POLITECHNIKA Czestochowa University of Technology

Faculty of Mechanical Engineering and Computer Science

Computer vision, pattern recognition and image retrieval

Laboratory 5

Topic: *Nonlinear filtering and morphology operations*

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

In Lab 05, you are required to create a new application 'Lab05.mlapp' using a graphical user interface similar to the one used in Lab 02. Subsequent tasks will involve adding additional functionalities to this application.

Exercise 1

Create a new application 'Lab05.mlapp'. The form should contain 11 Button objects and 6 Axes objects. The first button 'Close program' should close the form. The second button 'Open image' should read a colored image (in .jpg, .png, .bmp format) from the selected file and display it in one of the Axes objects. The 'Gray image' button should convert the loaded colored image to grayscale and display it in the second Axes object. (Lab02 contains detailed instructions on how to do this).

Exercise 2

In the next button 'MAX Filter', program the operation of filtering both images (colored and grayscale). Use a maximum filter with a size of [3x3]. Axes3 should display the colored image after applying the maximum filter. Axes4 should display the grayscale image after applying the maximum filter.

Please note that operations such as filtering a colored image are performed on each channel individually.

Required commands:

max - returns the maximum value in a given range

Exercise 3

In the next button 'MIN Filter', program the operation of filtering both images (colored and grayscale). Use a minimum filter with a size of [3x3]. Axes3 should display the colored image after

applying the minimum filter. Axes4 should display the grayscale image after applying the minimum filter.

Please note that operations such as filtering a colored image are performed on each channel individually.

Required commands:

min - returns the minimum value in a given range

Exercise 4

In the next button 'MED Filter', program the operation of filtering both images (colored and grayscale). Use a median filter with a size of [3x3]. Axes3 should display the colored image after applying the median filter. Axes4 should display the grayscale image after applying the median filter.

Please note that operations such as filtering a colored image are performed on each channel individually.

Required commands:

median - returns the median value from a given range

Exercise 5

Program another button 'Binarization' and add one 'Edit Field (numeric)' object named 'Threshold'. Please set the default value for 'Threshold' to 100 and allow values in the range from 0 to 255. The functionality of this button is to perform binarization on the grayscale image. The binarization threshold value should be retrieved (using the 'get' function) from the 'Edit Field' object. The result should be a new binary image; please display it in the Axes5 object.

Exercise 6

Program another button 'Erosion'. Its functionality should be to perform the erosion operation on the binary image obtained from the previous exercises. This task can be accomplished using the 'imerode' function. The result should be a modified binary image; please display it in the Axes6 object.

Exercise 7

Program another button 'Dilation'. Its functionality should be to perform the dilation operation on the binary image obtained from the previous exercises. This task can be accomplished using the 'imdilate' function. The result should be a modified binary image; please display it in the Axes6 object.

Exercise 8

Program another button 'Open'. Its functionality should be to perform the opening operation on the binary image obtained from the previous exercises. This task can be accomplished using the 'imopen' function. The result should be a modified binary image; please display it in the Axes6 object.

Exercise 9

Program another button 'Close'. Its functionality should be to perform the closing operation on the binary image obtained from the previous exercises. This task can be accomplished using the 'imclose' function. The result should be a modified binary image; please display it in the Axes6 object.

Please send only the „Lab05.mlapp” file to the moodle platform as an answer.