Exercise 13

All pixels in a grey scale image (0 = black, 255 = white) shall be manipulated by multiplication and addition.

a) The image is multiplied by 2. Draw a diagram that shows the relation between input and output pixel values. (Min value = 0 and max value = 255 in both input and output values). Describe how this function will change the appearance of the image.

b) After the multiplication, a constant value of 127 is subtracted from the pixel values. Draw a diagram that shows the relation between input and output pixel values. (Min value = 0 and max value = 255 in both input and output values). Describe how this function will change the appearance of the image.

c) The original reference image is multiplied by 0.5. Draw a diagram that shows the relation between input and output pixel values. (Min value = 0 and max value = 255 in both input and output values). Describe how this function will change the appearance of the image.

d) After the multiplication, a constant value of 63 is added to the pixel values. Draw a diagram that shows the relation between input and output pixel values. (Min value = 0 and max value = 255 in both input and output values). Describe how this function will change the appearance of the image.

e) Describe how an image will be changed if it is filtered (convolved) with a 3×3 filter kernel and all kernel values are 1/9.

f) How do you expect an image to be changed if it is filtered with a 3×3 filter kernel with center value 1 and all others has value -1/8.

g) How will the image be changed if the center value is changed to 2 and the others still are -1/8.

h) Explain the principle of a median filter.

i) Explain the principle of the morphological functions erosion and dilation.