Task 3 Documentation

Aim:

To Detect an object of particular shape and color using OpenCV and Python

Software Used:

- OpenCV
- Python v 3.8

Introduction:

HSV Color Space: Hue, Saturation, and Value (HSV) is a color model that is often used in place of the RGB color model in graphics and paint programs. In using this color model, a color is specified then white or black is added to easily make color adjustments. HSV may also be called HSB (short for hue, saturation and brightness).

Object Detection: We can detect shapes in real time in these three simple steps:

- Detect the objects, removing the background.
- Find the contours of the objects detected.
- Detect the shape of each of the objects detected, in real time.

Procedure:

Step 1:

- We start by importing the libraries OpenCV and Numpy, we create a function nothing that we need later and we load the camera.
- We import the libraries OpenCV and Numpy, then load the cap to get the frames from the webcam. After that we start a while Loop where we get the frames and we do the detection.
- We create the trackbars in order to change the ranges to detect a specific color in real time.
- Inside the while loop we define the HSV ranges (low, high), we create the mask and we show only the object with color of the trackbar.

Step 2:

- Second step once we detected the objects by their colors, we need to find the contours.
- We do this by using OpenCV findContours() methods and store the contours found

Step 3:

- If we consider a contour as a polygon which exactly surrounds the object, the shape detection is a simple counting of how many points the contour has.
- We need to remove as much noise as possible in order to have a clean contour. So, we use the approximation function of OpenCV
- Later we improve even more the detection, removing all the small dots detected, which are just noise. We do that by taking contour which have a big area, in this case greater than 400 pixels.
- And finally, we can count the no of points the contour has so as to find out which type of shape the contour has.

Future Improvements:

- Display the shape of the object on the screen
- Auto detection of shape and its colors

Bibliography:

- Programming Knowledge YouTube Channel
- PySource YouTube Channel
- https://docs.opencv.org/master/d9/df8/tutorial_root.html (OpenCV Documentation)

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