

# Hand Gestured Real Time Paint Tool - Box

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**Abstract** - The paper suggests about with using of real time color segmentation, filtration and feature selection process to draw the patterns with major use of image processing i.e., Drawing the different shapes using the double tap of fingers, open the hand and change the color of given shape. so basically Vision-based human-computer connection could be achieved by determining separated primary color areas. Still, one of the challenges of this hand gesture target following is that color distribution would be change in small lighting objects and so the hand recognition is typical to detect. This paper presents analyses and real time example of color-based image segmentation, color based image filtration, feature selection, hand recognition and using all this draw the different shapes in real time world in front of the screen. The observations show that RGB are the default color used for segmentation proceeding. Meanwhile Real time video is captured from the camera and the video is transformed into number of real time frame images. This algorithm should monitor and process every frame image from the real-time video and it will detect the hand gesture and according to those hand gesture, different shapes are drawn. Camera is used as an input. In the coding area here image processing is done through Open-CV and python for feature selection and feature recognition.

**Keywords**—*Dynamic Image Processing; Image Recognition; Image Analysis; Feature Extraction; Image Segmentation; Open-CV; Python*

## I. INTRODUCTION

Many real-world applications want real-time image processing like for object recognition, feature selection and image segmentation. Performance of an object recognition, feature selection and image segmentation system should be fast accurately so that moving object in the video can be dignified and further refined in real time. Once motion area in a video is identified, object recognition, feature selection, object tracking, image data mining, and other video and image processing algorithms and techniques can be performed. Image segmentation has acknowledged an important towards computer vision due to the wide area of applications

containing video surveillance, bio-metric recognition, and face indexing in multimedia contents. Due to a real time process it gets an input as several frames and processing it at the same time. Now in this process we actually identify our hand using the image segmentation, color filtration, feature extraction process essential colors are separated from the input RGB frame and so we can accurately detect our hand. Then with this process using real time video streaming we can draw, erase, cut, copy, paste and even we can take pictures from that, for just we have to identify some hand gesture using segmented color and feature extraction. Therefore, the hand gestured paint tool-box is major process. It requires some of the fast GPU and processor to make it easier, and also two major components used which are Open-CV and Python, with these both we can make our process faster, and there brief introduction is given below.

## II. INTRODUCTION TO OPEN-CV & PYTHON

### A. Open-CV

Open-CV (Open Source Computer Vision) is a programmable library which is focuses basically on real time applications. It's written in C++ and the interface is in C++, but it still retains less comprehensive though through older C interface. There are bindings in Java and MATLAB/OCTAVE. The API for these interfaces can be found in the online database. All the major developments and algorithms in Open-CV are now also developed in the C++ interface Open-CV is an open source computer vision library which is now widely use in dynamic image processing and real-time image processing.

### B. Python

Python is used as high-level programming language for general-purpose programming. The language provides constructs intended to enable writing clear programs on both a small and large scale. Python features a dynamic type system and automatic memory management and supports multiple programming paradigms, including object-oriented, imperative, functional programming, and procedural styles. It has a large and comprehensive standard library. In python sci kit-image (formerly scikits.image) is an open source image

processing library. It includes algorithms for segmentation, geometric transformations, color space manipulation, analysis, filtering, morphology, feature detection, and many more. It is designed to inter-operate with the Python numerical and scientific libraries NumPy and SciPy.

### III. COLOR SEGMENTATION

The color targets were designed with an idiosyncratic combination of color organize in a particular configuration. A series of elementary and very expeditious tests performed on an input image will immediately encounter and localize the color target. The tests accomplishment in-variants based on color gradients that we have derived analytically under a collection of indoor and outdoor lighting conditions for our color pattern. While the decisive color gradients among the three-color patches vary depending on brightness and noise, some facet of the gradient are highly certain and generate a nearly exclusive signature of the target. Four subsequent color gradient tests satisfy to rule out all but a small portion of the image pixels that do not lie on a color target. These tests are based on the following gradient components: the blue channel gradient component across the blue-green and blue-red boundaries and the green channel gradient component across the red-green and green-blue boundaries. The gradients are predicted by figure out differences in RGB channels between neighboring pixels. Color barriers between contiguous regions are hardly sharp in real images because of effects such as color draining, motion blurring and pixel projection. So, we determine these gradient characteristics across several pixels rather than between nearby pixels. We designate this separation to be as large as possible, dependable with the prerequisite that the samples used to compute the gradients all fit within the target place. (The minimal scale of the target in the image -- which is inversely commensurate to the utmost distance it can be determine from the camera thus regulate the utmost admissible distance between samples.)

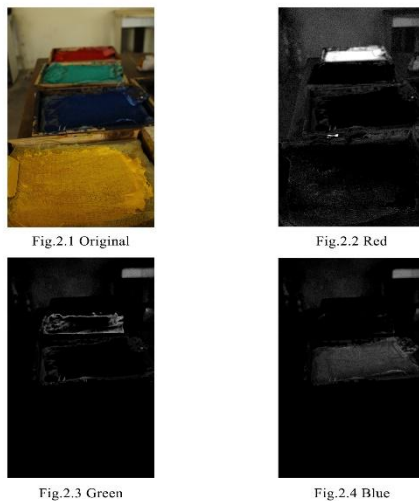


Figure 1. Color Segmentation

### IV. FEATURE SELECTION

Feature selection is the procedure of selecting a subset of those features (variables, predictors) which are use in the

algorithms and model construction. A feature selection algorithm could be seen as the combination of a search technique for describing some new feature subsets, along with an evaluation measure which scores the different feature subsets. The simplest algorithm is to test each possible subset of features finding the one which minimizes the error rate. The feature selection methods are typically presented in three classes based on how they combine the selection algorithm and the model building.

### V. BLOCK DIAGRAM

The block diagram symbolizes the distribution of elementary color from a real-time video input. At initial camera device is acting as input device, it gives input of RGB images to our algorithm. It accommodates numerous numbers of color images in motion. It provides the various color frame into the given development and the essential color are disjointed. Now due to the feature selection process, we can identify our hand using the contours. Then the selection of the different tools will be done by our hand-gestures i.e. joint the double fingers to select the dot, line and eraser tool, Open the hand to select the R,G & B color. Now this RGB output will be use for the hand recognition, and this recognition will be help to draw those lines and mainly the contours are take major part in recognition of gestures. Following is the block diagram shown.

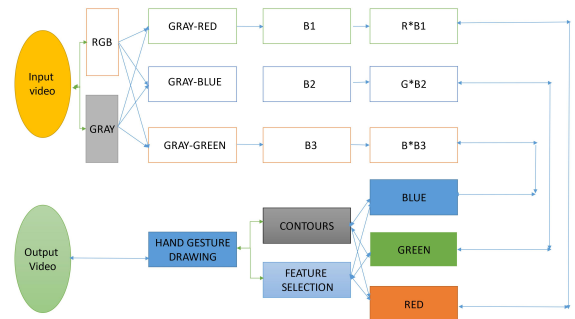


Figure 2. Block Diagram

#### A. Gray Conversion:

It is the proceeding of alteration from color images into gray scale image. Color image consist of 24 bits per pixel; it is shortened to 8 bits per pixel. Most frequently levels perform the interval number of quantization in gray scale image alter. At right now, the best generally used repository method is 8-bit storage. There are 256 gray levels in an 8-bit gray range image, and the magnitude of each pixel can have from 0 to 255.

#### B. Subtraction:

The RGB image enclose 24 bits, each of three colors having 8 bits per pixel. At side-by-side RGB is isolating into each 8 bit colors. The color subtraction is the operation of subtracting the color amount between the two colors. Here every three colors are replaced with the gray image which transformed from the original RGB image.

### C. Binary Conversion:

Binary conversion is the procedure of transforming any considerate of image into a binary (1, 0) image. Essentially binary image two bits image, it consists of only 1 and 0. Here 1 will be shown as white and 0 will be shown as black. Hence, it's named as black and white image. The determination of transformation is to calculate the black and white pixels in the image. Every detached color is transformed as black and other colors are converted as white.

### D. Multiplication:

Image multiplication is the process of amplification of pixel amount between more than images; here this development is used to multiply binary images with breached color images. Subsequently this action we can get every elementary color that having above 300 PPI. The range consist of below 300 PPI does not treated as color. After the multiplication, this proceeding having three disjointed colors that having 300 PPI. By bringing together these three colors we can get the anecdotal color image that consist of only elementary colors. From the given technique, the RGB color area can be disjointed like subsequent diagram.

### E. Color Filtration:

Color Filtration is the technique of disjointing the colors and analyzing the disjointed colors. It is the one of the human to computer interplay. Here the colors are substituting in a role as amalgamate between human and computer. At introductory elementary color modal is used for a recognition technique, it only recognizing elementary colors in each color images, elementary colors are disjointed and disjointed colors are recognized to determine its name like blue, green, red. It gives the recognized color as an output by utilizing two ways, that is composition text on the output screen and playing audio(.wav) files which having the names of the elementary colors. The pixels of each three colors are check in order after disjointed it. At whatever time, it gets above 300 PPI of these three colors (RGB) it should identify that the given colors are establish or formed. That we set that below 300 PPI are not any phenomenon found there. It may be a emission from luminous. So, that it should not recognize the colors below 300 PPI of the elementary colors. Also, the other colors are also undervalued. These are the core technique of color identification. In the real-time proceeding, real time signals are refined by convinced algorithms, for this project real time input signal is uninterrupted motion of image signal like video signal. It does not have any restricted duration, algorithm observing for each frame and converting by the given algorithm. The given technique displays input and refined window. The input window has live video from the camera object and the refined window has sanctioned colors as an output.

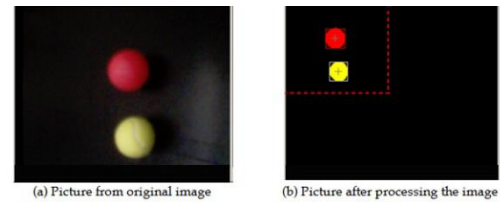


Figure 3. Output Image

### F. Feature Selection

For the given output now, we use contours to identify our hand and basically it divided into two parts like, Gloves based & Vision Based. The glove-based approach employs sensors (mechanical or optical) attached to a glove that acts as transducer of finger flexing into electrical signals to determine hand posture. The second approach, vision based analysis, is based on how humans perceive information about their surroundings. Edges are basic image features that carry useful information regarding the object boundaries, so using canny edge detection we can make the boundaries around our hand using gray values. Thus, an edge is defined by a discontinuity in gray level values. Ideally, an edge is caused by changes in color or texture or by the specific lighting conditions present during the image acquisition process. Hand gesture recognition process involves several techniques and algorithms that fall under the areas of image processing. The first phase deals with problems related to image processing, such as reducing noise by using filters, scaling, and break down the image into meaningful regions using segmentation techniques such as thresholding and edge detection methods. So now with recognition of our hand using contours and edge detection methods now we can detect those hand gestures of taping two fingers to select tool, open our hand to change the color value. The following figure shows the hand detection and feature selection, and basically we have imported the different shapes i.e. Dot, Line, RGB Color.

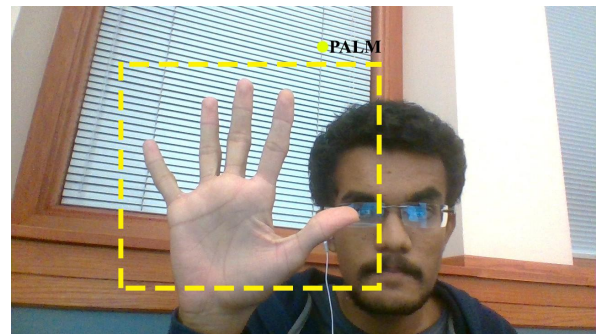


Figure 4. Hand Detection



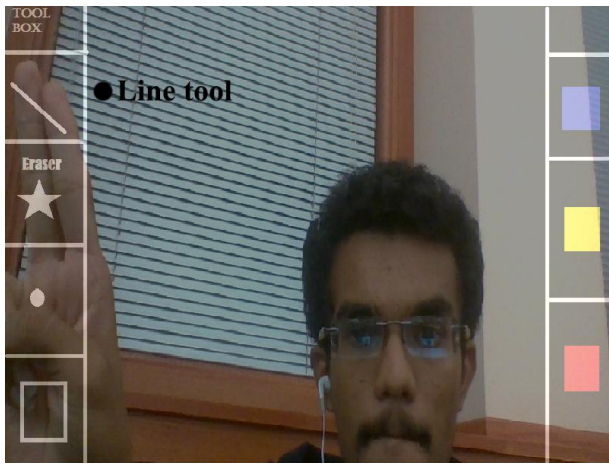


Figure 5. Tool Selection

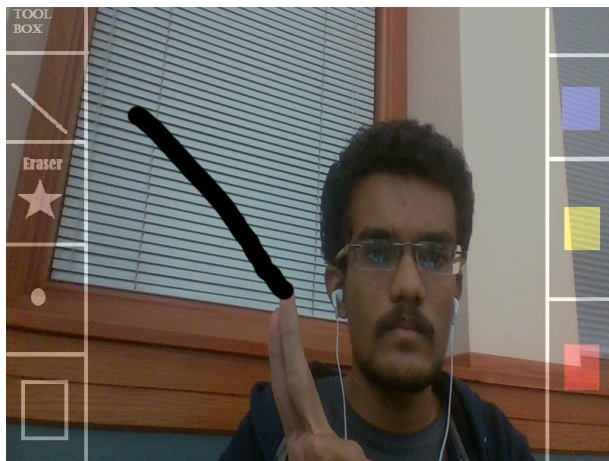


Figure 6. Drawing line with Hand Gesture.

## VI. CONCLUSION

Computer vision algorithms support encouraging ways to human-computer through perceptive elementary colors from visual data. A substantial step to accomplish this goal is the prosperous and precise disjoining of elementary colors. Now this elementary things are used for the different technologies for sixth sense, virtual reality. Nevertheless, littered backgrounds, obscure luminous circumstances and diversified affecting objects make this tasks dispute. This paper mainly robust on hand gestured paint tool box with color-based image segmentation and vision located color identification by marking these predicaments.

## VII. FUTURE WORK

We can create a graphical user interface software for these utilization and can amalgamate that graphical user interface with an extraneous camera module which will be in the saddle of an machine learning robot, and can be adequate to latch on to the video and the further refining of the video will take position with the help of the advanced graphical user interface. Then this Autonomous Robot can be used for to teach the children about various activities and these concept can also be used for virtual reality and augmented reality. Also these application is used for games like snakes etc. In which with using of hand gestures you can play it.

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