**Colour Dectection - Using python OpenCV**

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**Abstract:**

OpenCV is a Computer Vision library. It is a collection of C functions with a few C++ classes that implement popular Image Processing and Computer Vision algorithms. Computer vision is the science that means to give a comparative, if not better, capacity to a machine or PC. Computer vision is worried about the programmed extraction, investigation and comprehension of valuable data from a single picture or a grouping of pictures. Some of the basic image processing capabilities include filtering, edge detection, corner detection, sampling and interpolation, color conversion, morphological operations, histograms and many more.

Color detection using OpenCV has many advantages like, it allows the detection of a specific color in a livestream video content. In this OpenCV color detection system there are four major modules, activated webcam, scan object, match frame parts and system results. Users can open webcam by clicking the webcam button. Then the algorithm analysis the pattern of the framed part of webcam. Pattern is matched with defined color pattern by RGB color model. If the pattern matched with the potential pattern of RGB color model then the system results with the correct output.

**KeyWords:**

Python , openCV , Colour Detection , Numpy and Image Processing.

**Introduction:**

Artificial intelligence is the new emerging technologyalong with machine learning. It is going to replace humans in vareity of fields. Like almost in every possible place. But the main obstacle is it has to learn everything before we apply.It needs a lot of information and learning which we can do with the help of Machine Learning.

It is going to acquire every thing that humans can do. Like human Vision. Which is know as Computer Vision in reality. We can use so many feutures of Computer Vision with Python programming language.

It has the module named openCV which is having so many applications like the one we implemented here. openCV itself means Open Computer Vision. The "Colour Detection" we implemented here will detect the colours in the input which we are taking from the webcam.We wrote the code for 3 primary colours to detect.

The option that we dragged from openCV module in python is very good at detecting red,blue and green colours.

**Contents:**

**1. What is the Pre-Requisite and Prior fundementals of Colour detecting.**

**2.How Colour-Detection Works?**

**3.What are the Advantages and Disadvantages?**

**4.What are the applications?**

**5.What are the limitations?**

**6.Conclusion.**

**Pre-Requisite:**

i) Windows Operating System

ii) Python 3.7 or above versions

iii) OpenCV

iv) Numpy,Scipy modules

v) Some command on Programming in python.

**In a Nutshell !**

Color detection is the process of detecting the name of any color. ... Human eyes and brains work together to translate light into color. Light receptors that are present in our eyes transmit the signal to the brain. Our brain then recognizes the color.

In this report, we have learned about the OpenCV library and its basic concept. We have described all the basic operation of the image. In the next tutorial we will learn about the face recognition and face detection.

**| How it works?!**

**Work Flow Description:**

**Step 1:**

By running the code in Python , webcam will automatically on and start collecting the input image frames.

**Step 2:**

Convert the imageFrame in BGR(RGB color space represented as three matrices of red, green and blue with integer values from 0 to 255) to HSV(hue-saturation-value) color space.

Hue: describes a color in terms of saturation, represents the amount of gray color in that color and value describes the brightness or intensity of the color. This can be represented as three matrices in the range of 0-179, 0-255 and 0-255 respectively.

**Step 3:**

Define the range of each color and create the corresponding mask.

**Step 4:**

Morphological Transform: Dilation, to remove noises from the images.

**Step 5:**

Bitwise\_and between the image frame and mask is performed to specificaly detect that particular color and discrad others.

**Step 6:**

Create contour for the individual colors to display the detected colored region distinguishly.

**Step 7:**

Output: Detection of the colors in real-time.

**Advantages**:

Color detection using opencv has many advantages like,

I) It allows the detection of a specific color in a livestream video content.

II) In this opencv color detection system there are four major modules, activated webcam, scan object, match frame parts and system results.

III) Users can open webcam by clicking the webcam button.

**Limitations:**

**Illumination**

The illumination plays an essential role during image recognition. If there is a slight change in lighting conditions, it will make major impact on its results. It is the lighting to vary, and then the result may be different for the same object cause of low or high illumination.

**Background**

The background of the object also plays a significant role in Face detection. The result might not the same outdoor as compared to what is produces indoors because the factor - affecting its performance-change as soon as the locations change.

**Why this is important? : Some Real-world Applications**

In self-driving car, to detect the traffic signals.Multiple color detection is used in some industrial robots, to performing pick-and-place task in separating different colored objects.

This is an implementation of detecting multiple colors (here, only red, green and blue colors have been considered) in real-time using Python programming language.

**CONCLUSION:**

Colour Detection is one of the key and most important need for Artificial intelligence and its applications.We have to handle or analyse the different kind of real world problems in applications. Giving the vision to the computer means opening the Galaxy of possibilities to analyse everything. For that using openCV will be an option.It is basically giving eyes to the machine with image processing.In this mini project we have developed a basic RGB colour Detector.We have implement this in a large scale to solve numerous situations in real world.

**THANK YOU !**