



Using the Matlab App to Detect Objects By Color With Hsv Color Segmentation

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ABSTRACT

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Object detection using computer vision algorithms is a crucial procedure for accurately detecting items in a three-dimensional image. When using the color segmentation method with HSV color, an image segment object in the shape of a blob is created, which the computer can detect. The color sample will provide a value that will be the reference for the filter range in the segmentation process based on the test findings. During the process, the number of objects identified according to the given color will be determined.

Keywords:

Computer Vision,
Detection,
RGB,
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1. Introduction

Data and information cannot be isolated from multimedia in today's technological innovations. Data and information are now offered in a variety of formats, including graphics, audio, and video, in addition to text [1]. Image is one of the components of multimedia that plays a significant role as a source of information. RGB is a color scheme that includes elements of red (red), green (green), and blue (blue) (Blue) [2].

You must first recognize the thing before you can detect color. One sort of image utilized in color segmentation is the HSV (Hue Saturation Value) image [3]. The scope of HSV is separated into three parts: Hue, which indicates color, Saturation, which represents color dominance, and Value, which represents brightness. Segmentation is the separation of sections of an image in order to achieve accurate object recognition results. As a result, based on the detected object, color segmentation using the HSV approach will tend to find colors with a degree of dominance and brightness [4]

Thresholding (threshold value) is a digital image processing limit value. It is a segmentation approach in which the intensity of the image between the background and the main object differs significantly. The threshold is defined as a value barrier between the object and the background [5].

Matlab is a programming language with advantages for technical computing needs and programming interfaces that enable data analysis, algorithm development, and graph computations easier [6]. In the video, the matlab application is used to track the color of an object. The matlab utilized in this paper is Matlab R2016b, which can handle movies better than the previous version of Matlab [7].

The experiment carried out in this study used an example from an existing instance in mathworks and replaced it with an object example from another movie to see if the results accurately tracked the color of the object [8].

2. Method

This research looks at the advantages and applications of the HSV approach. HSV stands for Hue Saturation Value, which denotes the actual colors such as red, violet, and yellow, Saturation, which denotes the level of authenticity of the color, such as indicating how much white color is present, and Value, which denotes the amount of light caught by the eye regardless of color [9].



HSV modeling is a more versatile alternative to RGB modeling. This HSV model is more commonly utilized in computer graphics. Because the HSV color model is developed from the RGB color model, you must first convert the color from RGB to HSV to obtain the HSV color model [10]. HSV is a color-description method based on a combination of color circles. Saturation defines the radius of the color level between dark (center) and white. Hue measures the angle of the red color at 0 degrees, green 120 degrees, and blue 240 degrees (outside). Value, on the other hand, adjusts the brightness level from 0 to 100% [11]. HSV has an advantage over other color spaces in that it can handle light intensity fluctuations.

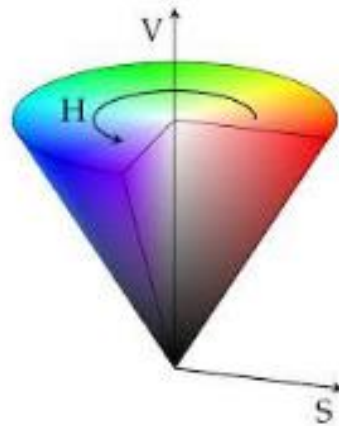


Figure 1. Illustration HSV

Hue, which is represented by a 360° circle in the image, has the purpose of representing color types. Saturation is indicated by a white straight line centered in the middle of the circle, with a number ranging from 0-100 percent. The higher the value, the clearer the apparent color, and vice versa, the lower the value, the brighter the color (brightness). A perpendicular line represents value, which is used to set the hue of darkness and ranges from 0-100 percent. The higher the value, the more perfect the color, and vice versa, the lower the number, the darker the color [12].

To design the system in this research, you'll need a personal computer and matlab software. Then conduct an analysis to determine what is required in the design of HSV color recognition as well as the design of the application's interface. To create a color model in HSV, you must first apply the HSV color value, which comes in ten different colors: red, yellow, green, blue, purple, black, and white [13]. The HSV values of the seven colors are as follows: red has a hue value of 0°, saturation of 100%, and value of 100%.

TABLE 1
HSV COLOR VALUE

No	Color	Hue (°)	Saturation (%)	Value (%)
1	Black	0	0	0
2	White	0	0	100
3	Red	0	100	100
4	Green	120	100	100
5	Blue	240	100	100
6	Yellow	60	100	100
7	Purple	300	100	50

3. Result and Discussion

Based on the procedures taken using the HSV color model, which included evaluating color recognition, building the system interface display, and applying HSV color values to the program. The item will be tracked according to the color entered by the threshold value or threshold of the HSV color by inputting the video.

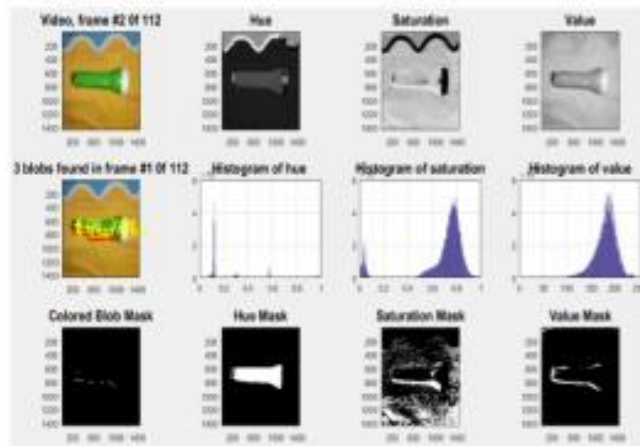


Figure 1. System Interface Appearance

This study was carried out by entering the HSV color threshold value, which will be tracked by the color of the object in the video. We'll trace the green hue to the object, as seen in Figure 3 and below.



Figure 2. Video views to track

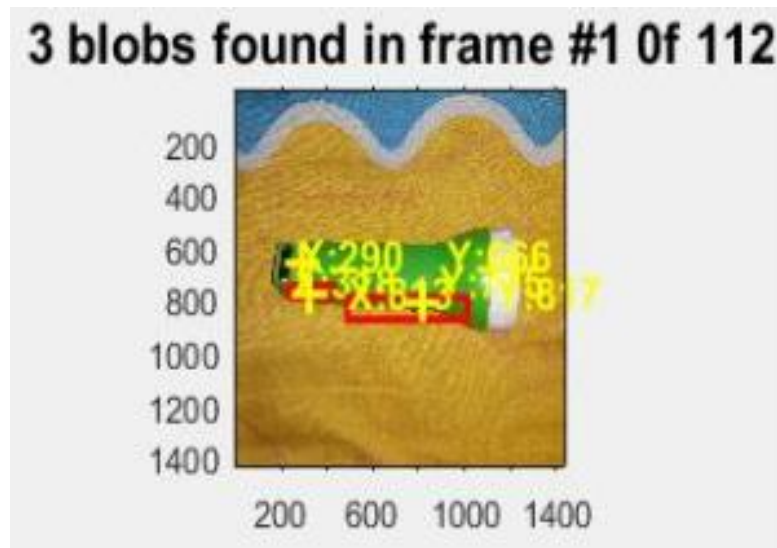


Figure 3. Color Tracking Process Display

The object will be removed from its background during the segmentation process, as seen in Figure 5, where the green object has been successfully tracked and will appear white on the Hue Mask display.

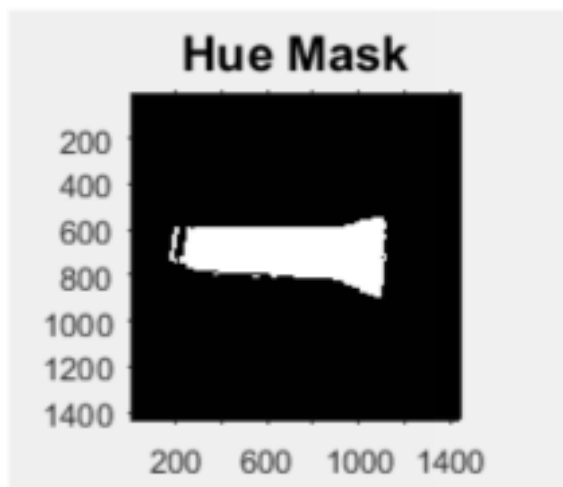


Figure 4. Hue Mask Segmentation Results Display

In Figure 6, the Saturation Mask display contains a lot of noise.

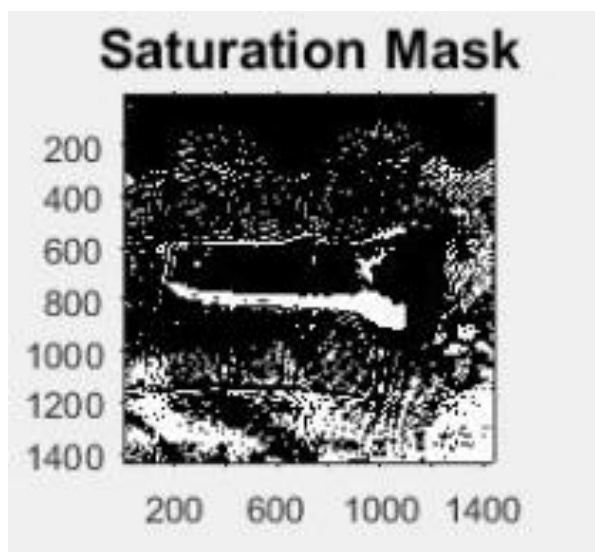


Figure 5. Display the Results of the Saturation Mask Segmentation Process

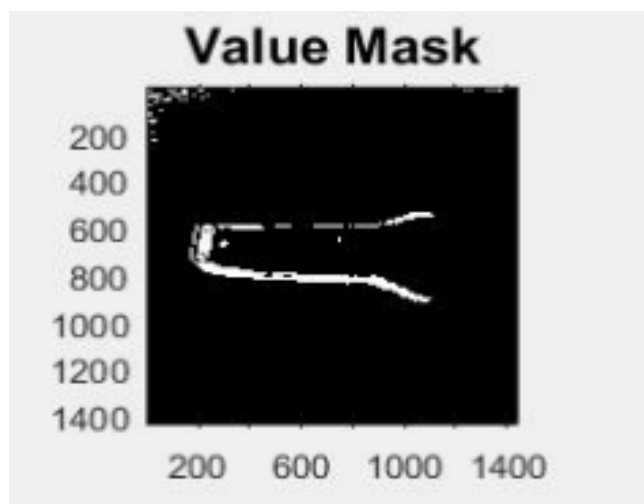


Figure 6. Display of Value Mask Segmentation Process Results

To try to track different colors, you must first change the hsv color threshold value; for example, tracking black will be used to detect objects, as illustrated in Figure 9.

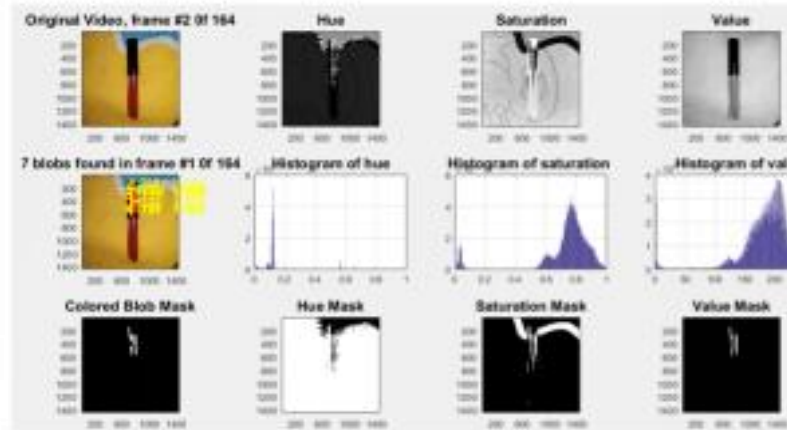


Figure 7. System Interface Display

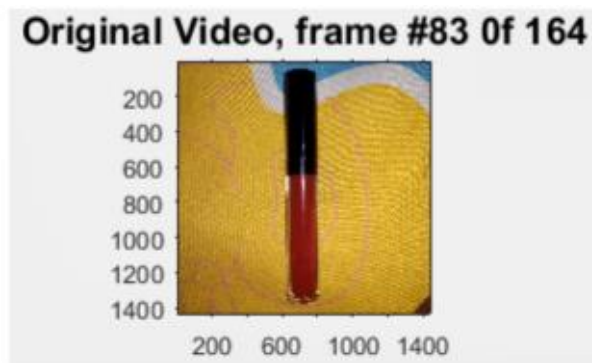


Figure 8. Display of Value Mask Segmentation Process Results

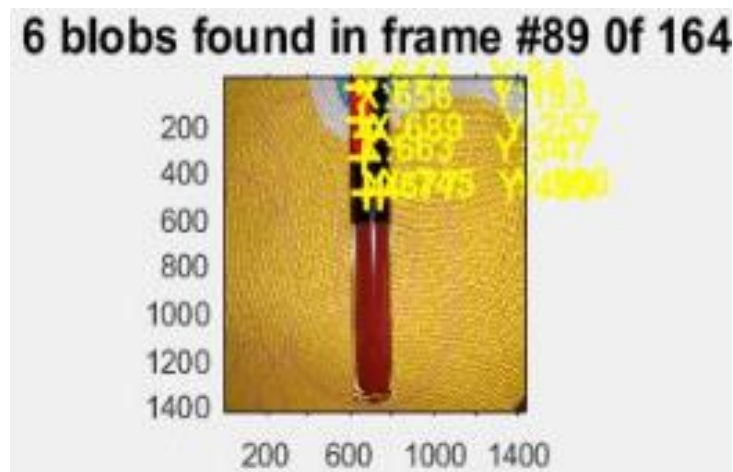


Figure 9. Display of Value Mask Segmentation Process Results

4. Conclusion

The following conclusions can be drawn from studies on the use of Random Forest for the categorization of Palembang Songket themes using the Scale-Invariant Feature Transform: The Random Forest approach cannot classify all visual objects because the motifs in the training dataset are not identical to

the motifs in the testing dataset. For the Cantik Manis Songket motif, the best value per class accuracy is 100 percent; for the Bunga Cina Songket motif, it's 91.11 percent; and for Pulir, it's 91.11 percent. The Chinese Flower and Beautiful Sweet Songket motifs have a precision rating of 100 percent, whereas the Pulir Songket motif has a precision value of 78.94 percent. The Cantik Manis and Pulir songkets have a 100% recall value, whereas the Bunga Cina Songket motif has a recall rating of 69.23%.

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