

**FUNDAMENTALS OF IMAGE PROCESSING**  
**SUBJECT CODE: 2181102**  
**B.E. 8th SEMESTER**

**Submission date: 16/01/2018**

**ASSIGNMENT 1**

- 1 Draw and Explain basic block diagram of image processing system.
- 2 Explain Sampling and quantization in image and How does one avoid aliasing?
- 3 Explain different types of image file formats.
- 4 Differentiate between spatial resolution and intensity resolution
- 5 Differentiate between image enhancement and image restoration.
- 6 Make comparison between point processing and neighborhood processing techniques.
- 7 Compare various methods of image interpolation.
- 8 Explain Basic Intensity (Gray Level) transformation.
- 9 Explain and write MATLAB/SCILAB code for contrast stretching and dynamic range compression

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**ASSIGNMENT 2**

- 1 What is histogram? Explain histogram equalization algorithm. Write pseudo code or Matlab code for calculation of histogram and histogram equalization
- 2 What is mean and standard deviation of the histogram? What are the physical significances of these quantities?
- 3 Given histograms (a) and (b), modify the histogram of image (a) as per the histogram of image (b).

Histogram (a)

Gray Level	0	1	2	3	4	5
No of pixel	790	1023	850	656	329	245

Histogram (b)

Gray level	0	1	2	3	4	5
No of pixel	0	0	0	614	819	1230

- 4 Consider that the digital image is corrupted by following noises individually: 1. Salt & pepper noise, 2. Salt noise only, 3. Pepper noise only. Suggest & explain the best suitable spatial filtering methods to remove the noise from the image in each case.
- 5 There are two images I1 and I2. They have identical histograms. Suppose we form a third image I3 as  $I3 = I1 - I2$ . Will this image I3 be a zero image? Give reason for your answer.

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**ASSIGNMENT 3**

- 1 Explain spatial domain low pass (smoothing) filtering
- 2 Explain spatial filtering process. Write MATLAB code for convolution of 3x3 filter mask with image of size MxN. Write 3x3 mask for low pass filtering and high pass filtering.
- 3 Discuss steps of image filtering in frequency domain.
- 4 Explain and write MATLAB/SCILAB code for Butterworth high pass filter in frequency domain.
- 5 Explain Homomorphic filtering and write MATLAB/SCILAB code for it.
- 6 Discuss frequency domain formulations of the Laplacian, Unsharp masking, Highboost filtering, and High-frequency-emphasis filtering with applications.
- 7 Explain two dimensional DFT and state any three properties of 2-D DFT
- 8 What is wavelet? Explain how wavelet transform is used to decompose image with help of block diagram?

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**ASSIGNMENT 4**

- 1 Draw and explain Image Degradation Model and also explain different image noise models.
- 2 Explain Inverse Filtering and Wiener Filter
- 3 Write a detailed note on image pyramids and sub-band coding.
- 4 Which are the different types of colour image processing? Explain them.
- 5 Explain RGB color model and its application.
- 6 Explain Pseudo coloring.
- 7 Discuss CMY color model. Why CMYK color model is required?
- 8 Differentiate between radiance and luminance using one example.
- 9 Write a short note on all-system-safe colors.

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**ASSIGNMENT 5**

- 1 What is redundancy in an image? Explain different types of redundancy in an image.
- 2 Derive Huffman code for encoding gray levels in image and find compression ratio.

3	3	3	2
2	3	3	3
3	2	2	2
2	1	1	0

- 3 Find the Huffman code for the following stream of data.  
 {a,a,a,a,a,b,b,b,c,c,c,c,c,d,d,d,d,d,d,d,d,d,e,e,e,e,f}

- 4 With the following symbols and their probabilities of occurrence, encode the message “ACBA” using the arithmetic coding algorithm.

symbol	A	B	C
probability	0.8	0.02	0.18

- 5 Consider the 9 x6, 8- bit image. Perform LZW encoding.

10	15	20	100	200	255
10	15	20	100	200	255
10	15	20	100	200	255
10	15	20	100	200	255
10	15	20	100	200	255
10	15	20	100	200	255
10	15	20	100	200	255
10	15	20	100	200	255
10	15	20	100	200	255

- 6 Explain Lossy compression and compare Lossless and Lossy compression.

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**ASSIGNMENT 6**

- 1 What is edge detection? Explain and compute the Gradient.
- 2 Explain Prewitts and Sobel Operators and also write MATLAB/SCILAB code for sobel operator.
- 3 Explain importance of thresholding in image segmentation and also explain Global, Local and Optimum thresholding.
- 4 Explain region splitting and merging.
- 5 Explain edge detection using first –order derivatives.
- 6 Explain segmentation using second derivatives-laplacian.
- 7 Explain Region filling.
- 8 List out various basic morphological algorithms and explain any one in detail.
- 9 Explain Dilation and erosion of a pseudo image with MATLAB/SCILAB code.
- 10 Explain HIT-or-MISS Transformation.
- 11 Explain Thinning and Thickening Transformation.

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