RAMA UNIVERSITY

www.ramauniversity.ac.in

FACULTY OF EGINEERING

Digital Image Processing
LECTURE-13

Mr. Dhirendra

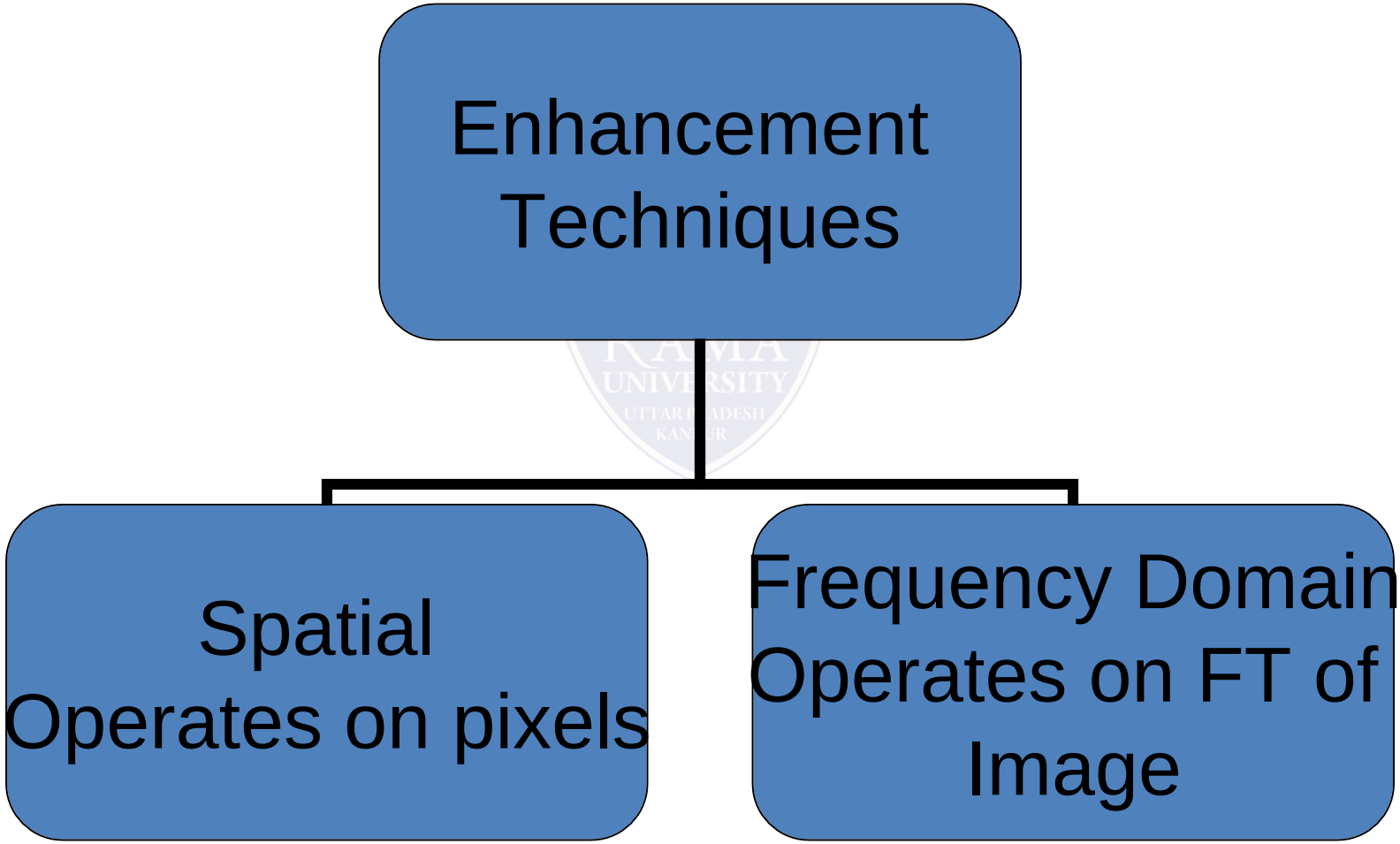
Assistant Professor

Computer Science & Engineering

OUTLINE

- Image Enhancement Techniques
- Spatial Domain Methods
- Grey Scale Manipulation
- Image Negative
- Log Transformation
- MCQ
- References

Image Enhancement Techniques



Spatial Domain Methods

•In these methods a operation (linear or non-linear) is performed on the pixels in the neighborhood of coordinate (x,y) in the input image F, giving enhanced image F'

•Neighborhood can be any shape but generally it is rectangular (3x3, 5x5, 9x9 etc)

$$g(x,y) = T[f(x,y)]$$

Grey Scale Manipulation

•Simplest form of window (1x1)

•Assume input gray scale values are in range [0, L-1] (in 8 bit images L = 256)

•Nth root Transformation

s = c (r)n

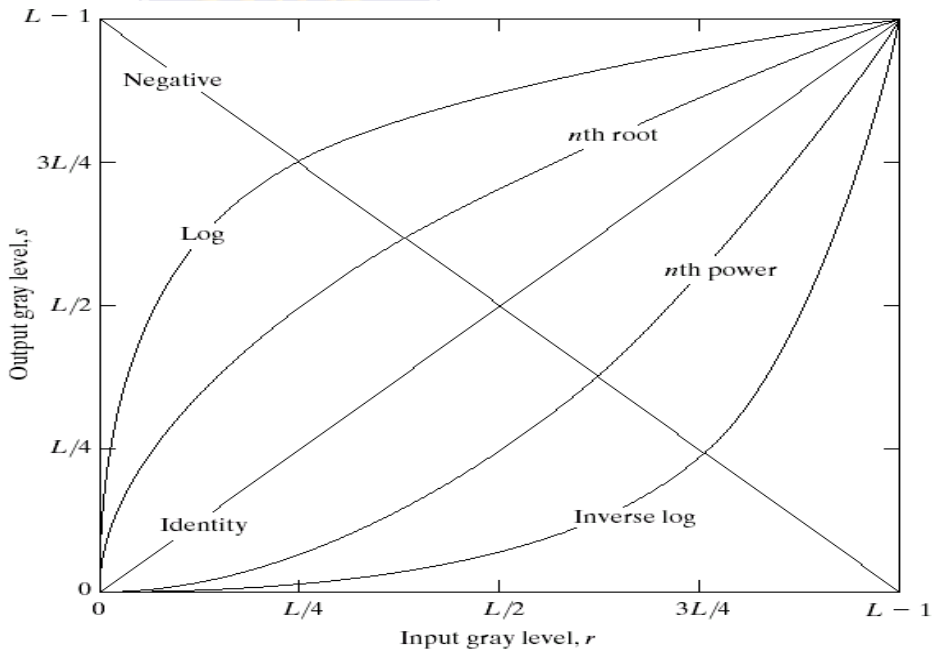
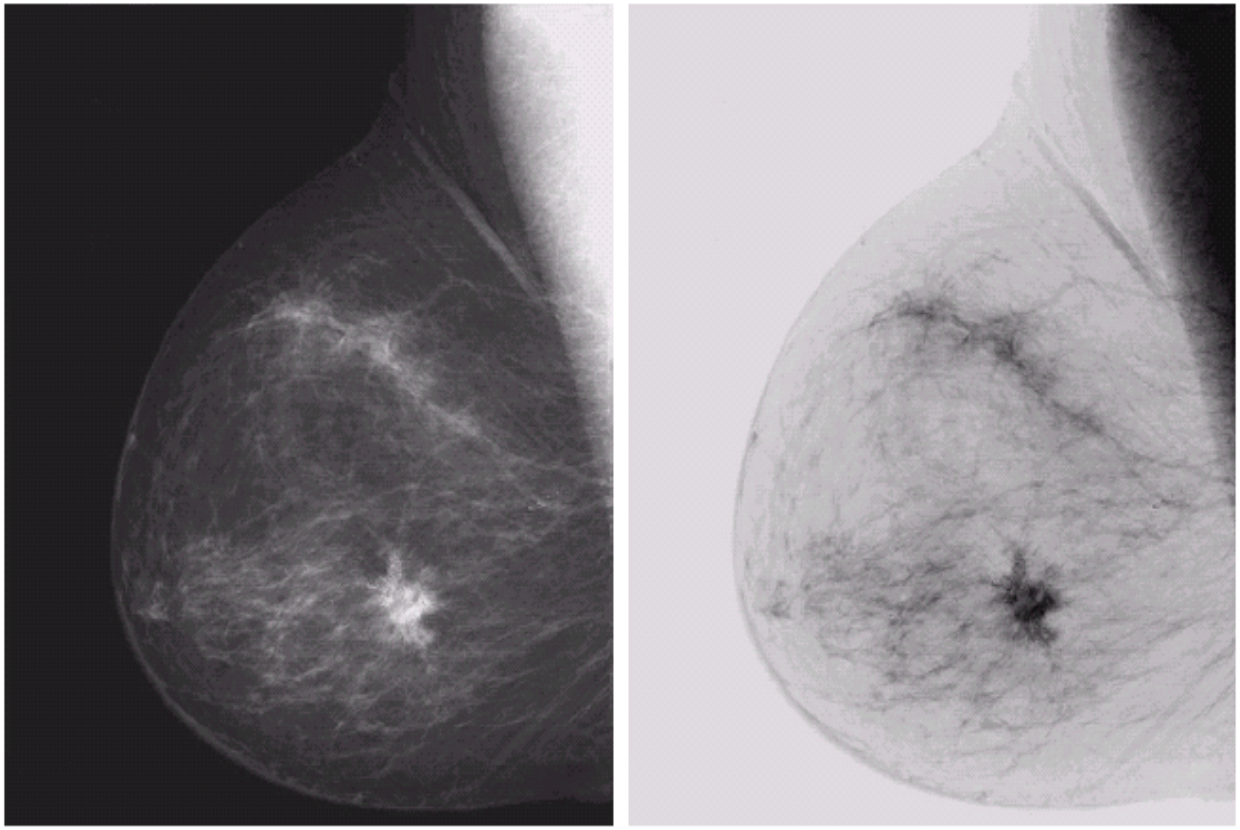


FIGURE 3.3 Some basic gray-level transformation functions used for image enhancement.

Image Negative



a b

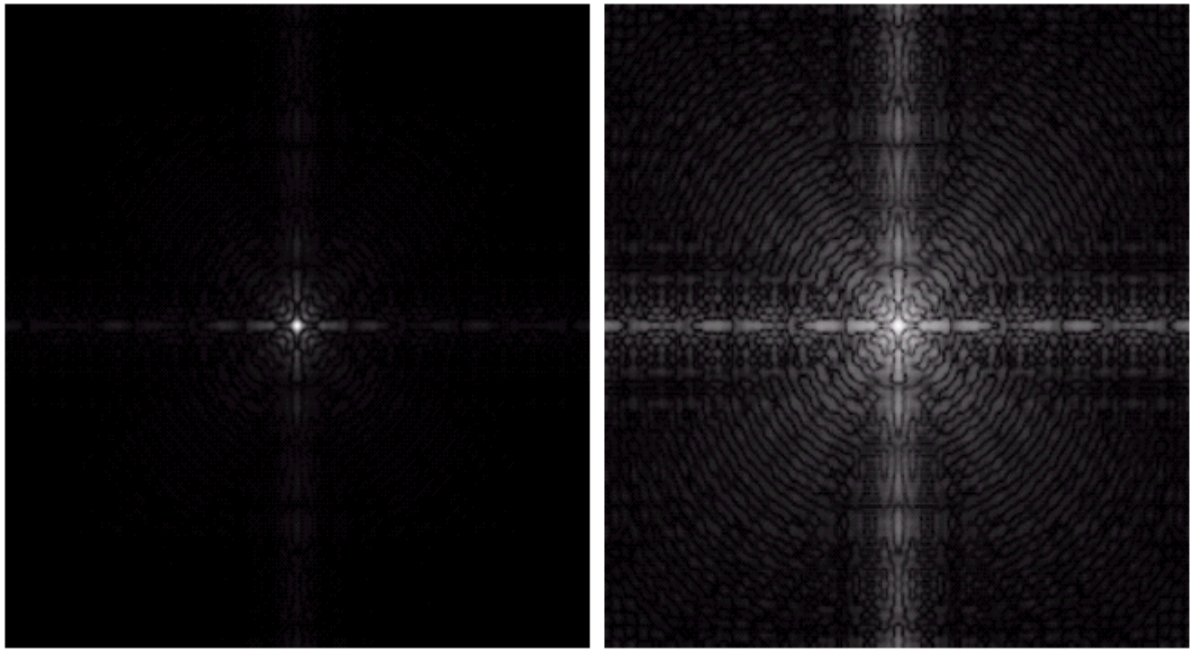
FIGURE 3.4 (a) Original digital mammogram. (b) Negative image obtained using the negative transformation in Eq. (3.2-1). (Courtesy of G.E. Medical Systems.)

Image Negative: $s = L - 1 - r$

Log Transformation

a b

FIGURE 3.5
(a) Fourier spectrum.
(b) Result of applying the log transformation given in Eq. (3.2-2) with $c = 1$.



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

c: constant

- Compresses the dynamic range of images with large variations in pixel values

MCQ

1. Noise reduction is obtained by blurring the image using smoothing filter.
   a) True
   b) False

2. What is the output of a smoothing, linear spatial filter?
   a) Median of pixels
   b) Maximum of pixels
   c) Minimum of pixels
   d) Average of pixels

3. Smoothing linear filter is also known as median filter.
   a) True
   b) False

MCQ

4. Which of the following in an image can be removed by using smoothing filter?

   a) Smooth transitions of gray levels

   b) Smooth transitions of brightness levels

   c) Sharp transitions of gray levels

   d) Sharp transitions of brightness levels

5. Which of the following is the disadvantage of using smoothing filter?

   a) Blur edges

   b) Blur inner pixels

   c) Remove sharp transitions

   d) Sharp edges

References

- https://www.javatpoint.com/digital-image-processing-tutorial
- https://www.geeksforgeeks.org/
- Digital Image Processing 2nd Edition, Rafael C. Gonzalvez and Richard E. Woods. Published by: Pearson Education.
- Digital Image Processing and Computer Vision, R.J. Schalkoff. Published by: JohnWiley and Sons, NY.
- Fundamentals of Digital Image Processing, A.K. Jain. Published by Prentice Hall,Upper Saddle River, NJ.