# Medical Image Analysis Exercises: Session 03

http://physics.medma.uni-heidelberg.de/cms/

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## 13: smoothing with linear filters

input: `eight.tif` from MATLAB

a: add noises

- add Gaussian noise with 2 different variances separately
- add salt-and-pepper noise with 2 different levels separately

b: smoothing

- apply Gaussian filter with 2 different standard deviations separately
- apply mean filter with 2 different sizes separately

c: compare the results

- display the results in 4 different figures, one figure for one noisy image
- display 6 axes in each figure, including the original image, the noisy image, the 2 outputs of the Gaussian filter and the 2 outputs of the mean filter
- add titles to the axes

## 14: frequency response

input: `cameraman.tif` from MATLAB

a: display the linear kernels of the following filters

- disk filter with radius 10
- Laplacian filter with alpha = 0.3
- Sobel filter

b: display the frequency responses of the 3 filters

- pad the filters with zeros to form a 128x128 matrix before doing the Fourier transform
- shift zero-frequency component to center of spectrum

c: compare the filters

- apply the filters to the image
- display the results in 3 different figures, one figure for one filter
- display 4 axes in each figure, including the filter in the space domain, the filter in the frequency domain (amplitude), the original image and the filtered image
- add titles to the axes