Department of Computer Science
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…14th.. March 2018
…10:00-11:50…

Lab 7th **Color image processing**

Objectives

To learn how to convert between color spaces and to apply for on color image processing

1. Learn how to represent RGB color images
2. Learn how to represent color indexes
3. Learn how to process pseudo-color images

Experimentations

1. Create gray scale image by the following instructions:

   ```
   I = repmat(uint8([0:255]), 256, 1);
   figure, subplot(1,2,1), subimage(I), title('Original Image');
   ```

2. Slice the image and display the results.

   ```
   I2 = grayslice(I, 16);
   subplot(1,2,2), subimage(I2, colormap(winter(16)) );
   title('Pseudo-colored with "winter" colormap')
   ```

   Question 1) What does the value 16 represent in the function call for grayslice?

   Question 2) In the statement subimage(I2,colormap(winter(16))), what does the value 16 represent?

3. In the above procedure, we sliced the image into equal partitions by grayslice function. In the case of slice the image into unequal partitions and display the result, we can operate by the following:

   ```
   levels = [0.25*255, 0.75*255, 0.9*255];
   I3 = grayslice(I,levels);
   figure, imshow(I3,spring(4))
   ```

Question 3) The original image consists of values in the range [0, 255]. If our original image values ranged [0.0, 1.0], how would the above code change?

4. In pseudocolor image processing, let us apply it to an image where this visual information might be useful. Load and display the 'spine.tif'

   clear all

   I = imread('spine.tif');

   figure, subplot(1,2,1), subimage(I), title('Original Image');

5. Partition the image into nL levels as the following:

   lev = [0 5 20, 29, 35, 40, 45, 50, 63];

   nL = numel(lev)-1;

   I2 = grayslice(I, lev);

   subplot(1,2,2), subimage(I2, colormap(jet(nL))), ...

   title('Pseudo-colored with "jet" colormap');

   Question 4) In the previous steps, we have specified how many colors we want in our color map. If we do not specify this number, how does MATLAB determine how many colors to return in the color map?

6. Use the following instruction set to determine color pixels at the plane, {0, 64, 128, 192, 255}

```
rgb = [];
figure
Z = [0,64,128,192,255];
for z=1:5
    for x=1:256
        for y=1:256
            rgb(x,y,1) = Z(z);
            rgb(x,y,2) = x-1;
            rgb(x,y,3) = y-1;
        end
    end
```

```
    subplot(2,3,z);
    imshow(uint8(rgb));
end
```

Question 5) How color pixel relate to RGB color model?

7. Load the onions.png image and display its RGB components.

```
I = imread('onion.png');
figure, subplot(2,4,1), imshow(I), title('Original Image');
subplot(2,4,2), imshow(I(:,:,1)), title('R component');
subplot(2,4,3), imshow(I(:,:,2)), title('G component');
subplot(2,4,4), imshow(I(:,:,3)), title('B component');
```

8. Convert the image to HSV and display its components.

```
Ihsv = rgb2hsv(I);
subplot(2,4,6), imshow(Ihsv(:,:,1)), title('Hue')
subplot(2,4,7), imshow(Ihsv(:,:,2)), title('Saturation');
subplot(2,4,8), imshow(Ihsv(:,:,3)), title('Value');
```

Question 6) From procedure 7 and 8, Let explain Hue, Saturation and Value how they different from RGB color model.