

Image processing (Lab 08)

Light and contrast adjustment, lab_08_1

- a) Use “Add-mult-add” and the picture “cameraman”. Adjust the brightness and contrast to show the details of the camera man’s coat. Draw a graph showing the resulting output versus input values, (see <http://www.dspguide.com/CH23.PDF>, fig 23.12).
- b) Use “Add-mult-add” and the picture “Baboon”. Adjust the brightness and contrast so that the histogram covers the whole range from 0 to 255. Draw a graph showing the resulting output versus input values. Compare the resulting picture with the original.
- a) Repeat b) with “Add-square-div” and “Root-mult-add” and compare the three resulting pictures.

Linear and non-linear filtering, lab_08_2

- a) Select “No noise” and “Convolution”. Use a 5×5 kernel with all values set to 1, (the program normalizes the values so that the sum of the kernel components will always be 1). Observe the effect on the image. Is this a low or high pass filter function? Describe in words what this filter does for each pixel.
- b) Select “No noise” and “Convolution” and. Use a 3×3 kernel and try to make an edge detecting filter and an edge enhancing filter, (see <http://www.dspguide.com/CH24.PDF>, fig 24.4).
- c) Select “No noise”, “Convolution” and “penguins”. Use a 3×3 kernel with 9 in the middle and all others set to -1. Set “Invert picture” to “Inverted”, observe the result and try to explain why it is like this.
- d) Set “Invert picture” back to “Normal”. Select “Low noise” or “High noise”. Compare the effect of using a low pass filter (“Convolution”) and “Median filter”. Try both 3×3 and 5×5 filters. Describe what the two filters do with each pixel.

Dilation and erosion, lab_08_3 and lab_08_4

- a) Use the controls of lab_08_3 to create a black and white image where the teddy bear or duck shall be in massive black and all the rest shall be white. (Here as an example, it is used to compute the point of gravity of the objects). The function “Black/white level” set all pixels with value below the level to 255 and the rest to 0. What is the effect of dilation and of erosion?
(See <http://www.dspguide.com/CH25.PDF>, morphological image processing).
- a) Run lab_08_4 to produce a “skeletonized” fingerprint. Use an edge detecting filter kernel with 16 as central element, -1 in all the outer elements and 0 for the rest. Why has the contrast and brightness so little effect when the edge detection filter is used? What is the difference between erosion and skeletation?