

407 Comp Lab 5

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Q1-Write a MATLAB code for histogram equalization on an image

- Convert the image to grayscale using e.g. `rgb2gray`.
- Perform histogram equalization on this image using the method mentioned in class, without Using MATLAB `histeq`. `cumsum` is a useful MATLAB function
- Display the histogram and the cumulative histogram of the transformed image, and the original image and transformed image. Why is this operation called 'histogram equalization'?
- Compare with the result of applying the MATLAB `histeq` function
- Compare with the result of contrast stretching algorithm you did last lab

```
clear
clc
a=imread('pout.tif');
[r,c]=size(a);
freq=zeros(1,255);
for x=1:255
    freq(1,x)=length(find(a==x));
end
n=r*c;
norm=freq/n;
cum=cumsum(norm);
roun=round(255*cum);
res=zeros(r,c);
for i=1:r
    for j=1:c
        res(i,j)=roun(1,a(i,j));
    end
end
subplot(3,2,1);imshow(a)
subplot(3,2,2);imhist(a)
subplot(3,2,3);imshow(res)
subplot(3,2,4);hist(res)
subplot(3,2,5);histeq(a)
subplot(3,2,6);imhist(histeq(a))
```

Q2- Bit-plane slicing

- Extract the 8 bit-plane slicing using an 8-bit image.
- Choose only 4 bit- planes to reconstruct the original image
- Subtract the lower 4-bit plane from original image and report result
- Subtract the higher 4-bit plane from original image and report result

Hint: use code from lecture.

```
clear
clc
a=imread('cameraman.tif');
Y1=bitget(a,1);
Y2=bitget(a,2);
Y3=bitget(a,3);
Y4=bitget(a,4);
Y5=bitget(a,5);
Y6=bitget(a,6);
Y7=bitget(a,7);
Y8=bitget(a,8);
Y=Y8+Y7+Y6+Y5;
X1=a-Y;
figure,
subplot(3,3,1);imshow(logical(Y1));title('Bit plane 0');
subplot(3,3,2);imshow(logical(Y2));title('Bit plane 1');
subplot(3,3,3);imshow(logical(Y3));title('Bit plane 2');
subplot(3,3,4);imshow(logical(Y4));title('Bit plane 3');
subplot(3,3,5);imshow(logical(Y5));title('Bit plane 4');
subplot(3,3,6);imshow(logical(Y6));title('Bit plane 5');
subplot(3,3,7);imshow(logical(Y7));title('Bit plane 6');
subplot(3,3,8);imshow(logical(Y8));title('Bit plane 7');
figure,
subplot(3,3,1);imshow(a);
subplot(3,3,2);imshow(logical(Y));
subplot(3,3,3);imshow(uint8(X1));
```

Q3-Density/graylevel slicing

- Get a gray image, investigate the histogram and
- determine the range of values representing a certain object for example a white object.
- Write a code to select a range of grayvalues that represent the object
- highlight this specific range of gray-levels in original image.

```
clear
clc
img = imread('football.jpg');
grayImg = rgb2gray(img);
[r,c] = size(grayImg);

newImg = zeros(r,c);
for i = 1:r
    for j = 1:c
        if grayImg(i,j) >= 225
            newImg(i,j) = 255;
        else
            newImg(i,j) = 0;
        end
    end
end
subplot(2,2,1);imshow(img);
subplot(2,2,2);imshow(grayImg);
subplot(2,2,3);imshow(newImg);
subplot(2,2,4);imhist(newImg);
```