Assignment Questions – Unit 2.

| Unit 2 | | |
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|  | Explain the following intensity transformations using suitable diagrams.   * 1. Gamma Transformations   2. Contrast Stretching | |
| 2. | Explain the following intensity transformations using suitable diagrams.   * + - * 1. Contrast Stretching         2. Thresholding function | |
| 3. | What is histogram? Explain the process of histogram equalization using an example. | |
| 4. | Explain the following intensity transformations using suitable diagrams.  Log and Inverse Log Transformation  Power Law transformation | |
| 5. | Give an example with explanation where each of the following changes to gamma would be desirable.   * 1. Set Gamma > 1   2. Set Gamma < 1 | |
| 6. | Explain the two variation of Intensity level slicing using a suitable diagram. | |
| 7. | What is Bit- Plane Slicing? What is the advantage of applying Bit- Plane Slicing on an image? | |
| 8. | Find all the bit planes of the following 4 bit image  0 3 7 8  1 1 2 2  3 14 15 13  4 6 9 11 | |
| 9. | Perform Histogram equalization for the following image. Plot original and equalized histogram.   | 4 | 4 | 4 | 4 | 4 | | --- | --- | --- | --- | --- | | 3 | 4 | 5 | 4 | 3 | | 3 | 5 | 5 | 5 | 3 | | 3 | 4 | 5 | 4 | 3 | | 4 | 4 | 4 | 4 | 4 |   Sol:   | no-n | 3 | 4 | 5 | | --- | --- | --- | --- | | N | 6 | 14 | 5 | | Pr(n) | 6/25=.24 | 14/25=.56 | 5/25 =.20 | | S(n) | 3\*.24=.72 -> 1 | 3\*.56=1.68 -> 2 | 3\*.20=.6 ->1 | |
| 10. | Perform histogram equalization and draw new equalized histogram for the following image data. |
| 11. | Perform histogram equalization and draw new equalized histogram for the following image data.   | Grey level | | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | | No of Pixels | 400 | | 700 | 1350 | 2400 | 3000 | 1500 | 650 | 0 | |
| 12. | Histogram of an image with 8 quantization levels is given below. Perform histogram equalization. Draw original and equalized histogram. |
| 13. | What is low pass filtering? Discuss the image smoothing filters in spatial domain.   * Average * Weighted Average |
|  | What is salt and pepper noise and how does a median filter remove it? |
| 14. | How does Weighted average filter reduce the effect of blurring as compare to average filter.  Apply the below filter to the given image-   | Input Image   | 40 | 40 | 200 | 40 | 40 | | --- | --- | --- | --- | --- | | 40 | 40 | 40 | 40 | 40 | | 40 | 40 | 100 | 40 | 40 | | 40 | 0 | 40 | 40 | 40 | | 40 | 40 | 0 | 40 | 40 | | 40 | 40 | 40 | 40 | 40 | | Kernel   |  | 1 | 2 | 1 | | --- | --- | --- | --- | | 1/16 | 2 | 4 | 2 | |  | 1 | 2 | 1 | | | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | |
| 15. | Discuss and show the effect of order-statistics filters median, mean on the following-   1. Isolated pixels 2. Thin line 3. A step edge 4. A corner |

MCQ:

### **What is the primary purpose of intensity transformation in image processing?**

a) To improve the image resolution  
b) To enhance image details by modifying pixel intensities  
c) To reduce the size of the image  
d) To convert an image into grayscale

**Answer**: b) To enhance image details by modifying pixel intensities

### **Which of the following intensity transformations enhances the contrast of an image by stretching the range of pixel values?**

a) Logarithmic transformation  
b) Power-law transformation  
c) Contrast stretching  
d) Histogram equalization

**Answer**: c) Contrast stretching

1. **What is the result of applying a logarithmic intensity transformation to an image?**

a) Enhances bright areas of the image  
b) Increases the overall contrast  
c) Brightens dark regions while compressing bright regions  
d) Makes the image grayscale

**Answer**: c) Brightens dark regions while compressing bright regions

### **Which transformation is often used to improve the brightness of an image, especially in low-intensity regions?**

a) Exponential transformation  
b) Logarithmic transformation  
c) Linear transformation  
d) Gamma correction

**Answer**: b) Logarithmic transformation

### **What is the main advantage of applying contrast stretching to an image?**

a) It can remove noise from the image  
b) It enhances the visibility of features by expanding the range of pixel values  
c) It increases the image resolution  
d) It converts the image into grayscale

**Answer**: b) It enhances the visibility of features by expanding the range of pixel values

### **What is the main objective of histogram equalization in image processing?**

a) To reduce the image resolution  
b) To improve the contrast of an image by redistributing pixel intensities  
c) To convert the image to grayscale  
d) To smooth out the image noise

**Answer**: b) To improve the contrast of an image by redistributing pixel intensities

### **Histogram equalization is most effective when applied to images with:**

a) Low contrast  
b) High contrast  
c) Already equalized histograms  
d) Noisy backgrounds

**Answer**: a) Low contrast

### **Which of the following is the result of applying histogram equalization to an image?**

a) The image is turned into black and white  
b) The pixel intensities are uniformly distributed  
c) The image size is reduced  
d) The image is blurred

**Answer**: b) The pixel intensities are uniformly distributed

### **After applying histogram equalization, the histogram of the output image is:**

a) Concentrated around a small range of intensities  
b) Uniformly spread across all possible intensity values  
c) The same as the input histogram  
d) A smooth bell curve

**Answer**: b) Uniformly spread across all possible intensity values

### **What is the significance of the least significant bit (LSB) in bit-plane slicing?**

a) It carries the most important information of the image  
b) It carries the least important details and is often used for hiding data  
c) It represents the highest contrast features of an image  
d) It stores the grayscale values of an image

**Answer**: b) It carries the least important details and is often used for hiding data

### **When performing bit-plane slicing on an 8-bit grayscale image, how many bit planes will be generated?**

a) 1  
b) 4  
c) 8  
d) 16

**Answer**: c) 8