Piecewise Linear Functions:-

- ✓ Contrast stretching
- ✓ Grey level slicing
- ✓ Bit plane slicing

Low Contrast Images may result due to one of the following reasons,

- ✓ Poor illumination
- ✓ Lack of dynamic range in the sensor.
- ✓ Wrong setting of the lens.

→ It is used to manuplate the Contrast of an image.

By using simple fiuctns to represent Complex functions.

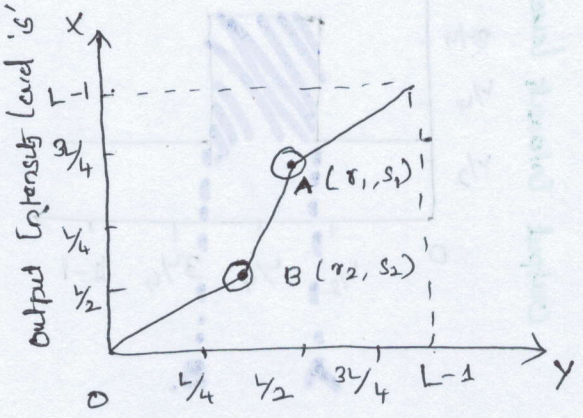
✓ Contranst Stretching. { dark to dark; black to black. / lighter to lighter; white to white }

Condition: 01

If $r_1 = s_1$; $s_2 = r_2$

Transformatin is a linear function.

✓ No changes in grey level



Condition: 02:

If $r_1 = r_2$: { $s_1 = 0$ (black) / $s_2 = L-1$ (white) }

Transformatin between a "thresholding functn"

↳ It creates "binary images"

R. C. Gonzalez and R. E. Woods, Digital Image Processing, Addison-Wesley Publishing Company, 2007.
A. K. Jain, Fundamentals of Digital Images Processing, Pearson Education India, 2015
Web Sources, NPTEL Materials, Other online Resources

Other Conditions :-

a) Range Normalization
b) Clipping
c) Binarization
d) multiple thresholding.

2) Grey level slicing :-

- Highlighting a specific range of grey levels in an image is often required.

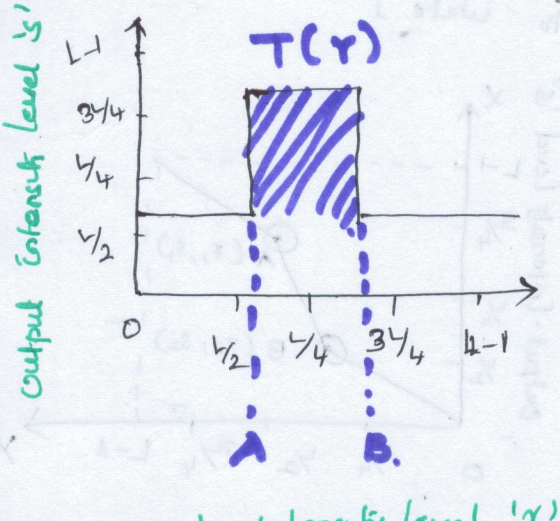
Example :-

Enhancing the flaws in x-ray images.

Two approach :

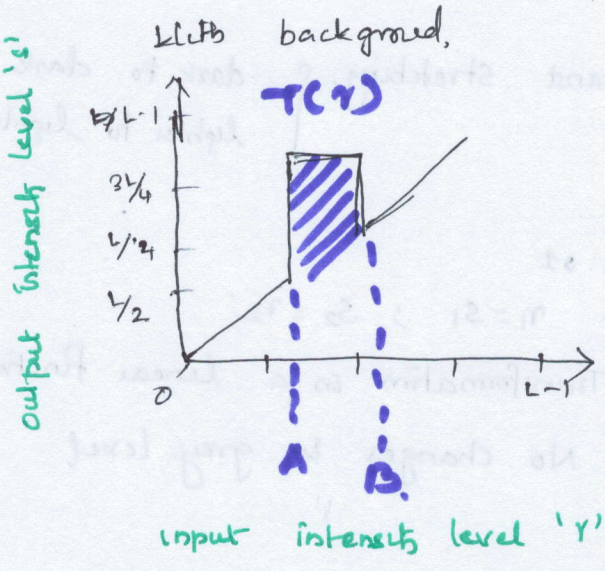
1) Slicing with background
2) Slicing without background.

Klith out background.



$$S = \begin{cases} L-1 & \text{if } a \le r \le b \\ 0 & \text{otherwise} \end{cases}$$

Klith background.



$$S = \begin{cases} L-1 & \text{if } a \le r \le b \\ r & \text{otherwise.} \end{cases}$$

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CS4043D Image Processing

Lecture: Image Enhancement Techniques

Bit-plane Slicing :

- Instead of highlighting the intensity ranges sometimes
- Highlight the contribution made to total image appearance by considering specific bits of the image.
- Image Representation:

No. of Rows × No. of Columns × bit depth

$256 \times 256 \times \underline{8}$ $\quad 2^3 = (8)$

8-bits.

256 grey levels.

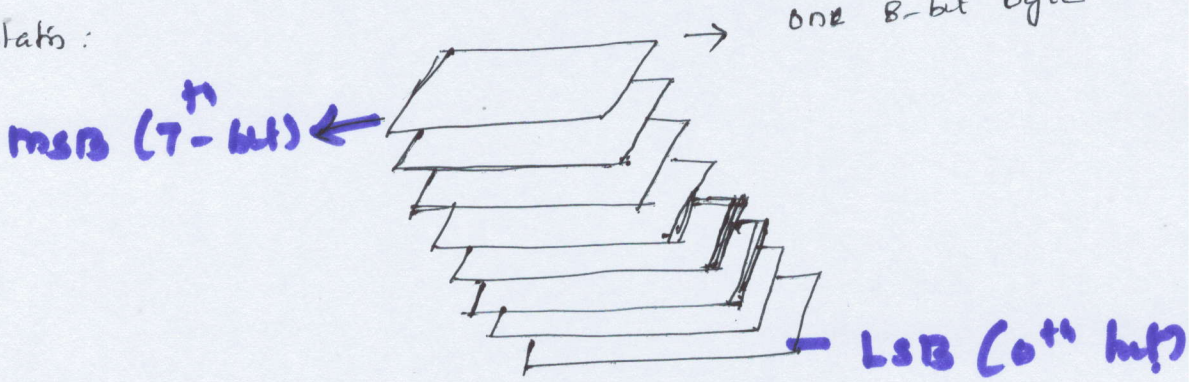
Black: 0 0 0 0 0 0 0 0 → 0 ; 254 ← In between 254 bits.

White 1 1 1 1 1 1 1 1 → 255

0 → 7 ⇒ 8 bits.

LSB → MSB. (Least significant bit to Most significant bit)

Representation:



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Histogram Processing :- CS4043D Image Processing

Lecture: Image Enhancement Techniques

Definition:-

A plot between the probability associated with each gray level versus gray levels in the image.

From this, we can infer whether the given image is

(i) a dark image
(ii) Bright image
(iii) Low Contrast image
(iv) High Contrast image

Histogram of an image represents the relative frequency of occurance of various gray levels in an image.

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