Al-Mansoura University
Faculty of Engineering
Communications & Electronic Dept.
Information Theory and Coding

Time: 3 Hours.
Postgraduate Exam.
Sep 2013
Dr. M. Morsy

Attempt in All Questions and Assuming Any Missing Data.

Q1:

(a)- Define the following technical terms; **Sampling process, Oversampling, Undersampling**, and **Nyquist criterion**.

(b)- Explain the different electromagnetic radiation used as an energy source for image acquiring.

(c)- Describe how to use the different digital image processing techniques for automatic process of the postcodes from envelopes.

(d)- Define the **colourmap, grayscale colourmap, false colourmap**, and **true colour** images.

(e)- Define the following image compression methods, lossless and lossy.

(20 Marks).

Q2:

(a)- Define the following Matlab function; **imread, montage, imwrite, load,** and **save**.

(b)- Define the **brightness quantization**, and a **pixel neighbourhood**.

(c)- Define the **spatial, temporal**, and **bit resolution** of a digital image.

(d)- Write a Matlab code which loads the indexed image X from a MAT-file, **"Clown.mat"**, that contains the data matrix and the associated colormap and then writes the image to a BMP file.

(e)- Design a Matlab function to convert intensity image to binary image using dithering algorithm. The inputs of the function are the input filename and the output filename, and draw the results.

(20 Marks).

Q3:

(a)- Define with drawing the **CCD digital** camera, and the **flat bed scanner.**

(b)- Define the following image formats, **gif, jpg, bmp, png**, and **tiff**. Make a comparison between its properties.

(c)- Explain the following Matlab IPT functions, **dither, gray2ind, graythresh, im2bw, ind2gray**, and **rgb2gray**.

(d)- A **'CtBrain.tif'** is a graphic image file contains multiple images. Write a Matlab code to find who many slices in this file, the size of each slice, kind of the images, read, and stores the images in a four-dimensional array.

(e)- Design a Matlab function to convert a true color image to a grayscale image.

(20 Marks).

Q4:

(a)-Define the following type of images; **binary**, **gray**, and **indexed**.

(b)- Define the Matlab IPT functions, **imadjust** and **mat2gray**.

(d)- Describe the following Matlab commands: **imshow**(I,[low high]), **imshow**(I,[ ]), **imshow**(RGB); **imshow**(BW), **imshow**(X,map), and **imshow**(filename).

(e)- Write a Matlab function to make a selective contrast adjustment of a grayscale image using **imadjust** of **IPT**. The function will ask about the lower and higher gray levels to make this process. Hence, write the necessary Matlab commands to carry out this process.

(20 Marks).

Q5:

(a)- Define the **Matlab IPT** functions, **immultiply** and **im2uint8**.

(b)- Write a Matlab function to multiply a certain gray level for a gray scale image. The input of this function is the image file name and the output is the modified image. The function will be asked about the gray level to be multiplied.

(c)- Explain with drawing how to perform the contrast stretching process of a grayscale image.

(d)- Write a Matlab function to perform the contrast stretching process of a grayscale image. The function will ask about the thresholding gray level and the power of the exponential function using the modular programming technique. Hence, write the necessary Matlab commands to carry out this process.

(20 Marks).

With My Best Wishes
Dr. Muhammad El-said Morsy
September 2013