DIP

Home Assignment

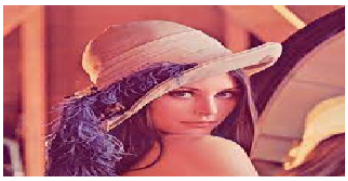
1. Resize a 512x512 image breadthwise by pixel replication without using in-built functions. The final image should be of size 512x1024

```
img = imread("/home/jacob/Documents/College/Sem5/DIP/LAB/lena.jpeg");

A = [];

for i = 1:size(img, 1)
    for j = 1:size(img, 2)
                A(i, j*2, 1) = img(i, j, 1);
                A(i, j*2, 2) = img(i, j, 2);
                A(i, j*2, 3) = img(i, j, 3);
                A(i, j*2-1, 1) = img(i, j, 1);
                A(i, j*2-1, 2) = img(i, j, 2);
                A(i, j*2-1, 3) = img(i, j, 3);
    end
end

resized = uint8(A);
imshow(resized)
imshow(img)
```



2. Apply thresholding on grayscale Lena.bmp and Barbara.bmp images without using inbuilt functions and convert them to binary images. See the effect of different thresholds and comment on your observation.

```
img1=imread("/home/jacob/Documents/College/Sem5/DIP/LAB/lena_gray.bmp");
%img1=imread("barbara_gray.bmp")

binary=[];
threshold = [];
thresh = 120;

% thresh = uint8(mean(mean(img1)));

for r = 1:size(img1, 1)    % for number of rows of the image
    for c = 1:size(img1, 2)   % for number of columns of the image
        if img1(r,c) <= thresh
            binary(r,c)=0;
        else
            binary(r,c)=1;
        end

    end
end
imshow(binary)
```

3. Plot the histogram for ‘Cameraman.png’. Then:

i) Add 80 to each pixel in the original image. Plot the histogram for this.

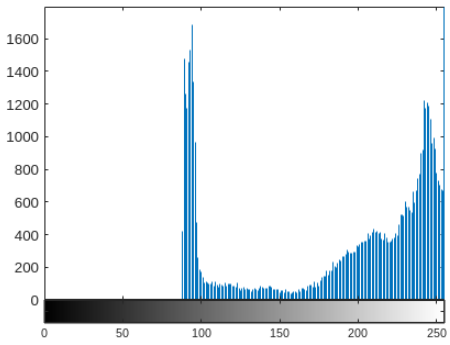
ii) Subtract 80 from each pixel in the original image. Plot the histogram for this.

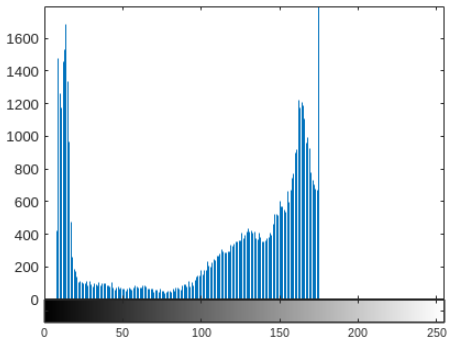
How does the original image differ from the images obtained in i) and ii)? What can you say about the histograms obtained in i) and ii)? Overall, what conclusion can be drawn?

```
yemum = imread("/home/jacob/Documents/College/Sem5/DIP/LAB/cameraman.png");

for i = 1:size(yemum, 1)
    for j = 1:size(yemum, 2)
            yemum(i,j) = yemum(i,j) + 80;
    end
end
imhist(yemum);

for i = 1:size(yemum, 1)
    for j = 1:size(yemum, 2)
            yemum(i,j) = yemum(i,j) - 80;
    end
end
imhist(yemum);
```





4. Import any image and multiply by a constant that is

i) Greater than 1

ii) Lesser than 1

With the help of subplots display all 3 images in one window and compare them. What do you observe in each case?

```
img=imread("/home/jacob/Documents/College/Sem5/DIP/LAB/lena.jpeg");

subplot(2,2,1),imshow(img*1.5);
subplot(2,2,2),imshow(img*0.5);
subplot(2,2,3),imshow(img);
```

Observations

1. The threshold value selected affects the binary percentage of the final image, i.e. for a low threshold a higher ratio of white pixels is seen whereas for a higher threshold, a higher ratio of black pixels is seen. Therefore, to make the image acceptable or in a sense, similar to the grayscale image, we must carefully pick the threshold value, something like the average of the intensity values of all the pixels in the grayscale image.

2. A histogram is basically a distribution showing the frequency of all the grayscale intensity values of the image. Therefore, adding 80 to each pixel, increases the image brightness by 80, capped at 255, and accordingly shifts the entire histogram to the right. Whereas subtracting 80, the brightness is reduced, floored at 0 and the histogram accordingly shifts to the left

3. By multiplying the images by a factor which increases or decreases the pixel intensity by that amount, we expect the image to be that much more or less intense. By comparing all three images side by side, our intuition is proved correct as the images are accordingly modified.

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