

Name: _____

Score: /19

CSE 5524

Computer Vision for HCI

AU'22

Homework Assignment #3

Due: Tuesday 9/13

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- 1) Generate a N=3 level Gaussian pyramid (original image is level-0, you will have level-0, level-1, level-2, and level-3) and the corresponding Laplacian pyramid of an image (select an image from the web, make it 1-channel grayscale). First use the formula in the notes to determine a viable image size (use N=3, and pick integers N_C and N_R), and crop the image (if needed) to test the pyramid code. Use $a=0.4$ for the Gaussian mask – **you must use separable masks!** Write/use functions for properly reducing and expanding an image. Write your own interpolation function - do not use Matlab/Python in-built interpolation functions (e.g., `interp2`). Lastly, perform a reconstruction of the original (cropped) image using the Laplacian pyramid. [8 pts]
 - 2) Using the grayscale images (walk.bmp, bg000.bmp) provided on the WWW site, perform background subtraction 1 (abs diff) to extract the object. (Make sure your image is of type *double*!) Experiment with thresholds and discuss. [2 pts]
 - 3) Using the grayscale images (walk.bmp, bg[000-029].bmp) provided on the WWW site, perform background subtraction 2 using statistical distances. Experiment with thresholds and discuss. [5 pts]
 - 4) Dilate your best binary image resulting from problem 3) using: [1 pt]

```
d_bsIm = bwmorph(bsIm, 'dilate');
```

- 5) Next perform a connected components algorithm, and keep only the largest region in L (save/display as an image). [1 pt]

```
[L, num] = bwlabel(d_bsIm, 8);
```

As usual, upload your report, code, and selected images to Carmen. [2 pts]

MATLAB help: Loading several ordered grayscale images:

```
for i=1:N
    filename = sprintf('myimage_%03d.bmp', i-1); % if starts with 000
    Im(:, :, i) = double(imread(filename));
end
```

The %03d gives a zero-padded number (e.g., 001), and the image storage is now a 3-D cube. To get image 3 from the cube, use `myIm = Im(:, :, 3)`. With such a cube, MATLAB operations such as 'mean' can be told to work along certain dimensions of the cube.