

Basic Grey Level Transformation

Thresholding: -

In this method, we increase the contrast by darkening the gray levels below m and brightening the levels above m in the original image. As a result, we obtain a narrower range of gray levels.

Activity No.1

Write MATLAB script to implement Thresholding.

Negative Transformation: -

Generally, the negative transformation of an image having gray levels $[0, L-1]$ is obtained as

$$s=L-1-r.$$

Fig. 4.3 shows the negative transformed image of 'Lena' and its histogram. While input image having the original 'Lena' and its histogram is shown in Fig. 4.4. The intensity levels, in the histogram of a negatively transformed image, are reversed from that of an input image.

Activity No.2

Write a MATLAB script to implement the negative transformation of an input image.

Log Transformation: -

Log transformation can be obtained by the following relation between input, s , and output image, r .

$$s=c\log(r+1)$$

Log transformation expands the values of dark pixels in an image while compressing the higher-level values. The inverse is true for inverse log transformation. Log transformation compresses the dynamic range of images with large variations in pixel values.

Power-law Transformation

The power law transformation between input image, r , and output image, s is given by

$$s=cr^\gamma$$

where c and γ are positive constants.

Activity No.4

Write MATLAB code to implement power law transformation of an image.

Spatial Domain Processing

Contrast Stretching: -

Low contrast images can result from poor illumination, lack of dynamic range in the imaging sensor, wrong setting of a lens aperture during image, and many other factors. So, our goal is to increase the dynamic range of the gray level to enhance the visual appearance of an image.

Activity No.5

Write MATLAB script to obtain $g(l)$, piecewise transformation function.

Gray Level Slicing: -

Gray level slicing is used to highlight a specific range of gray levels in an image. It is used to enhance the features such as masses of water in satellite images or flaws in X-ray images.

Activity No.6

Write MATLAB code to take an input image and implement gray-level slicing.

Bit Plan Slicing: -

In this section, we will discuss the importance of individual bits in image appearance. Bit plane slicing aid in determining the adequacy of the number of bits used to quantize each pixel which is useful for compression. In a grayscale image, each pixel is represented by 8 bits. We can imagine an image consisting of eight 1-bit planes.

Activity No.7

Write MATLAB code to implement bit-plane slicing.