Computer vision, pattern recognition and image retrieval

Laboratory 8

Topic: *Image segmentation used for object detection*

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Technical support for Matlab is available on the website: http://www.mathworks.com/

In Laboratory 08, you will prepare a new application. Its purpose is to perform image segmentation for object detection. The segmentation should be based on the color of pixels for individual objects in the image. This will be a simplified version limited to three objects in three different colors.

Exercise 1

Please create a new "Lab06" application. The form should include 2 Button objects and 5 Axes objects. The first "Close" button should close the form. The second "Open" button should read a color image (in formats .jpg, .png, .bmp) from the selected file and display it in Axes (detailed instructions on how to do this can be found in Lab02).

Exercise 2

Add a new button "Sampling 1". Its functionality should be to retrieve, from the previously loaded colored image, a set (vector) of pixel values. This can be done using the 'impixel' function. Next, calculate the maximum and minimum values for the obtained color level values in the specified channels of the indicated pixels (minR, maxR, minG, maxG, minB, maxB). Then, prepare an image that will serve as a template, categorizing each pixel of the image into the specified object or the rest of the image. (This can be done by assigning a value of "0" in the template for all pixels greater than minR, minG, and minB, and simultaneously less than maxR, maxG, and maxB; otherwise assigning a value of "255").

Show the created template in Axes3. The template should be of a global type.

Required commands:

impixel - the function opens a new window with the provided image; then, it retrieves and saves the values of the three channels (RGB) for all indicated pixels (indicate pixels by clicking the left mouse button); after indicating the last pixel, press the "Enter" button.

Exercise 3

Add a new button "Sampling 2". Its functionality should be to create a second image-template. It can be programmed in the same way as in Exercise 2. However, remember that this is to be the second template for a different object than in the second task. Show the created second template in Axes4. The template should be of a global type.

Exercise 4

Add a new button "Sampling 3". Its functionality should be to create a third image-template. It can be programmed in the same way as in Exercise 2. However, remember that this is to be the third template for a different object than in the second and third tasks. Show the created third template in Axes5. The template should be of a global type.

Exercise 5

Add a new button "Segmentation". Its functionality should be to perform segmentation on the loaded image using the templates prepared in Exercises 2, 3, and 4. In the first step, it is advisable to create a copy of the loaded image from Exercise 1. Then, assign a yellow color to each pixel of this image (as a reminder: the first channel 255, the second channel 255, and the third channel 0). Next, using the template from Exercise 2, change the color of the pixels to red where the template pixels have a value of 0. Then, using the template from Exercise 3, change the color of pixels to green where the template pixels have a value of 0. Finally, using the template from Exercise 4, change the color of the pixels to blue where the template pixels have a value of 0.

In the end, please Show the resulting image in Axes2.

Please send only the „Lab08.mlapp" file to the moodle platform as an answer.