

Image Processing and Pattern Recognition

Assignment 1

1. Discuss about the importance of Sampling and Quantization in Images with appropriate examples.
2. Define contrast stretching and histogram equalization. How do you perform histogram equalization of gray scale image? Explain
3. What is the basic idea of bi plane slicing? Explain with an example.
4. Write algorithms for
 - a. Histogram Stretching
 - b. Histogram Equalization
 - c. Histogram Matching
5. What is histogram? Explain the histogram equalization technique. Perform the histogram equalization on the following 8-bit gray level image and also scale the intensity from 1 to 20.

3	2	4	5
1	2	1	2
7	3	1	2
7	6	4	7

6. List down the properties of smoothing and sharpening filters. What is the difference between these filters in spatial and frequency domain?
7. A 4*4 size image has following intensity information.

1	2	3	4
5	6	7	8
9	8	6	7
5	4	3	2

Change this image into 8x 8 size image using interpolation method.

8. Explain how image averaging and directional smoothing reduces noise in a digital image.
9. What is Image Transform? List down the different types of Image Transform along with their properties.
10. What is Frequency Domain? List down the equations of 1D-DFT. How can we apply DFT in image. Explain with their equations and properties.
11. How can we perform sharpening in frequency domain? Compare Butterworth high pass filter with Gaussian high pass filter with equations.
12. How Hough Transform can be used for line detection? Explain with an example.
13. How can we obtain the Hadamard Matrix for $N=2$ and $N=4$.
14. Calculate the Haar transform T from the given image matrix F . And then reconstruct the original F by performing inverse Haar transform on T .

$F=$

1	0	0	1
1	1	0	1
1	0	1	0
1	0	1	1

15. What is Fast Fourier Transform (FFT)? Explain FFT algorithms for one dimensional transform. Explain it's computational advantage over DFT.
16. How can we perform compression in Image? Define and discuss about the three types of redundancy for image compression.
17. Find Huffman code and calculate the coding efficiency and redundancy of the following 6 x 6 image:

254	254	100	100		12	12
254	254	100	100		12	12
50	50	50	50		50	50
254	254	100	100		12	12
254	254	100	100		12	12
254	254	100	100		12	12

Also make a comparison between this code and 8 bit fixed coding scheme.