Medical Image Analysis Exercises: Session 08

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

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31: thresholding

input: `rice.png` from MATLAB

a: global thresholding

- display the histogram of the intensity of the image
- compute a global threshold and its effectiveness using Otsu's method (using `graythresh()`)

b: local thresholding

- take the size of neighborhood as an input
- compute a local threshold and its effectiveness for each pixel based on its neighborhood using Otsu's method (using `graythresh()`)
- tune the size of neighborhood to get a better result

c: compare the results

- display the results in 2 different figures
- display 4 axes in the first figure, including the original image, the result using the global thresholding, the threshold map computed for the local thresholding, and the result using the local thresholding
- display 2 axis in the second figure, including the global threshold value overlaid on the histogram of the intensity, and the effectiveness value of the global threshold overlaid on the histogram of the effectiveness values of the local thresholds

35: watershed segmentation

input: `rice.png` from MATLAB

a: watershed

- approximate the gradient magnitude of the image

- smooth the gradient magnitude image with a 2-D Gaussian smoothing kernel with standard deviation of 2
- apply the watershed transform
- convert the watershed output into an RGB image with random colors
- display 4 axes in one figure, including the original image, the gradient magniude image, the smoothed gradient image and the colorful label image

b: merge labels

- calculate the mean intensity of each label returned by watershed
- detect the neighbor labels of each label by dilating the labeled area
- discover neighbor label pairs with the difference of their mean intensities less than 40
- merge the discovered neighbor label pairs
- convert the merged output into an RGB image with random colors
- display 3 axes in one figure, including the original image, the colorful label images before and after merge