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Virtual Switch Using Image Processing

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ABSTRACT

This paper presents a generalized framework for virtual switch based on image retrieval.
For designing, a white wall is selected and snap shouted. The image is processed to note down RGB values. The image is divided into two equal halves. Whenever the top part is touched, the switch will be set to OFF state and whenever the bottom portion of the wall is tapped, the switch gets ON just like a normal switch which we use for household purposes .This image is recorded or saved. Whenever you tap the wall, the camera which is arranged will snapshot the image and compares the present image with the recorded image. If the tapping is observed on top, the switch will be OFF and if on the bottom, the switch gets ON. For making the switch ON or OFF and for processing of image, a MATLAB code is written and executed. This virtual switch has many practical applications. Whenever you are in hurry and find no time to switch OFF the fans and lights of your home or any machine in your factory, don't worry. Leave them as it is, come and sit in your car and just use this switch for switching them OFF.

KEYWORDS Virtual switch Digital image processing Home automation RGB color space Image conversion Pixel reading Image retrieval.

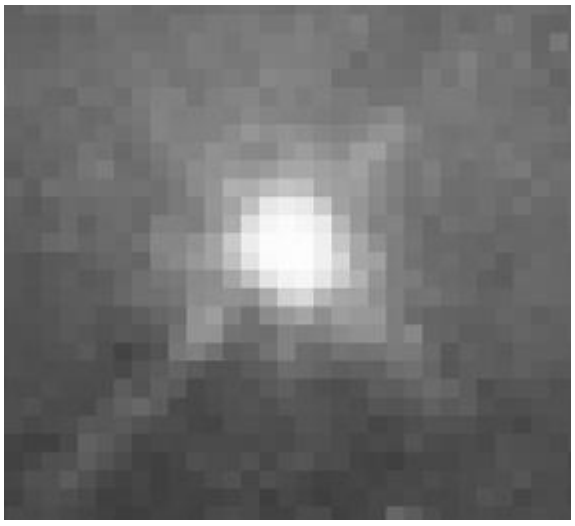
INRTODUCTION

Nothing is impossible in the present world. Everything is automated now a day. We are in the generation of where human beings are replaced by robots. Every need of

us is just a click away from us. One of the most important advancements in the field of technology and science is image processing. An image is an array, or a matrix, of square pixels (picture elements) arranged in columns and rows.. In this context, I would like to use image processing for designing a virtual switch. This concept of image processing and virtual usage of things is the core idea behind sixth sense technology. Virtual switch is nothing but a switch which is invisible or virtual. You can design this switch anywhere on your palm, on your wall, or even on a floor. I will design this virtual switch on a white wall. There are many image processing softwares like Khoros, Microsoft vision SDL library, MATLAB, CVIP tools (Computer Vision and Image Processing tools), Intel open computer vision library etc. we can use any of the image processing software's for this application of virtual switch. We can write a program for performing the action of virtual switching using image processing software. Here I use Matlab for this purpose. There should be an aid for capturing the image. We can use the webcam for this purpose. In order to interpret the switching action we command the image processing software to do some sequence of operations. At first, the image of the region at which we desire the switching action is to be captured. The first operation on the image by the processing software should be, its conversion into RGB color spacing. The next operation should be , converting the specified ranges of RGB color spacing to equivalent number of white and black pixels. To do this operation, at first we specify the limits of rgb color ranges for which below a specified range all the image components should convert into black and rest into white. This is the key step for the idea of using the concept of virtual switch using image processing.

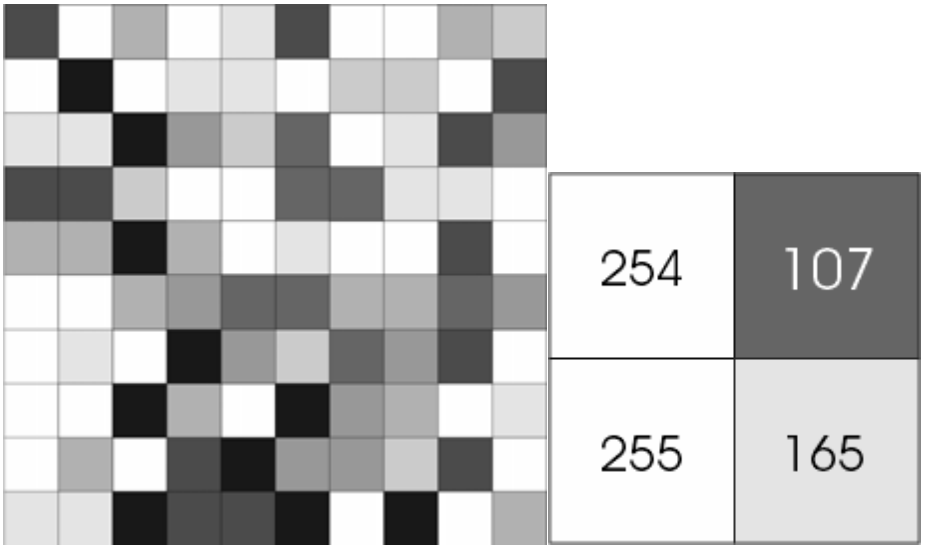
IMAGE DESCRIPTION :

A picture is a show, or a framework, of square pixels (picture components) organized in segments and lines.



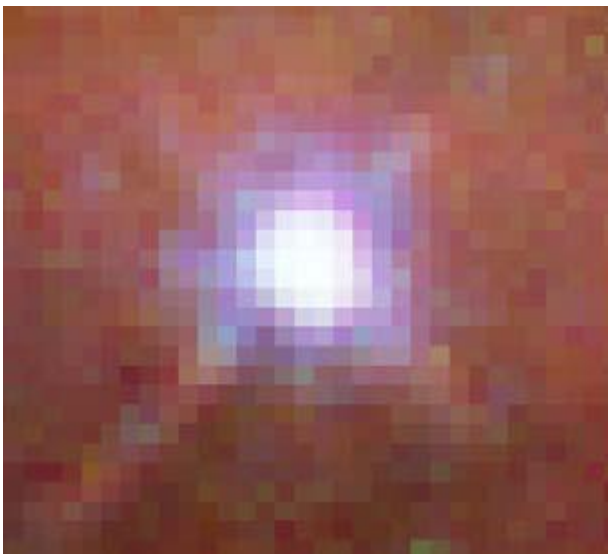
an array or a matrix of pixels arranged in columns and rows

For a (8-bit) light black scale picture each one picture component has an appointed power that ranges from 0 to 255. An ash scale picture is the thing that individuals typically call a high contrast picture, yet the name underscores that such a picture will likewise incorporate numerous shades of ash.



Each pixel has a value starting from 0 (black) to 255 (white). The possible range of the pixel values depend on the color depth of an image, here 8 bit is equal to 256 tones or grey scales.

A normal grey scale image has eight bit color depth that is equal to 256 grey scales. A "true color" image has 24 bit color depth = 8 x 8 x 8 bits = 256 x 256 x 256 colors that is approximately equal to 16 million colors.



A genuine nature picture transforms from three ash scale pictures hued as red, green and blue, such kind of picture may contain up to 16 million separate colors. . Some of grey scale images have more number of grey scales, for instance 16bit is equal to 65536 grey scales. In principle three grey scale images can be combined to form an image with 281,474,976,710,656grey scales.

In picture transforming by and large there are two gatherings of 'pictures': vector design (or line workmanship) and bitmaps (pixel-based or 'pictures'). The most widely recognized record organizations are:

GIGIF — an eight bit (256 color), non-destructively compressed bitmap format is mostly used for web and it has several sub-standards one of the technique is animated GIF.

JPEG is a very efficient destructively compressed 24 bit i.e 16 million colors bitmap position. Broadly utilized, particularly for web and Internet.

TIFF is a standard 24 bit production bitmap position. Clamps the non-damagingly with, for example, Lempel-Ziv-Welch (LZW) layering.

PS is a Postscript for a standard vector position. What's more it has a various sub-measures and can be hard to the vehicle crosswise over stages and working frameworks.

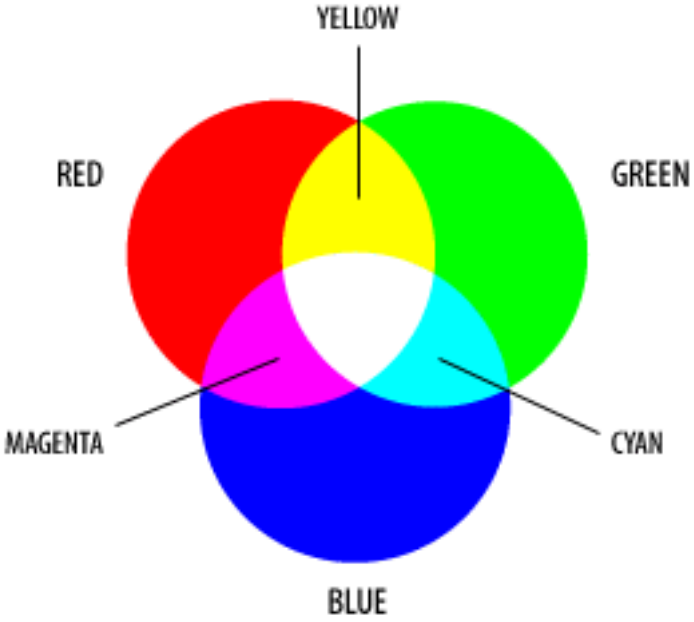
PSD is a devoted Photoshop organize that will keeps the data in a picture including all the layers.

RGB

The RGB color model is for perceiving th color of red ,green and blue receptors in our retina . RGB uses for additive color mixing and it is the basic color model used in television or any other medium that projects color with light. RGB color model is utilized as a part of machines and for web representation, yet it can't be utilized for print creation.

The auxiliary colors of RGB are cyan, maroon, and yellow and these are structured by blending two of the essential shades i.e red, green or blue by barring the third shade. Red and green shades are consolidate to make yellow, green and blue colors to make cyan, and blue and red colors for red. The combo of red, green, and blue in full makes white.

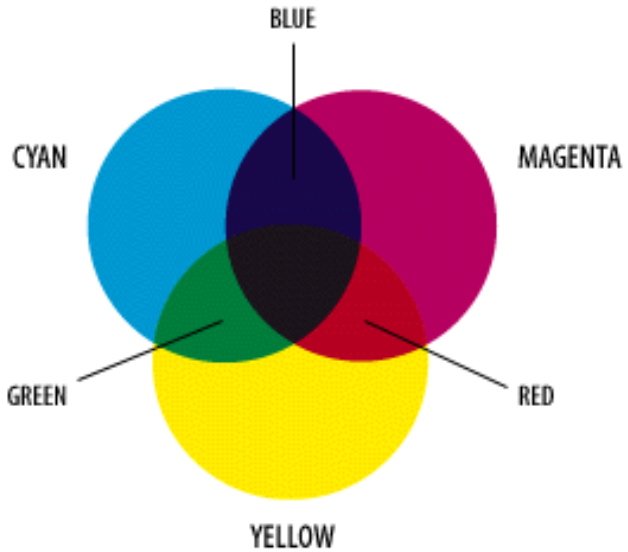
In Photoshop utilizing the "screen" mode for diverse layers in a picture will make intensities combine as indicated by the added substance shade blending model. This is undifferentiated from stacking slide pictures on top of one another and sparkling light through them.



The added substance model of RGB Red, green, and blue are the essential boosts for human color observation and are the essential added substance colors.

CMYK

The 4-color CMYK model used in printing lays down overlapping layers of varying percentages of transparent cyan (C), magenta (M) and yellow (Y) inks Notwithstanding that a dark (K) ink can be included. The CMYK model uses the subtractive shade model.



The colors created by the subtractive model of CMYK don't look exactly like the colors created in the additive model of RGB Most importantly, CMYK cannot reproduce the brightness of RGB colors. In addition, the CMYK gamut is much smaller than the RGB gamut.

INTERPRETING THE SWITCHING ACTION

First, select the regions for which the switching action is to be done. Divide the region into two parts for which top portion is used for OFF action of the switch and bottom portion is used for ON action of the switch. The camera captures this image first. Then we instruct the image processing software to convert it to RGB color spacing format. After this conversion, specified ranges of RGB will convert into white or black pixels which depends upon the choice of an individual. If there is an obstacle in the region selected, the camera will capture the image at that particular instant of time. Then as per given limits of RGB color spacing, some portions of the image gets converted into white and remaining into black.

The converted image which is having the pixel components in white and black is then sampled into many blocks say six. We instruct the image processing software to calculate the centroid of the white pixels if we assume that the converted white pixels are of an obstacle. If the centroid is in the region where we assume the switching ON action, then the switch is ON , If the centroid is in the region where we assume the switching OFF action, then the switch is OFF. Here the obstacle may be our hand while switching on or off .

If we interface the image processing software which is programmed with the above sequence of operations to external devices like tube lights, fans and any other power devices.

We call this also as the home automation, where all the house hold electrical components like television, air conditioner, fan, grinder etc can be switched on at a time using this concept of a virtual switch.

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