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TRACKING AND AUTOMATION OF IMAGES BY COLOUR BASED PROCESSING

N Alekhya [1], K Venkanna Naidu [2] and M.SunilKumar[3]

[1]*PG student, D.N.R College of Engineering, ECE, JNTUK, INDIA*

[2] *Associate Professor D.N.R College of Engineering, ECE, JNTUK, INDIA*

[3]*Assistant Professor Sir CRR College of Engineering , EEE, JNTUK, INDIA*

[1]alekhyanakka467@gmail.com, [2]kvnaidu.gagan@gmail.com ,[3]msunil.534@gmail.com

***Abstract*— Now a day all application sectors are moving for the automation processing and sensing . for example image processing in medical field ,in industrial process lines , object detection and Ranging application, satellite imaging Processing ,Military imaging etc, In each and every application area the raw images are to be captured and to be processed for human visual inspection or digital image processing systems. Automation applications In this proposed system the video is converted into frames and then it is get divided into sub bands and then background is get subtracted, then the object is get identified and then it is tracked in the framed from the video .This work presents a technique for automating the methodology of detecting and tracking objects utilizing color feature and motion. Video Tracking is the methodology of finding a moving object over the long distance using a camera. The main aim of video tracking is to relate target objects in consecutive video frames.**

***Keywords*— Hue Saturation –Intensity, Hue Saturation Value, Cyan Magenta Yellow Black, Gaussian Mixture Model**

1. INTRODUCTION

Image processing is any form of signal processing for which the input is an image, Such as a photograph or video frame; the output of image processing may be moreover an image or a set of uniqueness or parameters linked to the image. The majority image processing system involves treating the image as a two-dimensional signal and be appropriate standard signal-processing modus operandi to it.Image processing usually refers to digital image processing, but optical and analog

Image processing also is possible. This critique is about general modus operandi that apply to all of them. The acquisition of images (fabricate the input image in the first place) is referred to as imaging. In every research area, they analyze the problem, mostly image analysis involves maneuver the image data to conclude exactly the information compulsory to help to answer a computer imaging problem.

Digital image processing methods stems from two principal application areas: improvement of pictorial information for human interpretation, and processing of image data for tasks such as storage, transmission, and extraction of pictorial information

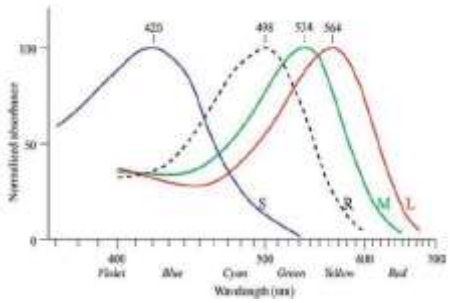
The remaining paper is structured as follows. Section 2 deals with the existing method of Image Processing. Section 3 deals with the proposed method of Image Processing. Section 4 deals the results and discussions. Finally, section 5 concludes the work done.

2. EXISTING METHODS OF IMAGE PROCESSING

A The perception of color starts with a chromatic light source, capable of emitting electromagnetic radiation with wavelengths between approximately 400 and 700 nm. Part of that radiation reflects on the surfaces of the objects in a scene and the resulting reflected light reaches the human eye, giving rise to the sensation of color. An object that reflects light almost equally in all wavelengths within the visible spectrum is perceived as white, whereas an object that absorbs most of the incoming light, regardless of the wavelength, is seen as black. The perception of several shades of gray between pure white and pure black is usually referred to as achromatic.

Objects that have more selective properties are considered chromatic, and the range of the spectrum that they reflect is often associated with a color name. For example, an object that absorbs most of the energy within the 565–590 nm wavelength range is considered yellow. A chromatic light source can be described by three basic quantities:

• Intensity (or Radiance): the total amount of energy that flows from the light Source, measured in watts (W).



Types of Color Models:

Some widely used color models are

1. RGB Color Model.
2. CMYK Color Model.
3. YUV Color Model.
4. YCbCr and YCCK Color Models.
5. PhotoYCC Color Model.
6. YCoCg Color Model.
7. HSV and HSL Color Models.
8. CIE XYZ Color Model.
9. CIE LUV and CIE Lab Color Models.

Two very popular models used in color image processing:

– RGB (Red Green Blue)

– HSV and HSL (Hue Saturation Value/Lightness)

RGB Color Model: The RGB color model is an additive color model in which red, green, and blue light are added together in various ways to reproduce a broad array of colors. The name of the model comes from the initials of the three additive primary colors, red, green, and blue The main purpose of the RGB color model is for the sensing, representation, and display of images in electronic systems, such as televisions and computers, though it has also been used in conventional photography. Before the electronic age, the RGB color model already had a solid theory behind it, based on human perception of colors.

The model is based on a Cartesian coordinate system

– RGB values are at 3 corners.
– Cyan magenta and yellow are at three other corners.
– Black is at the origin.
– White is the corner furthest from the origin.

– Different colors are points on or inside the cube represented by RGB vectors.

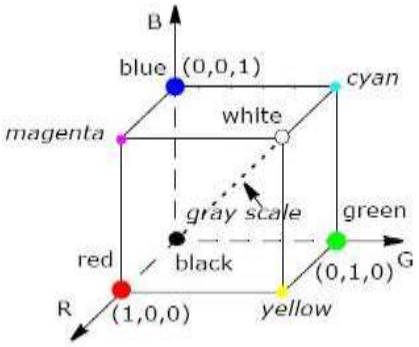


Fig: Cartesian RGB Cube

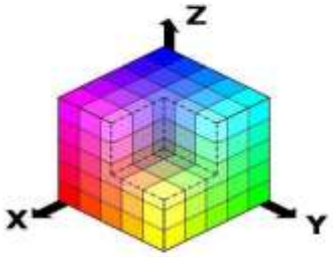


Fig : RGB Color cube

Images represented in the RGB color model consist of three component images one for each primary color. When fed into a monitor these images are combined to create a composite color image. The number of bits used to represent each pixel is referred to as the color depth. The axes of the RGB color model is represented by the three primary colors of light (R, G, and B), usually normalized to the range [0, 1]. The eight vertices of the resulting cube correspond to the three primary

Colors of light, the three secondary colors, pure white and pure black. The table below shows the R, G, and B values for each of these eight vertices.RGB color coordinates are often represented in hexadecimal notation, with individual components varying from 00 (decimal 0) to FF (decimal 255). For example, a pure (100% saturated) red would be denoted FF0000, whereas a slightly desaturated yellow could be written as CCCC33. The number of discrete values of R, G, and B is a function of the pixel depth, Defined as

the number of bits used to represent each pixel: a typical value is 24 bits = 3 image planes × 8 bits per plane. The resulting cube with more than 16 million possible color combinations.

Color Name	R	G	B
Black	0	0	0
Blue	0	0	1
Green	0	1	0
Cyan	0	1	1
Red	1	0	0
Magenta	1	0	1
Yellow	1	1	0
White	1	1	1

Table:3.1 R, G, and B Values for Eight Representative Colors Corresponding to the Vertices of the RBG Cube

HSV and HSL COLOR MODEL :

HSL and HSV are the two most common Cylindrical-coordinate representations of points in an RGB color model. The two representations rearrange the geometry of RGB in an attempt to be more intuitive and perceptually relevant than the artesian (cube) representation. Developed in the 1970s for computer graphics applications, HSL and HSV are used today in color pickers, in image editing software, and less commonly in image analysis and computer vision.

HSL stands for hue, saturation, and lightness, and is often also called HLS. HSV stands for hue, saturation, and value, and is also often called HSB (B for brightness). A third model, common in computer vision applications, is HSI, for hue, saturation, and intensity. However, while typically consistent, these definitions are not standardized, and any of these abbreviations might be used for any of these three or several other related cylindrical models.

In each cylinder, the angle around the central vertical axis corresponds to "hue", the distance from the axis corresponds to "saturation", and the distance along the axis corresponds to "lightness", "value" or "brightness". Note that while "hue" in HSL and HSV refers to the same attribute, their definitions of "saturation" differ dramatically. Because HSL and HSV are simple transformations of device-dependent RGB models, the physical colors they define depend on the colors of the red, green, and blue primaries of the device or of the particular RGB space, and on the gamma correction used to represent the amounts of those primaries. Each unique RGB device, therefore, has unique HSL and HSV spaces to accompany it,

and numerical HSL or HSV values describe a different color for each basis RGB space.

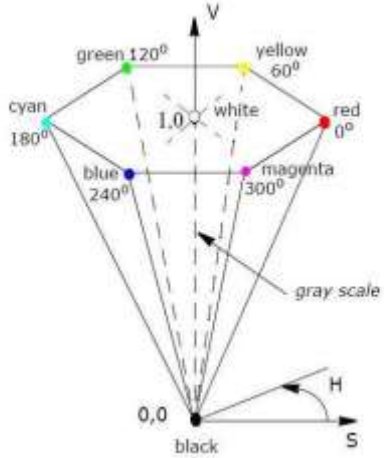


Fig:3.5 HSL Model

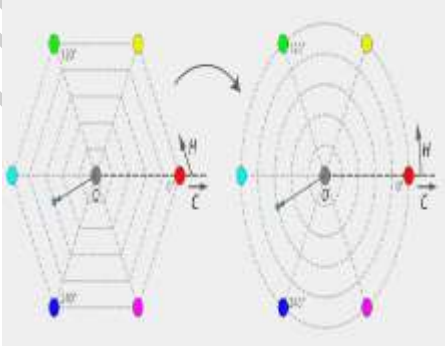


Fig HSV Model

The HSV (sometimes called HSB) color model can be obtained by looking at the RGB color cube along its main diagonal (or gray axis), which results in a hexagon shaped color palette. As we move along the main axis in the pyramid in the hexagon gets smaller, corresponding to decreasing values of V, from 1 (white) to 0 (black). For any hexagon, the three primary and the three secondary colors of light are represented in its vertices. Hue, therefore, is specified as an angle relative to the origin (the red axis by convention). Finally, saturation is specified by the distance to the axis: the longer the distance, the more saturated the color.__ shows an alternative representation of the HSV color model in which the hex cone is replaced by a cylinder. __ shows yet another equivalent three-dimensional representation for the HSV color model, like a cone with a circular-shaped base. In summary, the main advantages of the HSV color model (and its closely related alternatives) are its

ability to match the human way of describing colors and to allow for independent control over hue, saturation, and intensity (value).

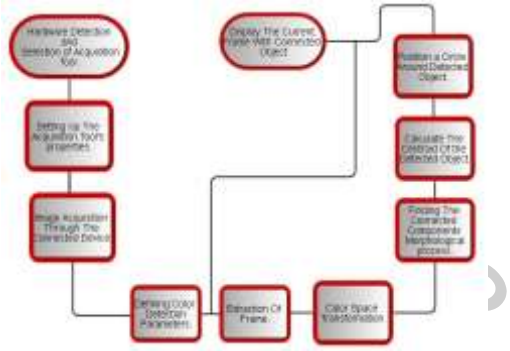
The ability to isolate the intensity component from the other two—which are often collectively called chromaticity components—is a requirement in many color image processing algorithms, Its main disadvantages include the discontinuity in numeric values of hue around red, the computationally expensive conversion to/from RGB, and the fact that hue is undefined for saturation of 0.

The HSV color model describes colors according to their Hue, Saturation, and Value. In some computer graphics programs, it is used as an alternative to the RGB system to quantify colors. In HSV, a hue is a number in the interval [0, 360). A color's hue is its general position on a color wheel, where red is at 0°, green is at 120°, and blue is at 240°. For example, the RGB code of a yellow/orange color has high red and green components and a low blue component, with the red level slightly higher than the green. On the color wheel, the angle of this hue is a little less than 60°. The hue of any neutral color--white, gray, or black--is set at 0°.

3. Proposed image processing method

In this proposed system the video is converted into frames and then it is get divided into sub bands and then background is get subtracted, then the object is get identified and then it is tracked in the framed from the video .This work presents a technique for automating the methodology of detecting and tracking objects utilizing color feature and motion. Video Tracking is the methodology of finding a moving object over the long distance using a camera. The main aim of video tracking is to relate target objects in consecutive video frames. The relationship can be especially troublesome when the objects are moving speedy with respect to the frame rate. An interchange situation that grows the unpredictability of the issue is the time when the tracking object changes orientation after eventually. For these circumstances video tracking frameworks typically utilize a movement model which depicts how the image of the target may change for distinctive conceivable movements of the object. In this paper an mat lab coding file is used to track the real-time moving objects in different frames of a video using color feature and motion.

3.1 Hardware Detection and Selection of Acquisition Tool



Here hardware refers to the webcam or any type of vision device which is compatible with present-day computers for the image acquisition we have to choose the properly installed adaptor and the required vision device. Since mat lab ver. 8.2 (R2020a) is compatible with 4 types of adaptors (a) gentl (b) gige (c) matrox (d) win video we have to select the win video as our adaptor.

Acquisition Tool Properties

we have created a video object video we have to set the properties of video such as frames per trigger, trigger mode, and trigger repetition color space selection and we can modify according to our need.

```
video.FramesPerTrigger = 1;
video.TriggerRepeat = Inf;
triggerconfig(video, 'manual');
video.ReturnedColorspace = 'rgb';
```

Next, we create a video source object name source. The Source property is a vector of video source objects that represent the physical data sources connected to a device. When a video input object is created, the toolbox creates a vector of video source objects associated with the video input object.

Each video source object created is provided a unique source name. You can use the source name to select the desired acquisition source by configuring the Selected Source Name property of the video input object.

A video source object's name is stored in its Source Name property. If a video source object's Source Name is equivalent to the video input object's Selected Source Name, the video source object's selected property has a value of 'on'. Here we have some properties such as white balance, contrast,

saturation, and many more these properties are device-dependent and all device doesn't support this property.

1 Defining Color Detection Parameters

we define the parameters in HSV color space as it is preferred as the accuracy is more. We define the range for the color to be detected where H determines the hue and S determines the saturation and V determine the value.

```
h = [0.1028 0.4627];
s = [0.1373 1.0000];
v = [0.1725 0.8118];
```

5.3.2 Extraction of Frame:

The extraction of the frame is done by first triggering the video source object and storing a single frame in a variable using the function **getdata(obj)**. The while loop controls how long the program will run by counting the no of frames acquired.

Color Space Transformation, and Calculation of the Centroid of the Detected Object.

These three functions are now carried out using a single function so that the program is easily understood and debugged. Here we use a function **detectcolor(frame,h,s,v)**where it takes 4 parameters the captured frame and the hue, saturation, and values and returns the two numbers which are the location of the centroid of color in the axial plane.

Image Acquisition through Connected Device

interpolated 20M pixels still image & 2.1M pixels video resolution

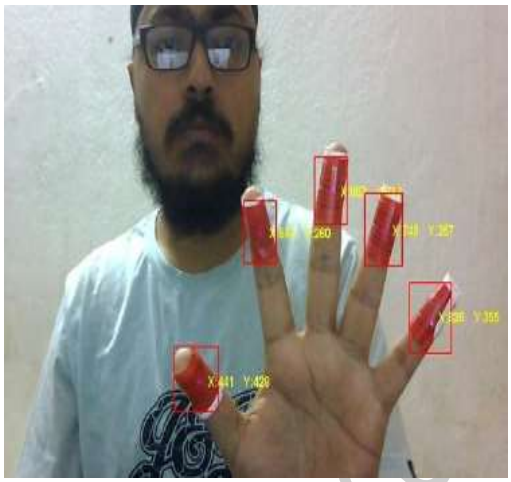


Fig : Object detection and tracking using red color**.**

Fig7.3: Object detection and tracking using red, green and blue color.

Fig.: Motion detection and tracking using back ground subtraction method.

Fig 7.5 Motion detection and tracking using RGB

CONCLUSION

we conclude that Color plays a vitally important role in the world in which we live. Color can sway thinking, change actions, and cause reactions. Colors tend to be the most important part of object detection. Colors can be expressed in many ways and it is the only way that distinct two objects for a computer.

The color-based image processing also plays in artificial intelligence more often it boosts the accuracy of algorithms we also came to know that color can be helpful in system automation and can have numerous applications soon

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