Design of Medical Information Processing Systems (E4902)

Part II Assignments

Assignment 1 (Week 10): Contrast Stretching

1. Derive the **grayscale transformation** $s = T(r)$ for contrast stretching.
2. Experiment contrast stretching for images using the web site below.

   http://www.signalsguru.net/projects/imageprocessing/lab4_contrast.htm

Assignment 2 (Week 11): Filters

1. Is **Gaussian smoothing operator** a linear or non-linear filter? Explain your answer and illustrate it with images.
2. Is **median filter** a linear or non-linear filter? Show that it is or is not and illustrate it with images.
3. Explain how the **Laplacian of Gaussian (LoG)** operator can be implemented by 1D filters?

Assignment 3 (Week 12): Active Contour

Using the **SnakeDemo** (Matlab),

1. Investigate the role of sigma in Gaussian smoothing, influence of initialization, effects of alpha and beta in the energy function, ability to deal with corner points.
2. Investigate the performance of the GVF method.
3. Experiment with rectangular (or other) shapes using binary images to perform your analysis.
4. Investigate the feasibility of initializing completely inside the object and expanding the snake outwards using only the gradient (external energy). When the snake stabilizes, you can introduce both the internal energy and external energy.

The code for SnakeDemo is available in the **snake_demo.zip** file on the course website.

Additional reference materials: http://iacl.ece.jhu.edu/projects/gvf/snakedemo/.

Assignment 4 (Weeks 10 – 12): Essay ("Impact of Image Processing to Medical Imaging")

Write an essay on how image processing techniques can contribute to the advancement of medical imaging. Your essay should be concise with about 2 to 4 A4 pages using Time New Roman 12pt font and 1.15 line spacing.