Digital Image Processing Assignment 1

1. Define Digital Image. With a neat block diagram explain the fundamental steps of image processing.

2. The process of image acquisition by sensors strips and sensor arrays is essential in image processing. Justify.

3. Explain four basic gray level transformation techniques.

4. Medical imaging and health care require application of image processing. Justify.

5. Explain the role of arithmetic and logic operations on image enhancement.

6. Let p and q are two pixels at coordinates (100, 120) and (130, 160) respectively Compute
   i. Euclidean distance
   ii. Chess board distance
   iii. Manhattan distance

7. Consider the gray scale image in matrix form. Let each element be a pixel of an image and values of the elements represent intensities of the pixels. Perform histogram equalization on this image and scale the intensity to 1-20.

$$\begin{pmatrix} 3 & 2 & 4 & 5 \\ 7 & 7 & 8 & 2 \\ 3 & 1 & 2 & 3 \\ 5 & 4 & 6 & 7 \end{pmatrix}$$

8. Discuss the limiting effect of repeatedly applying a 3x3 low-pass spatial filter to a digital image. You may ignore border effects. Is this effect different from applying 5x5 filter?

9. Explain the role of sampling and quantization with an example.

10. Consider the image segment, Set v= {0,1), Compute the lengths of shortest 4, 8 and m – path between p and q. If path does not exists between p and q, explain why.

$$\begin{pmatrix} 3 & 1 & 2 & 1 & (q) \\ 2 & 2 & 0 & 2 & \\ 1 & 2 & 1 & 1 & \\ (p)1 & 0 & 1 & 2 & \end{pmatrix}$$

11. Explain image smoothing spatial filters and sharpening spatial filters

12. Compare image enhancement and image restoration.