

Assignment-3

Question-1:

Part1:

```
function plotHistogram()
im = imread('cameraman.tif');
% get the histogram
imhistg = getHistogram(im);

% plot the histogram
plot(1:255, imhistg); xlabel('intensity'); ylabel('count of pixels'); title('histogram');

end

function hist = getHistogram(im)

[m,n,o] = size(im);
if(o == 3)
    im = rgb2gray(im);
end

out = zeros(255, 1);tic
for i = 1:m
    for j=1:n
        numb = im(i, j);
        out(numb, 1) = out(numb, 1) + 1;
    end
end
toc

hist = out
end
```

Part-2: (using the single loop)

```
function plotHistogram()
im = imread('cameraman.tif');
% get the histogram
imhistg = getHistogram(im);

% plot the histogram
plot(1:255, imhistg); xlabel('intensity'); ylabel('count of pixels'); title('histogram');

end

function hist = getHistogram(im)

[m,n,o] = size(im);
if(o == 3)
    im = rgb2gray(im);
end

out = zeros(255, 1);tic
for i=1:255
    out(i) = length(find(im==i));
end
toc
hist = out
end
```

Question-2:

Brightness: It simply increases the intensity of the image over the entire area. It highlights both the bright and dark areas equally.

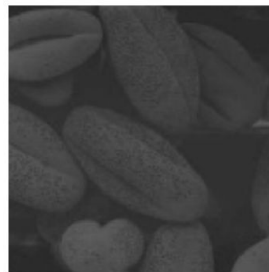
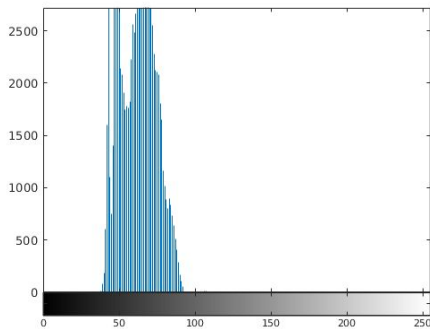
Contrast: Increasing contrast would increase the separation between the bright and dark areas. It darkens the dark area more and brightens the bright areas more.

Code:

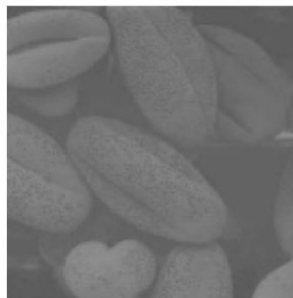
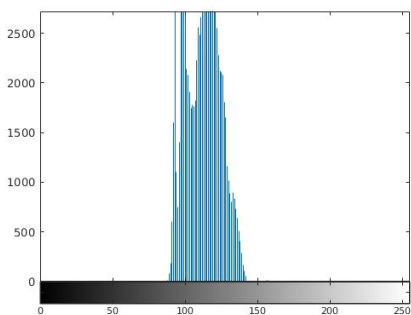
```
im = imread('LC.tif');  
imhist(im)  
imshow(im)  
% Increasing the brightness  
im = im + 50;  
imhist(im)  
imshow(im)  
  
%Increasing the contrast  
im2 = imread('LC.tif');  
im2 = im2 * 2;  
imhist(im2)  
imshow(im2)
```

Result:

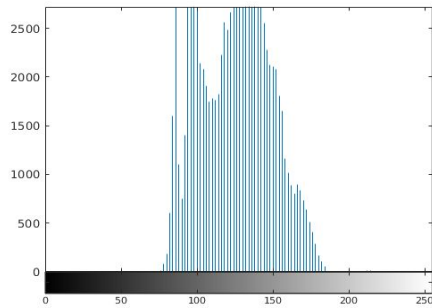
Initial Image--



After first operation--



After second operation--



Question-3:

Normalised Histogram:

In this case we divide the histogram with the total number of pixels to obtain the normalized one. The normalized histogram can be used for comparing with the other ones.

Code:

```
function plotHistogram()
im = imread('LC.tif');
% get the histogram
imhistg = getHistogram(im);
a = size(imhistg)
norm = imhistg/a(1) * a(2)

% plot the histogram
plot(1:255, norm); xlabel('intensity'); ylabel('count of pixels'); title('histogram');

end

function hist = getHistogram(im)

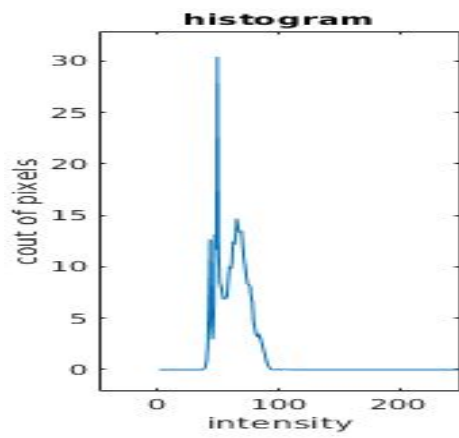
[m,n,o] = size(im);
if(o == 3)
    im = rgb2gray(im);
end

out = zeros(255, 1);tic
for i=1:255
    out(i) = length(find(im==i));
end
toc
hist = out
end
```

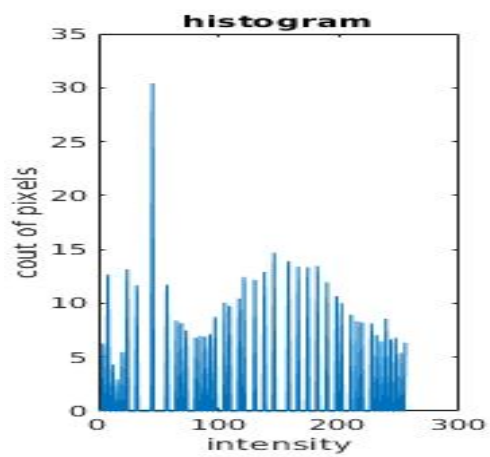
Question-4:

Plotting the normalized histogram for different images:

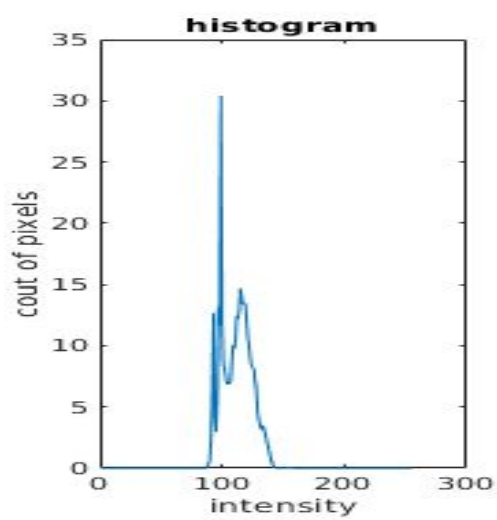
1. LC.tif:



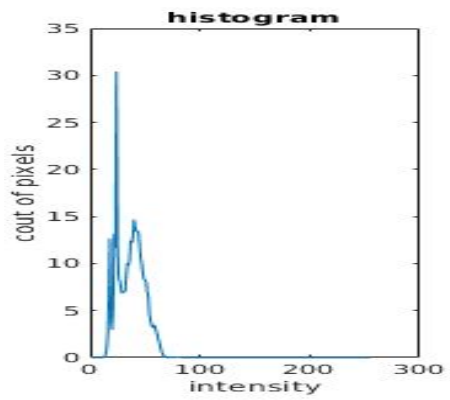
2. Gc.tif



3. Lchb.tif



4. Lclb.tif



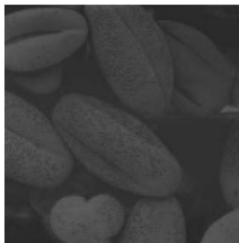
Question-5:

Code:

```
im = imread('LC.tif');
imshow(im)
histeq(im)
```

1. LC.tif

Before:



After:



2. Gc.tif

Before:

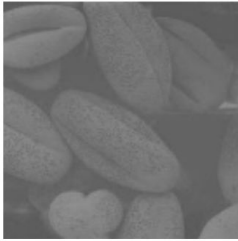


After:



3. Lchb.tif

Before:

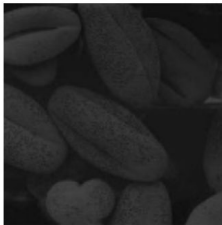


After:



4. Lclb.tif:

Before:



After:



Question-6:

There will be no change in equalising a already equalised image.

Question-7:

Implementing the functionality of histeq:

```

function plotHistogram()
im = imread('LC.tif');
% get the histogram
imhistg = getHistogram(im);

% perform histogram equalisation
a = size(imhistg)
pdf = imhistg/(a(1) * a(2))
sum = 0
for i=1:a(1)
    sum = sum + pdf(i, 1);
    pdf(i, 1) = floor(255*sum);
end

% plot the histogram
plot(1:255, pdf); xlabel('intensity'); ylabel('count of pixels'); title('histogram');

end

function hist = getHistogram(im)

[m,n,o] = size(im);
if(o == 3)
    im = rgb2gray(im);
end

out = zeros(255, 1);tic
for i = 1:m
    for j=1:n
        numb = im(i, j);
        out(numb, 1) = out(numb, 1) + 1;
    end
end
toc

hist = out
end

```

Question-8:

Here both the histograms are compared by median. (i.e the metrics to be compared is taken as median).

code:

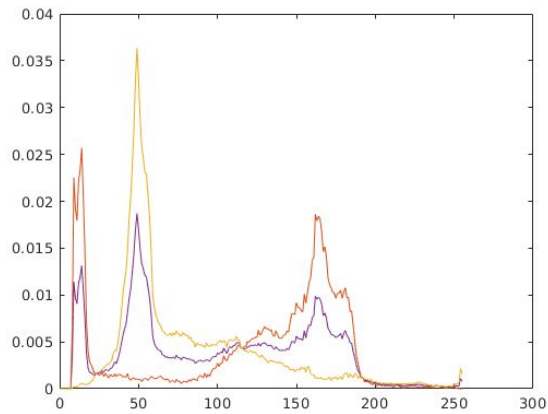
```

function plotHistogram()
im1 = imread('cameraman.tif');
hist1 = imhist(im1);
hist1 = hist1/sum(hist1);
im2 = rgb2gray(imread('peppers.png'));
hist2 = imhist(im2);
hist2 = hist2/sum(hist2);
measure = compareHistograms(hist1, hist2);
plot(0:255, hist1); hold on;
plot(0:255, hist2); title(['Hist1 Vs Hist2' num2str(measure)]);
end

function measure = compareHistograms(h1, h2)
a=size(h1)
d = zeros(a)
for i=1:a(1)
    for j=1:a(2)
        d(i, j) = (h1(i, j) + h2(i, j))/2;
    end
end
measure = d
end

```

Output:



2nd case:

In this case comparing by manhattan distance:

code:

```
function plotHistogram()
im1 = imread('cameraman.tif');
hist1 = imhist(im1);
hist1 = hist1/sum(hist1);
im2 = rgb2gray(imread('peppers.png'));
hist2 = imhist(im2);
hist2 = hist2/sum(hist2);
measure = compareHistograms(hist1, hist2);
plot(0:255, hist1); hold on;
plot(0:255, hist2); title(['Hist1 Vs Hist2' num2str(measure)]);
end

function measure = compareHistograms(h1, h2)
a=size(h1)
d = zeros(a)
sum = 0;
for i=1:a(1)
    diff = h1(i, 1) - h2(i,1);
    sum = sum + abs(diff);
    d(i, 1) = sum;
end
measure = d
end
```

Output:

