

Real-Time Color Detection Using Python and OpenCV

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ABSTRACT:

The main purpose of this application is the methodology identifying the shade of colours in real time with an exact predication with their names. A study says a normal human can able to clearly identify but for computer it is tough task. Many project and research papers are written on this task. But we use different techniques and method for this project. NumPy and OpenCV libraries used in python language. OpenCV provides a real-time optimized Computer Vision library, tools, and hardware. Computer Vision is the base or mostly used for Artificial Intelligence. Computer-Vision is playing a major role in self-driving cars, robotics as well as in photo correction apps.

Keyword: OpenCV, NumPy, HSV values.

INTRODUCTION:

Colour Detection it is a process of detecting the name of colour form image and video. It is very simple task for human to detect the colour from any sources but for computer cannot detect the colour easily. The eye and brain of human work together to convert light to colour. The signal is transmitted to the brain via light receptors in our eyes. The colour is then recognized by our brain. We have mapped certain lights with their color names. We will be using the somewhat same strategy to detect colour names. In this project we detect three different colours Red, Green, and Blue with the help of fundamentals computer vision. After successful compilation when we execute the code then the capture the video through the webcam and read the video stream in an image frame. And we obtain the name of the pixel with the three different colours Red, Green and Blue and it is helpful in recognizing colour and in robotic and it is helpful in driver less car and this system is useful in self-driving car, to detect the traffic signals.

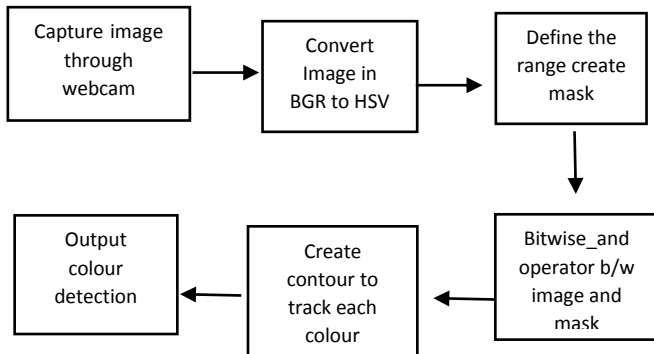
EXISTING SYSTEM:

In the existing system they have gone through with opencv but there is no exact colour representation of colour with accuracy. In this project we use only three colours BGR (blue, green, red) and image capture through webcam and we use hsv that can be identify the brightness or intensity of the colour. When we show a picture in front of the camera it automatically shows the name of the colour and it is detect multiple colours at the same time.

Methodology:

1. The first step is to capture the video through the webcam with "cv2.VideoCapture()".
2. It is reading the video from the webcam in image frames with "cv2.imread()"
3. Convert the image frame in BGR (BLUE, GREEN, RED) to HSV(hue-saturation-value It stores color information in a cylindrical representation of RGB color points. Hue value varies from 0-179 Saturation value varies from 0-255 and Value value varies from 0-255. It is mostly used for color segmentation purpose.) "hsv=cv2.cvtColor(image, cv2.COLOR_BGR2HSV)".
4. Set the minimum and maximum range of HSV for red green and blue and define the mask for highlight a specific object from the image . "mask=cv2.inRange(hsv, min, max)".
5. We use kernel for blur an image and Dilation for remove noises from the image. For each colour. "Cv2.dilate()"
6. We use bitwise_and operator between the image frame and mask is performed to specifically detect the particular colour and leave other colour. "Cv2.bitwise_and()".
7. Create contour for the individual colours to display the detected coloured region distinguish.
8. Output is detected of the colours name in the real time.

System Architecture:



The above architecture diagrams show the capability of the project. It consists of well define sequence diagram this is abstracted form the source code. It leverages the rich capabilities of the technology such as OpenCV library in Python.

The above architecture makes the process more efficient based on principles and properties related to each other. As we know that Red, Green and Blue are the primary colours and every colours has brightness and intensity that's why we use HSV and their values for better performance for each colour. The present colour detection project captures the image from the webcam as an input and looks for the three different colours red, green and blue in the captured image.

FUTURE SCOPE:

Computer vision has still not attained a level wherein it can be directly put into use to solve life problems as it is still in its developments phase. Computer vision is a sub-part on Machine Learning.

Some real - world Application based on colour detection:
In Self driving car this system is useful in detecting traffic light and vehicle backlights and makes decision where he should stop the car and where he should start and continue driving.

Industrial Robo this application use in industry to pick and place different coloured object by the robotic arm.

EXPERIMENTAL RESULTS:

CONCLUSION:

In this paper we work on only three colour Red, Green, and Blue and we also detect multiple colour in real time. In this various steps are implemented using OpenCV platform. We firstly convert the image frame in BGR to HSV(hue-saturation-value) and give their maximum and minimum values and we learnt about the colour intensity and brightness and we learned about colours how we can extract colour names from an image and how to convert BGR to HSV and we described the range of HSV for each colours. In this paper we define mask for highlight a specific object from the image. We also learned how we can detect the particular colour and leave others colours. This is used in numerous image editing and drawing apps.