

Digital Image Processing in Astronomy

Please write your results in a textfile or m-file and send it to me by e-mail at the latest on 23/06/2014. Group work is permitted but text and programs should be written by yourself.

Exercise 1: Wiener filter [3.5 Points]

Pick an image and degrade it by adding a motion blur, for example using `fspecial('motion', ..)`, and an additive noise to it.

- (a) Try to restore the degraded image by assuming that there is no noise (noise-to-signal power ratio = 0).
- (b) Now estimate the NSR of the degraded image and try again to restore it.

Exercise 2: Color image processing [2.5 Points]

Search and pick a color image.

- (a) Using the m-files, `rgb2hsi`¹ and `hsi2rgb`, convert from RGB to HSI-format and vice versa. Describe in brief about the conversions.
- (b) Perform histogram equalization in the HSI color space.
- (c) In RGB color space, sharpen the image using "Laplacian" filter and enhance the contrast.

Exercise 3: Indexed image [4 Points]

- (a) What is an indexed image? What is it composed of?
- (b) Create indexed images from an RGB image with and without "dither" option. Compare them.
- (c) Create an indexed image from a gray-scale image using the function, `grayscale()`.
- (d) Perform image segmentation using the m-file, `colorseg`. Try segmentation with both the options, *euclidean* and *mahalanobis*, and compare them. Also try for different values of threshold and explain it.

For questions or problems with the exercise, contact us at:

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¹all m-files can be found at: `/home/weber/pavalli/gonzlazmfiles`