



# Image Understanding and Processing

## Tutorial 04

Year 4

Semester 1, 2025

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1. .... is useful for image compression

- a) Contrast stretching
- b) Intensity-level slicing:
- c) Bit-plane slicing
- d) Power-Law Transformations
- e) All the above

2. -----are particularly effective in the presence of impulse noise.

- a) First order derivative filters
- b) Second order derivative filters
- c) Median filters
- d) Mode filters
- e) Averaging filters

3. The following matrix represents an image section of 8-bit image, apply the Logarithmic transformation where the constant equal 1, and find the new resulting image pixel value which is highlighted.

110	133	123
23	45	149
210	0	255

- a) 2.04
- b) 1.38
- c) 1.66
- d) 2.42
- e) 2.17

4. Perform Power Law Transformation where  $r$  and  $s$  are the input and output pixel value if  $c=1$  and  $\gamma=1.2$

240	240	250
180	200	220
165	155	170

718	718	754
509	577	647
458	425	475

a)

572	572	600
407	461	516
366	340	380

b)

718	718	622
401	423	559
412	397	429

c)

600	600	628
449	470	516
458	390	475

d)

718	756	753
500	588	657
458	425	475

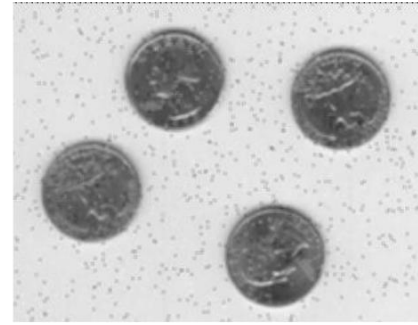
e)

5. What is the transformation method used in below image?



- a) Log transformation
  - b) Negative Transformation
  - c) Power Low Transformation
  - d) Inverse Log Transformation
  - e) None of the above
6. Select the correct statement on Gray Level Slicing
- a) Gray Level Slicing expands the range of intensity levels in an image
  - b) Gray Level Slicing can be done only, by setting all the pixel values within the range to one value and others to another value
  - c) Gray Level Slicing maps a wide range of low gray levels in the output image in to a narrow range of output levels
  - d) Gray Level Slicing is used to highlight a specific range of intensities in an image
  - e) None of the above

7. The original image is with 'salt-and-pepper' noise then filtered with a (3-by-3) filters. Identify which filter does to obtain the outputs given below?



F1



F2

- a) F1:Mean Filter, F2 :Median Filter
  - b) F1:Median Filter, F2 :Mean Filter
  - c) F1:Geometric Mean Filter, F2 :Median Filter
  - d) F1:Mid-point Filter, F2 :Mean Filter
  - e) None of the above
8. As a final year project requirement, assume you have to send a square image with a length of 2048 pixels to your group members. The image is a color image with each color having 256 intensity levels. If the mail system allows you to send files up to a maximum size of 8 MB (MegaBytes). Answer the following questions.
- i. What is the total number of bits required to store the original image?
    - a)  $2048 \times 2048 \times 8$  bits
    - b)  $2048 \times 2048 \times 256$  bits
    - c)  $2048 \times 2048 \times 256 \times 3$  bits
    - d)  $2048 \times 2048 \times 8 \times 3$  bits
    - e) None of the above
  - ii. How many bits of each color will it require to compress and send the file to your group members in such a way that it retains the important features of the image?
    - a) 8 bits
    - b) 5 bits
    - c) 6 bits
    - d) 7 bits
    - e) None of the above