Marking Scheme

Exam Paper
BSc CS

Digital Image Processing (0750474)

First exam                Second semester                Date: 21/03/2012

Section 1
Weighting 20% of the module total

Lecturer:                Coordinator:                Internal Examiner:
Dr. Qadri Hamarsheh     Dr. Qadri Hamarsheh     Dr. Nameer N. EL-Emam
Marking Scheme

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The presented exam questions are organized to overcome course material through 6 questions. The *all questions* are compulsory requested to be answered.

Marking Assignments

**Question 1** This question is attributed with 4 marks if answered properly; the answers are as following:

1. Imaging Radar Technology is an application of ________ band.
   - a) Radio waves
   - b) Gamma Rays
   - c) Ultra Violet
   - d) Micro Waves

2. One of the following functions is not an IPT (image processing toolbox) function used to convert images.
   - a) dither ()
   - b) rgb2gray ()
   - c) gray2rgb ()
   - d) ind2gray ()

3. The colormap array of the indexed image is always of class
   - a) uint8
   - b) uint16
   - c) double
   - d) logical

4. By default, Matlab stores most data in arrays of class
   - a) uint8
   - b) uint16
   - c) double
   - d) logical

**Question 2:** This question is attributed with 2 marks if answered properly, the answers are as following:

- Radiation from Electromagnetic Spectrum
- Acoustic
- Ultrasonic
- Electronic (in the form of electron beams used in electron microscopy)
- Computer (synthetic images used for modeling and visualization)

**Question 3:** This question is attributed with 3 marks if answered properly, the answers are as following:

<table>
<thead>
<tr>
<th>Image Type</th>
<th>Data Classes</th>
<th>Range</th>
<th>Number of matrices</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Intensity (Grayscale images)</td>
<td>uint8  uint16 double</td>
<td>0-255  0-65535 0-1</td>
<td>1</td>
</tr>
<tr>
<td>2. Binary Image</td>
<td>logical</td>
<td>0 or 1</td>
<td>1</td>
</tr>
<tr>
<td>3. Indexed Image</td>
<td>Index image (uint8, uint16,double) Color mapped image (double)</td>
<td>As in intensity images</td>
<td>2</td>
</tr>
<tr>
<td>4. RGB Images</td>
<td>uint8  uint16 double</td>
<td>As in intensity images</td>
<td>3</td>
</tr>
</tbody>
</table>
**Question 4:** This question is attributed with 3 marks if answered properly, the answers are as following:
The complete code for this question as the following:

```matlab
RGB = imread('peppers.png');    % 1 mark
red = RGB(:,:,1);               % 1 mark
green = RGB(:,:,2);             % 1 mark
blue = RGB(:,:,3);              % 1 mark
imshow(red), figure ,
imshow(green),figure
imshow(blue), figure,
imshow (RGB);                   % 1 mark
```

**Question 5:** This question is attributed with 3 marks if answered properly, the answers are as following:
The complete code for this question as the following:

```matlab
function [q] = imblend(p1,p2,br)
%IMBLEND Computes the blended version of two grayscale input images
%[Q]=IMBLEND(P1,P2,BR) Computes Q blended image
%using the equation Q(I,J)=BR*P1(I,J)+(1-BR)*P2(I,J)
%using low-level processing
%M: Mixing proportion or blending ratio, which determine the influences
[M N d] = size(p1);
qu = uint8(zeros(M,N));            % 1.5 mark
for x= 1:M
    for y=1:N
        q(x,y)=uint8(br*p1(x,y)+(1-br)*p2(x,y));
    end
end
image(q),figure, image(p1), figure, image(p2)     % 1.5 mark
```

**Question 6:** This question is attributed with 5 marks if answered properly, the answers are as following:
The complete code for this sub question as the following:

```matlab
A=imread('cameraman.tif');  % Read in 1st image           % 1 mark
B=imread('pout.tif'); % Read in 2nd image            % 1 mark
A1 = A(1:200,1:200);        % 1.5 mark
B1 = B(end-199:end,end-199:end);   % 1.5 mark
subplot(1,3,1), imshow(A); title('1st image') % Display 1st image
subplot(1,3,2), imshow(B); title('2nd image') % Display 2nd image
Output = imsubtract(A1, B1);     % 1.5 mark
subplot(1,3,3), imshow(Output);
title('subtract images') % subtract images % 1 mark
```