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REAL TIME COLOR RECOGNITION

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Abstract: This paper proposes new real time color recognition features, i.e., extracting primary colors for the purpose of vision-based human–computer interaction. Vision-based human–computer interaction could be achieved by analyzing segmented primary color regions. However, one of the challenges of color-based target tracking is that color distributions would change in different lighting conditions. This paper presents our investigation of color-based image segmentation, non-stationary color-based target tracking, color based mouse pointer, color based virtual music instruments, and color based virtual calculator. Our experiments show that Red, green and blue are the default color used for recognition process. Live video is captured from camera and the video is converted into number of frame images. This algorithm should monitor and process the every frame from the live video. Microphone and camera is used as an input devices. Here image processing is done through MATLAB for color recognition process.

Keywords: human computer interaction, color recognition, color segmentation, real time video.

I. INTRODUCTION

Many real world applications require real-time image processing like motion detection and color recognition. Performance of a motion detection and color recognition system should be fast enough so that moving objects in video can be detected and processed in real time. Once motion region in a video is detected, object tracking, image data mining, semantic meaning extraction, and other video and image processing techniques can be performed. Color recognition has received a significant interest computer vision due to the wide range of applications including video surveillance, biometric identification, and face indexing in multimedia contents. Due to a real time process it gets an input as a number of frames and processing it simultaneously. In this color recognition process primary colors are segmented from the input RGB frame. Then each segmented colors are identified by its own pixel. Therefore the real time color recognition has two major processes. Which is given below.

- Color segmentation
- Color recognition

II. COLOR SEGMENTATION

The color targets were designed with a distinctive combination of colors arranged in a particular configuration. A series of simple and very rapid tests performed on an input image will quickly detect and localize the color target. The tests exploit invariants based on color gradients that we have derived empirically under a variety of indoor and outdoor lighting conditions for our color pattern. While the precise color gradients among the three color patches vary depending on illumination and noise, some aspects of the gradient are highly predictable and create a nearly unique signature of the target. Four sequential color gradient tests suffice to rule out all but a small fraction of the image pixels that do not lie on a color target. These tests are based on the following gradient components: the red channel gradient component across the red-green and red-blue boundaries and the green channel gradient component across the red-green and green-blue boundaries. The gradients are estimated by computing differences in RGB channels between nearby pixels. Color boundaries between adjacent regions are rarely sharp in real images because of effects such as color bleeding, motion blur and pixel interpolation. So we calculate these gradient differences across a distance of several pixels rather than between neighboring pixels. We choose this distance to be as large as possible, consistent with the requirement that the samples used to compute the gradients all fit within the target region. (The minimum scale of the target in the image -- which is inversely proportional to the maximum distance it can be resolved from the camera thus determines the maximum allowable distance between samples.)

A. Block Diagram

The block diagram represents the segmentation of primary colors from a real time video input. At initial camera device is acting as input device, it gives input to our algorithm. It contains multiple numbers of color images in motion. It gives the multiple color frame into the given process and the primary colors are segmented.

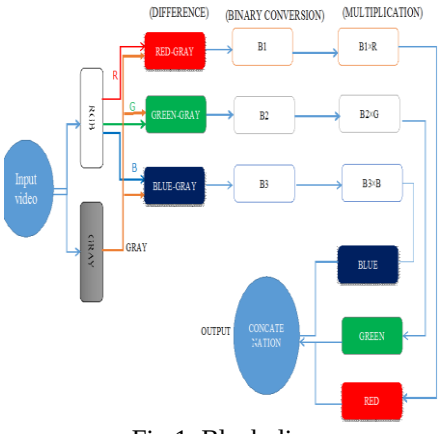

Fig.1. Block diagram

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B. Gray Conversion

It is the process of conversion from color images into gray scale image. Color image contains 24 bits per pixel; it is reduced into 8 bits per pixel. Most commonly gray levels represent the interval number of quantization in gray scale image processing. At present, the most commonly used storage method is 8-bit storage. There are 256 gray levels in an 8 bit gray scale image, and the intensity of each pixel can have from 0 to 255.

C. Subtraction

The RGB image contains 24 bits, each of three colours having 8 bits per pixel. At parallel RGB is splitting into each 8 bit colours. The colour subtraction is the process of subtracting the colour values between the two colours. Here each three colours are subtracted with the gray image which converted from the original RGB image.

D. Binary Conversion

Binary conversion is the process of converting any kind of image into a binary image. Basically binary image two bits image, it contains only 0 and 1. Here 1 will be represented as white and 0 will be represented as black. Hence it's called as black and white image. The purpose of conversion is to count the white and black pixels in the image. Each separated colour is converted as white and other colours are converted as black.

E. Multiplication

Image multiplication is the process of multiplication of pixel values between two or more images; here this process is used to multiply binary images with splitted color images. At the end of this process we can get each primary colors that having above 300 pixels. The area contains below 300 pixels does not considered as color. After the multiplication this process having three segmented colors that having 300 pixels. By combining these three colors we can get the segmented color image that contains only primary colors. From the given process the RGB color space can be segmented like following diagram.

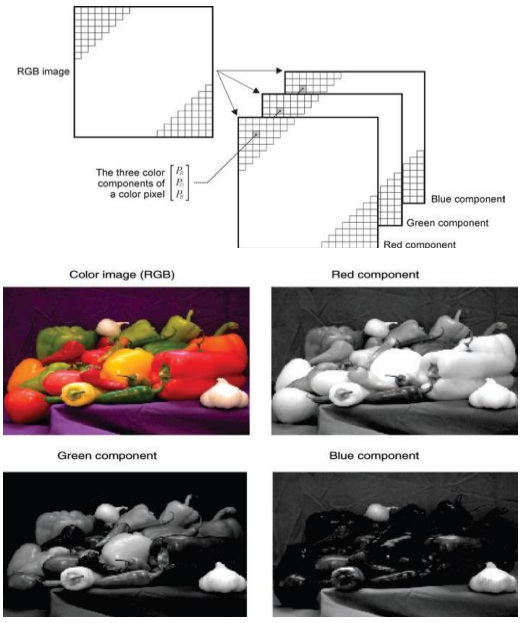

Fig.2. Segmentation

III. COLOR RECOGNITION

Color recognition is the process of segmenting the colors and identifying the segmented colors. It is the one of the human to computer interaction. Here the colors are acting as interface between human and computer. At initial primary color modal is used for a recognition process, it only recognizing primary colors In the every color images, primary colors are segmented and segmented colors are recognized to identify its name like red, green, blue. It gives the recognized color as a output by using two ways, that is printing text on the output screen and playing audio(.wav) files which having the names of the primary colors. The pixels of every three colors are counted after segmented it. Whenever it gets above 300 pixels of these three colors (RGB) it should recognizes that the given colors are found. That we set that below 300 pixels are not any object found there. It may be a diffraction from light. So that it should not consider the colors below 300 pixels of the primary colors. Also the other colors are also neglected. These are the core process of color recognition. In the real time process, real time signals are processed by certain algorithms, for this project real time input signal is continuous motion of image signal i.e., video signal. It does not have any finite duration, algorithm monitoring for every frame and processing by the given algorithm.

The given process shows input and processed window. The input window has live video from the camera object and the processed window has recognized colours as a output.

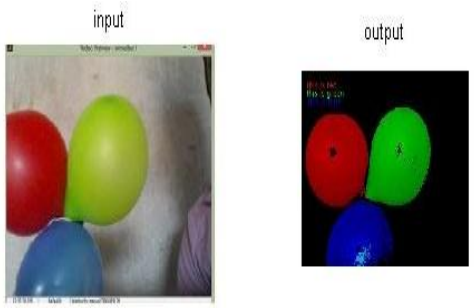

Fig.3. Result

IV. CONCLUTION

Computer vision techniques provide promising ways to human–computer interaction through understanding primary colors from visual data. An important step to achieve this goal is the robust and accurate segmentation of primary colors. However, cluttered backgrounds, unknown lighting conditions and multiple moving objects make this tasks challenging. This paper mainly concentrated on color-based image segmentation and vision based color recognition by addressing these difficulties.

V. FUTURE WORK

We can create a GUI software for these applications and can interface that GUI with an external camera which will be mounted on a Robot, and can be able to grab the video and the further processing of the video will take place with the help of the developed GUI . Then this Robot can be used for spying purpose as an Autonomous Robot.

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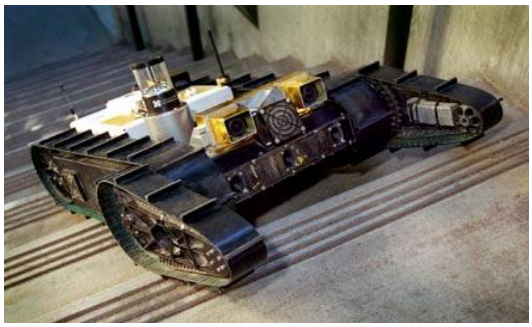

Fig.4. Result

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