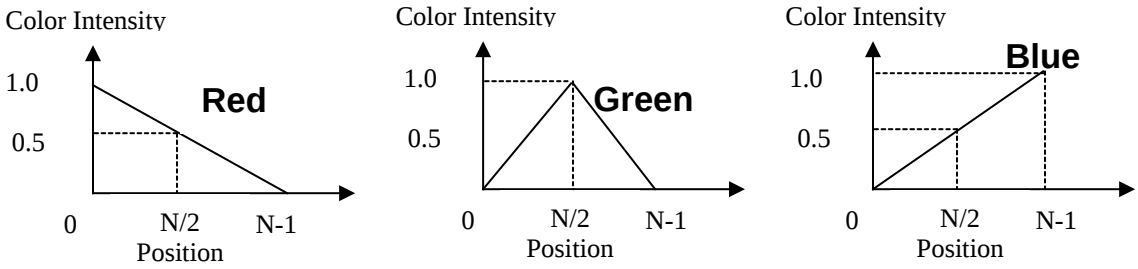
CS555/455 Fall 2018
Shriprasad Bhamare

CS555/455 Assignment 3

(Due on October 17, 2018 by 11:59pm)

Part A: Questions (27%)

(1) Q6.5 (p457) [9%] In the simple RGB image, the R, G and B component images have the intensity for each line as shown in the following diagram. What color would a person see in the middle column of this image?



ANS:
red 0.5 green 1 blue 0.5
final color will be , 0.5r + g + 0.5b
Therefore, 0.5(r+g+b) + 0.5g
Here,second term emphasize to green color
Hence, **Green is the resulting color**

(2)

Q6.16 (p459) [9%] The 8-bit images shown in Q6.16 (page-459) are (left to right) the H, S, and I component images. The numbers indicate gray-level values. Answer the following questions, explaining the basis for your answer in each. If it is not possible to answer a question based on the given information, explain the reason.

(a) Give the gray level values of all regions in the hue image.

The left in the bottom region is Blue 170. Because, if we perform intersection of green and blue the resultant would be Cyan.The central bottom would be Magenta 213 as, the central bottom region is intersection of Blue and Red. In the central region we get gray level 0 as it consist of intersection on red,green,blue in the center region

(b) Give the gray level values of all regions in the saturation image.

Gray level for black is 0 and that for white is 255. As, the image is saturated

(c) Give the gray level values of all regions in the intensity image.

Possible 4 intensity levels are:
Dark gray regions ==>gray level 85
light gray region ==> gray level 170
center white region ==> gray level 255
Background region ==>gray level 0

Color	R	G	B	H	S	I
Black	0	0	0	Not defined	Not defined	0
Red	1	0	0	0	255	85
Green	0	1	0	85	255	85
Blue	0	0	1	170	255	85
Magenta	1	0	1	213	255	170
Cyan	0	1	1	128	255	170
Yellow	1	1	0	43	255	170
White	1	1	1	Not defined	0	255

(3) Q6.25 (p460) [9%] Consider the following 500×500 RGB image, in which the squares are fully saturated red, green and blue, and each of the colors is at maximum intensity [e.g., (1, 0, 0) for the red square]. An HSI image is generated from this image.

(a) Describe the appearance of each HSI component image.
Gray scale values would be associated for all 3 colors for the hue component. Red color will be the darkest. Green would be associated with medium gray. And, finally blue will be light gray. Dark shade of gray will be associated for Intensity Component. In Saturation component ,there are all 1 so, for saturation component there will be a white color to sections.

(b) The saturation component of the HSI image is smoothed using an averaging mask of size 125×125. Describe the appearance of the result (you may ignore image border effects in the filtering operation).
There will be no effect on the appearance of a result. As we know,saturation is the same and constant for a image

(c) Repeat (b) for the hue image.

Green	Red
Blue	Green

Here averaging mask will blur the image and there will not be appearance of sharp borders. Also,regions will merge together. Colors will vary in two colors for a mask having two or more squares

Part B: (47%) DCT based image compression

Description: DCT transformation refers to the transform between image spatial domain and frequency domain. In the first part of the assignment, you are required to realize a simplified version of DCT based compression.

(I) (15%) Consider the following sequence of values:

10 11 12 11 12 13 12 11
10 -10 8 -7 8 -8 7 -7

(a) (5%) Transform each row separately using an eight-point DCT. Plot the resulting 16 transform coefficients

When we transform 10 11 12 11 12 13 12 11
coefficients ==> 32.527 -1.281 -1.307 0.450 -1.414 -0.301 0.541 0.255

When we transform 10 -10 8 -7 8 -8 7 -7
coefficients ==> 0.354 4.251 0.350 5.046 2.475 8.384 1.769 20.388

(b) (5%) Combine all 16 numbers into a single vector and transform it using a 16-point DCT. Plot the 16 transform coefficients

21.78 -3.92 -6.96 -0.68 23.25 6.04 -3.25 -2.57 0.75 3.16 -6.14 1.61 1.63 5.50 -14.24 13.56

(c) (5%) Compare the results of (a) and (b). For this particular case would you suggest a block size of 8 or 16 for greater compression? Justify your answer

we obtain a larger number of coefficients with relatively large magnitudes when we use the 16 point DCT. This is due to the differing natures of the two vectors. As more large magnitude coefficients mean more bits required, it would be better from a compression perspective to use two 8 points DCT rather than one 16 point DCT in this example.

.