## Department of Computer Science and Engineering

## National institute of Technology calicut

# CS4043 IMAGE PROCESSING
## *Exercise Set 1*

***Date of posting assignment : 27/12/2018***
***Date of Submission : 3/1/2019***

1. Write a program to read and display an image ?

   (a) Find the maximum and minimum pixel value in the image.

   **[1 mark]**

2. Take an image of size 1024 * 1024. Reduce the spacial resolution by half by replacing each 2 by 2 block of pixel by a single pixel. The gray value of the pixel can be taken as the mean of the four pixels in the block. To have a better comparison bring the image up to size 1024 * 1024 by row and column pixel replication. Repeat the experiment to reduce the resolution to 256 by 256, 128 by 128, 64 by 64 32 by 32 and 16 by 16. In all cases bring the image to its original size. **[2 marks]**

3. Create an image of size 64x64 where

   $$I(i,j) = \left| cos\sqrt{(i^2 + j^2)} \right|$$

   Display the image? **[1 mark]**

4. Quantize the intensity levels in the above image by dividing the range [0,1] into four equal intervals. Quantization happens according to the following table.

| Image gray level | Output gary level |
|---|---|
| $0 \leq I < 0.25$ | 0 |
| $0.25 \leq I < 0.5$ | 0.25 |
| $0.5 \leq I < 0.75$ | 0.5 |
| $0.75 \leq I < 1$ | 0.75 |
| 1 | 1 |

**[2 marks]**

5. 4 level quantization of the intensities of the imagei n Question 1.(max_intensity interval divided into 4 equal intervals and follow the scheme in the previous question). **[2 marks]**

6. 8 level quantization of the intensities of the image Question 1.(max_intensity interval divided into 8 equal intervals and follow the scheme in the previous question). Observe the difference in image quality (with image in question 5). **[2 marks]**

## Outputs Required

- Create EXERCISE1.tar file containing code for all questions with following naming convention.
  $EXE < number > \_ < rollnumber > \_ < firstname > \_ < questionnumber > if < partnumber > . < extension >$

- Output images with naming convention $< questionnumber > if < partnumber >$

- Observations (comparing images) in a Text file for question 2 and 6 with naming convention $< questionnumber > if < partnumber >$.