Title: To perform gray level and bit plan slicing on image.

Objectives:

(a) Implement Gray level slicing (intensity level slicing) in to read cameraman image.

(b) Read an 8-bit image and to see the effect of each bit on the image.

(c) Read an image and to extract 8 different planes i.e., 'bit plane slicing."

Aim: To perform gray level and bit plan slicing.

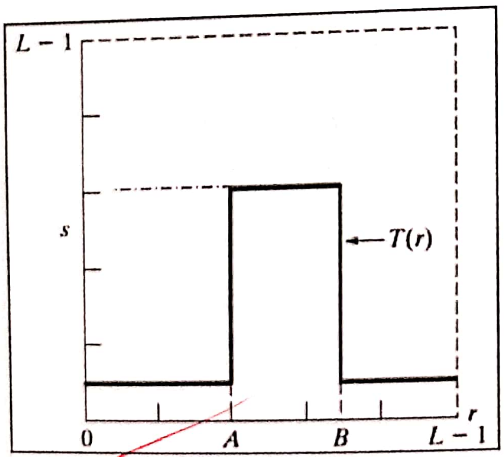
Software: Scilab.

Theory:

1. **Explain the image operation: Gray Level Slicing**

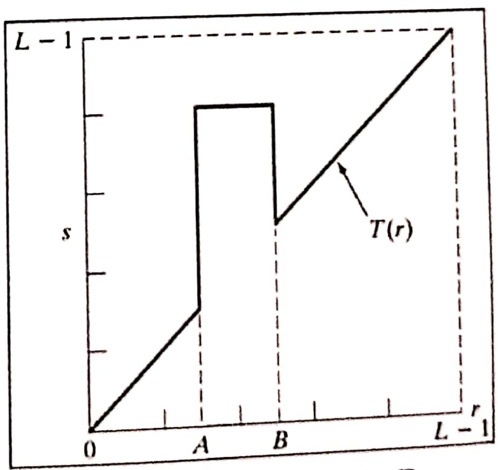
Grey level slicing is **equivalent to band pass filtering.** It manipulates group of intensity levels in an image up to specific range by diminishing rest or by leaving them alone. This transformation is applicable in medical images and satellite images such as X-ray flaws, CT scan.

Without background



$$s = \begin{cases} L; A \le r \le B \\ 0; otherwise \end{cases}$$

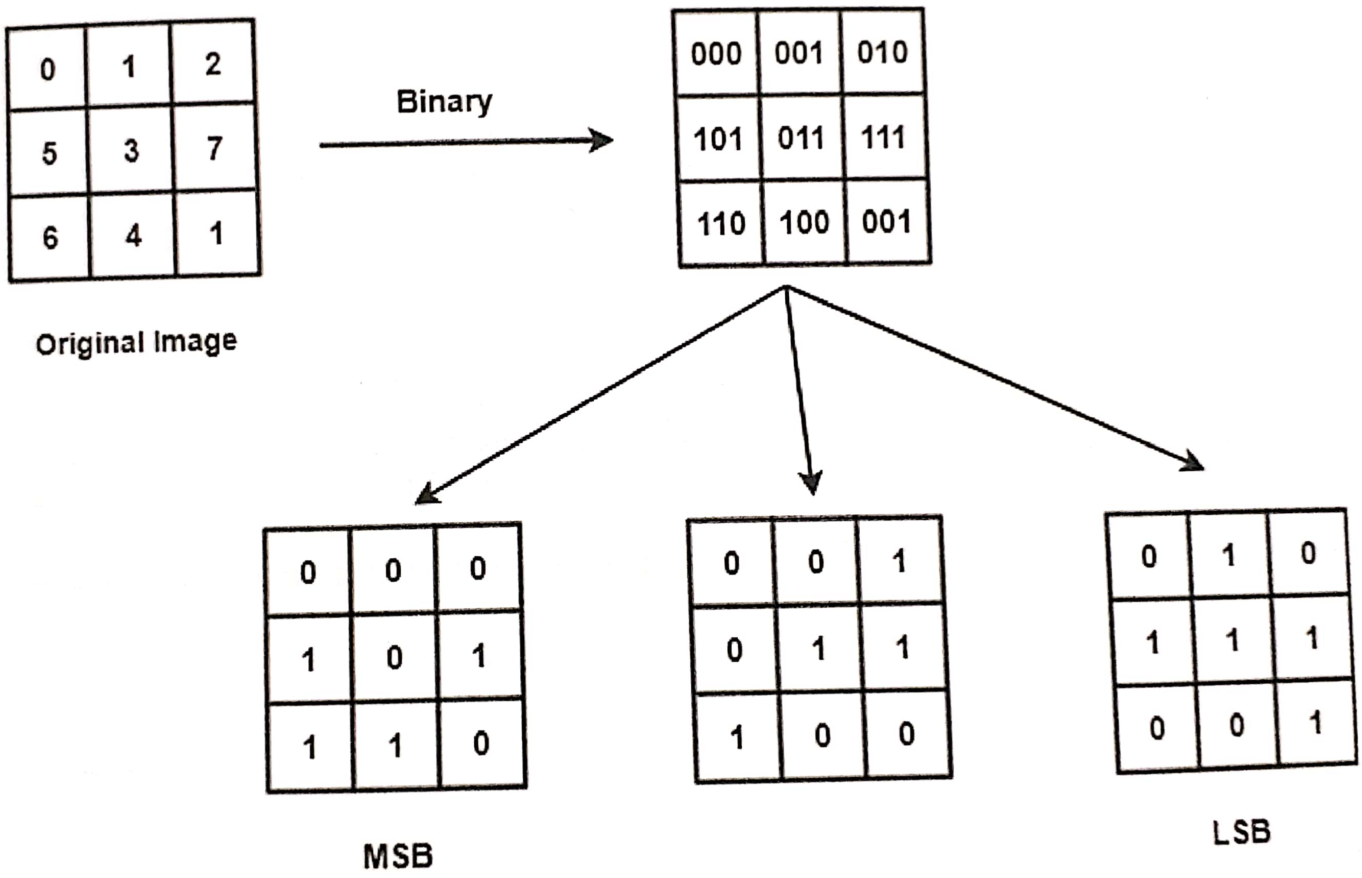
With background



$$s = \begin{cases} L; A \le r \le B \\ r; otherwise \end{cases}$$

2. **Explain the image operation: Bit Plane Slicing.**

Bit plane slicing is **a method of representing an image with one or more bits of the byte used for each pixel.** One can use only MSB to represent the pixel, which reduces the original gray level to a binary image. The three main goals of bit plane slicing are: Converting a gray level image to a binary image.



Experiment No. 8

To perform Image compression using DCT

- TITLE : To perform image compression using DCT
- AIM : To find DCT and IDCT of an Image
- Software : MATLAB / SCILAB
- Theory :

Image compression

1) lossless Compression : In this type of compression the recovered image will be exactly similar the image before compression. The quality of recovered signal didn't get reduced

2) lossy Compression : In this type of compression the recovered image will not be exactly similar to the other image before compression, that's why the quality of image significantly reduced but this type of compression ~~result~~ is very high compression of image data and is very useful in transmitting image over network

③ DCT is total use for lossy data compression because it has very strong energy compaction i.e its large amount of information is stored in very low frequency component of a signal and rest other frequency having very small data which can be stored using very less no. of bits (at most 2 to 3 bits

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(4) to perform DCS transformation of an image, first we have to fetch image information (Pixel value in them of integer having range 0,255) which we divide in block of 8×8 matrix and then we apply discrete cosine transform on that block of data, after applying discrete cosine transform we will see that its more than 90-70 data will be in lower frequency component. For simplicity we took a matrix of size 8×8 having all value as 255 (considering image to be completely white) and we are giving to perform 2.1) discrete cosine transform on that to observe the output

(5) the cosine, sine and hartely transform are unitary transform that utilized sinusoidal basis function as does the fourier transform, the cosine and sine transform are not simply the cosine and sine path of the fourier transform, In fact the cosine and sine path of the fourier transform individually are not orthogonal function, the hartely transform jointly utilized sine and cosine basis functions but its coefficients are real number as contracted with the fourier transform whose coefficient are in general complex number.

(6) DCT refers to discrete cosine transform a mathematical transform related to fourier transform A discrete cosine transform (DCT) the 2-D function is given by

Experiment No. 9

To perform Image restoration using wiener filtering

TITLE : to perform image restoration using weiner filtering

AIM : To generate degraded image using Gaussian Noise and restore the image using weiener filtering.

Software : MATLAB / SCILAB

Theory :

A) image restoration is the process of recovering an image that has be g degraded by some knowledge of degradation function H and the additive noise term n(x,y). This in restoration degradation is modelled and its inverse process is applied to recovered the original image.

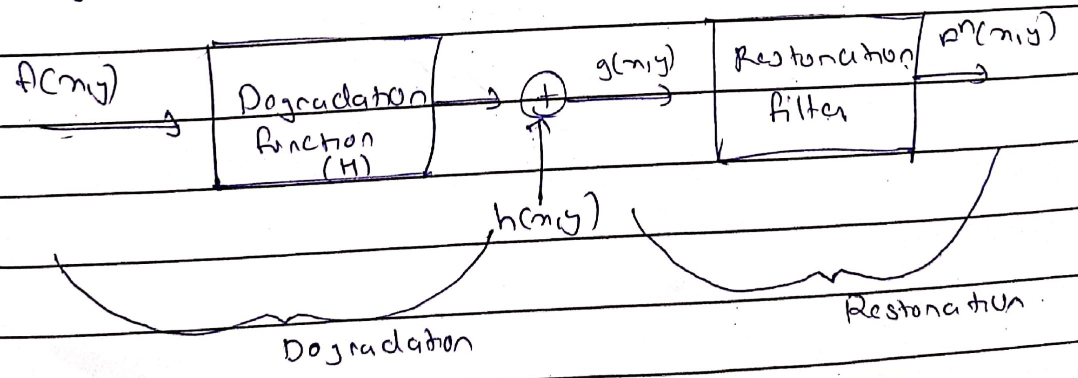

Fig - Image restoration and Image degradation model.

The objective of the image restoration is to obtained an estimate of original image f(x,y). here by some knowledge of h and n(x,y) we find the appropriate restoration filter so that output image function $\hat{f}(x,y)$ as possible since it is practically not possible to completely restore the original image.

Terminology :

$g(x,y)$ = degraded image.

$f(x,y)$ = Input or original image

$\hat{f}(x,y)$ = recovered or restore image

$n(x,y)$ = additive noise term

* In spatial Domain

$$g(x,y) = h(x,y) * f(x,y) + n(x,y)$$

where * represent convolution

* In frequency Domain

after taking fourier transform of the above equation

$$G(u,v) = H(u,v)\, F(u,v) + N(u,v) \quad -①$$

ii) wiener filter :

(minimum mean square error filter) wiener filter executes the optimal trade off it between filtering and Noise smoothing in the blurring simultaneously wiener filter is real and even.

It minimise the overall mean square error

$$\text{error } (e) = \underbrace{f(x,y)}_{\to \text{source image}} - \hat{f}(x,y) \to \text{degraded image}$$

$$\text{Variance } (e^2) = E\left[f(x,y) - \hat{f}(x,y)\right]^2$$

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