*Department of Electrical and Electronic Engineering*

**BANGLADESH UNIVERSITY OF ENGINEERING AND TECHNOLOGY**

**Project Title: Blue Color Detection & Object Tracking**

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# Blue Color Detection & Object Tracking

## Introduction:

Object detection and segmentation is the most important and challenging fundamental task of computer vision. It is a critical part in many applications such as image search, scene understanding, etc. However it is still an open problem due to the variety and complexity of object classes and backgrounds.

The easiest way to detect and segment an object from an image is the color based methods . The object and the background should have a significant color difference in order to successfully segment objects using color based methods.

## Methodology:

OpenCV usually captures images and videos in 8-bit, unsigned integer, BGR format. In other words, captured images can be considered as 3 matrices; BLUE, GREEN and RED (hence the name BGR) with integer values ranges from 0 to 255.

The following image shows how a color image is represented using 3 matrices.



How BGR image is formed
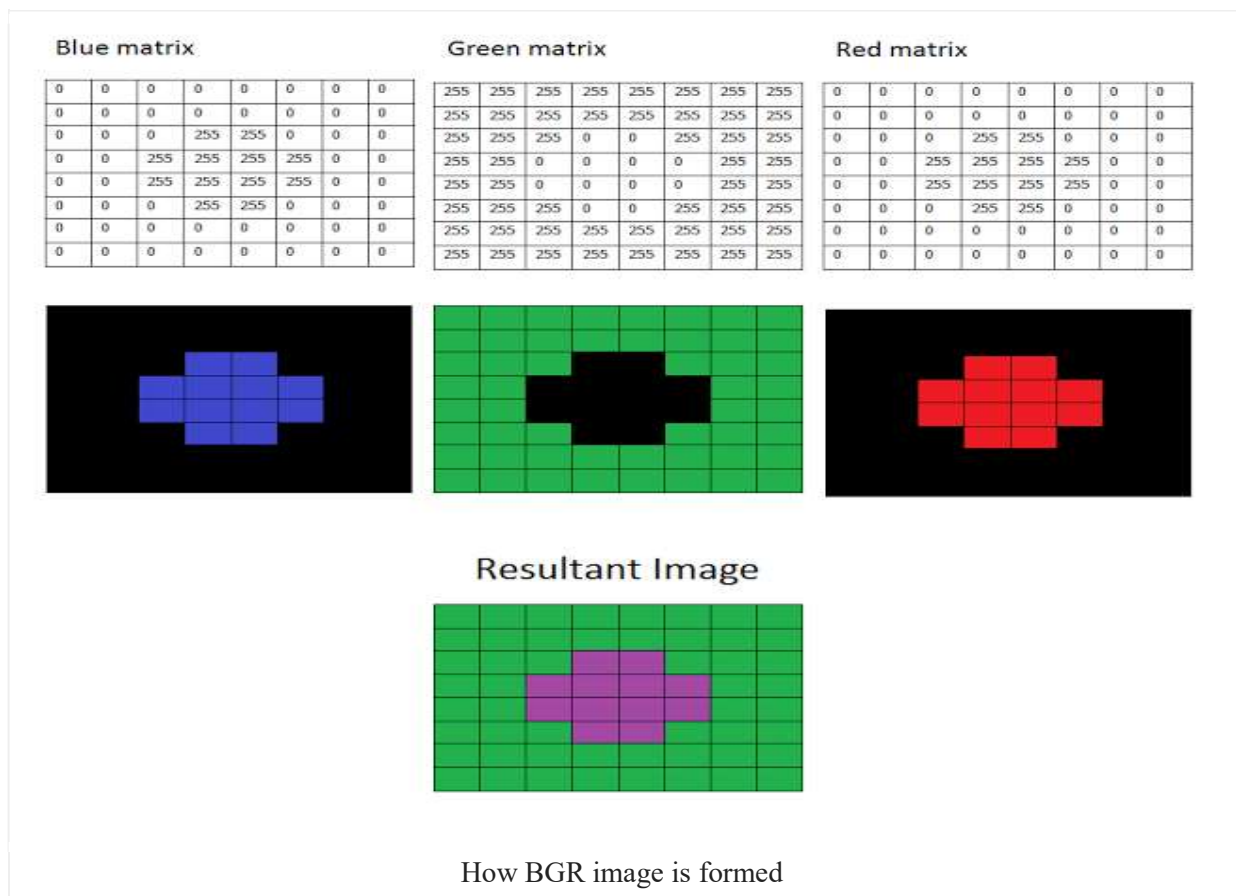
In the above image, each small box represents a pixel of the image. In real images, these pixels are so small that human eye cannot differentiate.

A binary image is a digital image that has only two possible values for each pixel. Typically, the two colors used for a binary image are black and white, though any two colors can be used. Binary images are also called *bi-level* or *two-level*. This means that each pixel is stored as a single bit—i.e., a 0 or 1. The names *black-and-white*, *B&W*, monochrome or monochromatic are often used for this concept, but may also designate any images that have only one sample per pixel, such as grayscale images. In Photoshop parlance, a binary image is the same as an image in "Bitmap" mode.[2] Binary images often arise in digital image processing as masks or as the result of certain operations such as segmentation, thresholding, and dithering. Some input/output devices, such as laser printers, fax machines, and bi-level computer displays, can only handle bi-level images.

Morphological transformations are some simple operations based on the image shape. It is normally performed on binary images. It needs two inputs, one is our original image, second one is called structuring element or kernel which decides the nature of operation. Two basic morphological operators are Erosion and Dilation.
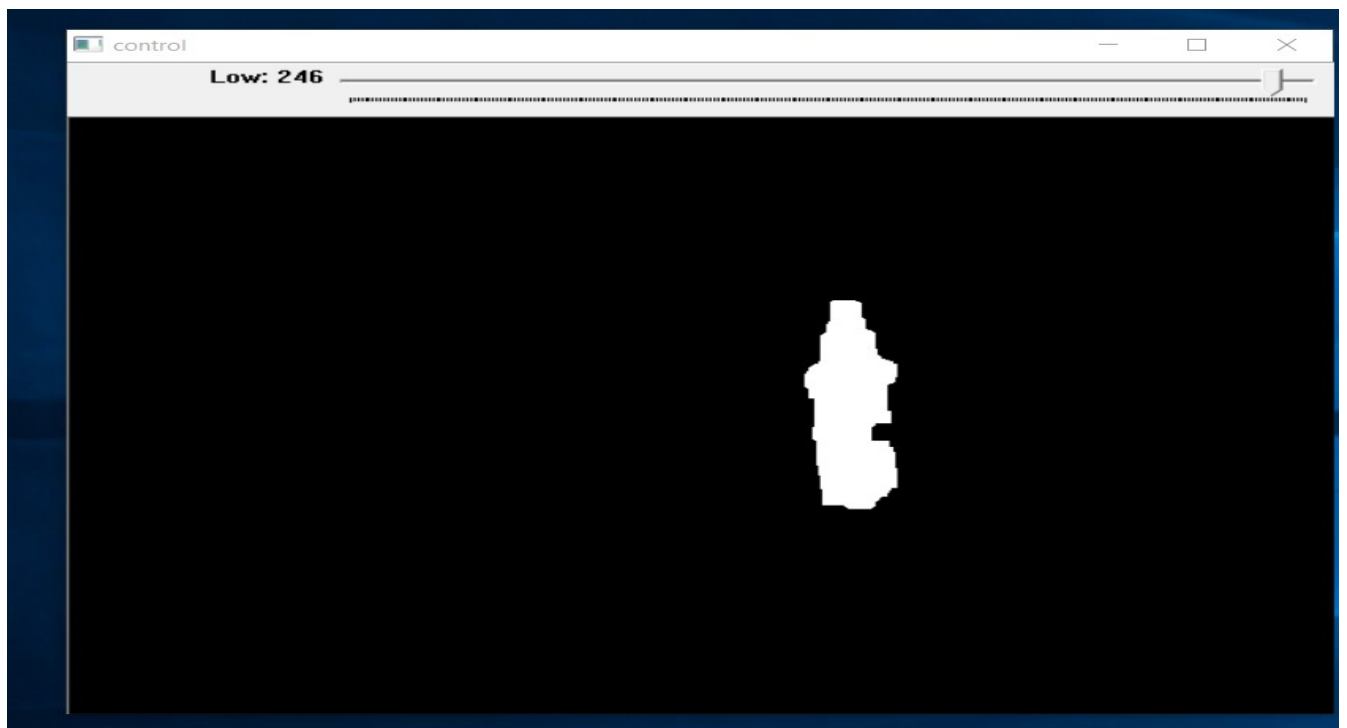
**Algorithm:**

Image Processing in Python using OpenCV

- ❖ Image reading as RGB.
- ❖ Splitting R, G, B components (Grayscale conversion).
- ❖ Making a binary image applying a perfect threshold.
- ❖ Some morphological operations and filtrations.
- ❖ Object detection using contour.

**Result:**



**Blue object detection with object area and pixel location.**



**Binary image with perfect threshold**

## Conclusion:

Usually, it is considered that BGR color space is more suitable for color based segmentation. But HSV color space is the most suitable color space for color based image segmentation. So, in the above application, the future work can be to convert the color space of original image of the video from BGR to HSV image .

HSV color space is also consists of 3 matrices, HUE, SATURATION and VALUE. In OpenCV, value range for HUE, SATURATION and VALUE are respectively 0-179, 0-255 and 0-255. HUE represents the color, SATURATION represents the amount to which that respective color is mixed with white and VALUE represents the amount to which that respective color is mixed with black.

## Reference:

1.http://opencv-python-tutroals.readthedocs.io

2.http://opencv-srf.blogspot.com/2010/09/object-detection-using-color-seperation.html

3.https://en.wikipedia.org/wiki/Binary_image

4.https://www.youtube.com/watch?v=-UbbjHXgTak