

Computer vision course

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Lab 3 - Mouse callback and color segmentation

Note: please create a separate main function in a separate file for each task.

Task 1

Write a program that loads the image provided (robocup.jpg) and shows it.

Task 2

Expand Task 1 adding a callback function reacting to the mouse click.

A callback is a function whose execution is triggered by an event, in our case, a mouse click. This is managed by the GUI—in OpenCV you can use the function `setMouseCallback()`¹ that sets a callback on a specific mouse event. Your callback shall print the BGR color triplet of the pixel where the click occurred.

Task 3

Modify the callback in Task 2: the new version calculates the mean of the B, G and R values (separately) in a 9x9 neighborhood around the clicked pixel and prints such values.

Task 4

Expand Task 3 in order to segment (i.e., “select”) the T-shirts of the robot soccer players.

Such selection operates by reading the average calculated in Task 3, taken as a reference color, setting a threshold T , and creating a new image, called mask, having:

- a white pixel if the corresponding pixel in the input image has all the three B, G and R values having a distance from the reference color not greater than T ;
- a black pixel otherwise.

Visualize the mask on the screen. The mask is generated from scratch at every new click on the original image.

Task 5

Expand task 4 by *first* applying a color conversion to the HSV color space², then performing the same task on the new color coding. The color conversion is done by the `cvtColor()`³ OpenCV function controlled by the color conversions code⁴.

¹ See documentation:

https://docs.opencv.org/4.x/d7/dfc/group__highgui.html#ga89e7806b0a616f6f1d502bd8c183ad3e

² https://en.wikipedia.org/wiki/HSL_and_HSV

³

https://docs.opencv.org/4.9.0/d8/d01/group_imgproc_color_conversions.html#ga397ae87e1288a81d2363b61574eb8cab

⁴

https://docs.opencv.org/4.9.0/d8/d01/group_imgproc_color_conversions.html#ga4e0972be5de079fed4e3a10e24ef5ef0

Task 6

Expand Task 4 by creating a new image whose pixels are:

- equal to the input image if the corresponding pixel in the mask is black;
- equal to a given color otherwise.

Choose the triplet (92, 37, 201) as the new color. This image is generated from scratch at every new click on the original image.

Are you able to change the color of the T-shirts?

Are you able to change the color of the ball?