pins
7: Reset switch

Revision 3 of the board (A000066) has the following new features:

- 1.0 pin out: added SDA and SCL pins that are near to the AREF pin and two other new pins placed near to the RESET pin, the IOREF that allow the shields to adapt to the voltage provided from the board. In future, shields will be compatible with both the board that uses the AVR, which operates with 5V and with the Arduino Due that operates with 3.3V. The second one is a not connected pin, that is reserved for future purposes.
- Stronger RESET circuit.
- Atmega 16U2 replace the 8U2.

3.2 Wife Camera

This chapter presents a high –level overview of image formation in a digital camera, highlighting aspects of potential interest in forensic application. The discussion here focuses on image processing, especially processing steps related to concealing artifacts caused by camera hardware that tend to create artifacts themselves. Image storage format issues are also discussed.

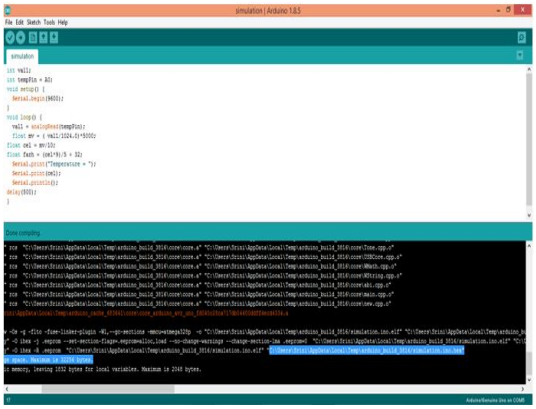
3.3 Servo Motor

A servomotor is a rotary actuator or linear actuator that allows for precise control of angular or linear position,velocity and acceleration. It consist of a sutable motor coupled to a sensor for position feedback. It also requires a relatively sophisticated controller, often a dedicated module designed specifically for use with servomotor

IV. MODULES

4.1 Arduino Modules

The arduino modules is used to detected the fire are occurred or not in the mall. The arduino application is used to display the temperature increasing or decreasing. The Arduino microcontroller is an easy to use yet power full single board computer has gained considerable tracking the temperature. It is develop to low cost hardware for interaction design. In arduino are connected with adaptor to give a power supply. It will be displaying the value of the temperature. In this application to verify the code and then uploading the code. The coding is dumb into the arduino kit.



4.2 MATLAB Module

A MATLAB "function" is a MATLAB program that performs a sequence of operations specified in a text file (called an m-file because it must be saved with a file extension of *.m). A function accepts one or more MATLAB variables as inputs, operates on them in some way, and then returns one or more MATLAB variables as outputs and may also generate plots, etc.

Some functions are

Imread() – Reading the image from the graphics file.

A = imread(filename, *fmt*) reads a grayscale or color image from the file specified by the stringfilename. If the file is not in the current folder, or in a folder on the MATLAB path, specify the full pathname.

The text string *fmt* specifies the format of the file by its standard file extension. For example, specify'gif' for Graphics Interchange Format files. To see a list of supported formats, with their file extensions, use the imformats function. If imread cannot find a file named filename, it looks for a file named filename.fmt.

The return value A is an array containing the image data. If the file contains a grayscale image, A is an M-by-N array. If the file contains a truecolor image, A is an M-by-N-by-3 array. For TIFF files containing color images that use the CMYK color space, A is an M-by-N-by-4 array. The class of A depends on the bits-per-sample of the image data, rounded to the next byte boundary. For example, imread returns 24-bit color data as an array of uint8 data because the sample size for each color component is 8 bits.

[X, map] = imread(...) reads the indexed image in filename into X and its associated colormap into map. Colormap values in the image file are automatically rescaled into the range [0,1].

Image- write image to graphics file

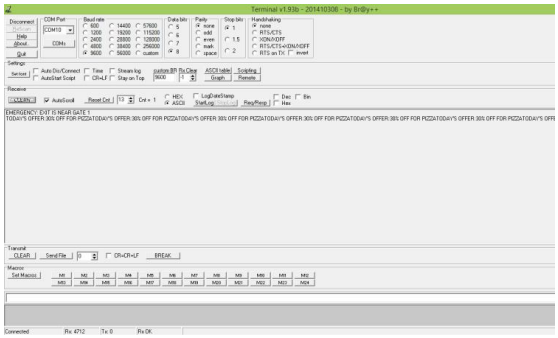
imwrite(A,filename,*fmt*) writes the image A to the file specified by filename in the format specified by *fmt.*

A can be an M-by-N (grayscale image) or M-by-N-by-3 (truecolor image) array, but it cannot be an empty array. For TIFF files, A can be an M-by-N-by-4 array containing color data that uses the CMYK color space. For GIF files, A can be an M-by-N-by-1-by-P array containing grayscale or indexed images — RGB images are not supported. For information about the class of the input array and the output image. filename is a string that specifies the name of the output file. fmt can be any of the text strings listed. This list of supported formats is determined by the MATLAB image file format registry. See imformats for more information about this registry. imwrite(X,map,filename,*fmt*) writes the indexed image in X and its associated colormap map tofilename in the format specified by *fmt.* If X is of class uint8 or uint16, imwrite writes the actual values in the array to the file. If X is of class double, imwrite offsets the values in the array before writing, using uint8(X–1). map must be a valid MATLAB colormap. Note that most image file formats do not support colormaps with more than 256 entries. When writing multiframe GIF images, X should be an 4-dimensional M-by-N-by-1-by-P array, where P is the number of frames to write. imwrite(...,filename) writes the image to filename, inferring the format to use from the filename's extension. imwrite(...,Param1,Val1,Param2,Val2...) specifies parameters that control various characteristics of the output file for HDF, JPEG, PBM, PGM, PNG, PPM, and TIFF files. For example, if you are writing a JPEG file, you can specify the quality of the output image. For the lists of parameters available for each format.

MATL

4.3 Terminal module

The terminal module is used to display the personnel computer and advertisement screen. The Zigbee competent are attached to the battery to given the power supply. The port is connected to the pc. The Zigbee components are receiving message from the Zigbee transmitter. In terminal we can uses COM port 10. Normally the mall screen to display the advertisement if fire is occurred, it automatically the emergency message send to the mall screen and mall admin.



V. CONCLUSION

This work presents an automatic visual inspection system using image processing technique to check the consistency of the color chocolate meeting the exact requirements of the manufacturer. The conventional camera used in the proposed system for setting up the initial process has a low frame rate of 30 frames/sec. This frame size is suitable for a line speed of 20 meter/min. But when the line speed is high, a high-end camera has to be used, which incurs a significant cost for the hardware setup. But the fact is that the main goal of this proposed system is to detect and identify the exact color of the insulated wires and also to find out whether the RGB to RAL Color codes stored in database matches effectively and accurately. Generally this can be achieved at the initial stages itself with the production line running at low speed (Say 20 meter/min).Initially, for inspection purpose, the production can be carried out at low speed. But, once the exact color match is achieved, the line speed can be increased resulting in a mass selections of chocolates. This will greatly reduce the errors occurring due to vibrations in the host machine. Since the proposed work performs well in the low speed production line, there is no necessity to use a high-end camera, which significantly increases the cost incurred for the hardware setup.

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