Department of Computer Science and Engineering
National institute of Technology Calicut
CS4043 Image Processing
Programming Assignment I

Date of posting assignment : 08/08/2017 Date of Submission : 05/09/2017

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1. *You can use any programming language or tool of your convenience.*
2. *Do not use built-in functions.*

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1. Write a function to convolve 2 sequences f and g of length N.
2. Write a program to find the Fourier Transform of a sequence of length N.
3. Find the Fourier Transform of sequence $f[u]$ using the function in Question 1. Change the value of $F[0]$ to 0 and take the inverse Fourier transform.
4. Implement a function to convolve 2 sequences f and g of length N & M respectively using DFT.
5. Write a program to read and display an image ?
   (a) Find the maximum and minimum pixel value in the image.
   (b) Quantize the image assuming 4 bits are allocated per pixel.
6. Consider the following continuous function

$$f(x\,,y) = \tfrac{1+sin(2\pi(x+y))}{2} \qquad 0 \leq x\,,y \leq 1$$

   (a) Convert to 100×100 image. Determine sampling intervals Δ_x and Δ_y?
   (b) Let $\Delta_x = 0.1$ and $\Delta_y = 0.2$. What is the size of sampled image?
7. Create an image of size 32×32 where

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

Display the image?

8. 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 Gray 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

Output Required

1. Create ASSIGNMENT1.zip file containing code for all questions with following naming convention.

2. ASSG1 $<$ *rollnumber* $><$ *firstname* $><$ *questionnumber* $>$ *if* $<$ *partnumber* $>$. $<$ *extension* $>$

3. Observations in a Text file with naming convention $<$ *questionnumber* $>$ *if* $<$ *partnumber* $>$.

4. A submission link will be activated in the course page on the due date. Students can upload their respective folders through this link.

5. Electrical students may prepare the submissions in the same format and can send to my email ID - pournamipn@nitc.ac.in - with *IP Assignment1* in the subject line.