

# Image and Video Processing

## Programming Assignment – Report

### Week1: Contrast Enhancement using Histogram Equalization

#### MATLAB code:

```
%main.m
%Main script that imports the image, creates negative and calls functions to
%calculate histogram and perform histogram equalization
```

```
%AUTHOR: SUMANTH SRINIVASAN
```

```
a = uint8(imread('lena_low_contrast.jpg'));
disp('Creating grayscale image...');
bw = rgb2gray(a);
imwrite(bw, 'lena_grayscale.jpg')

dim = size(a);

disp('Creating negative of the grayscale image')
%To create negative grayscale image
for x = 1:dim(1)
    for y = 1:dim(2)
        neg(x,y) = 255 - a(x,y);
    end
end
imwrite(neg, 'lena_negative.jpg')
disp('Computing histogram of the grayscale image')
tic
% computeHist(bw);
tot_time = toc
disp('Done.')
```

```
histEq(bw);
```

```
%histEq.m
%AUTHOR: SUMANTH SRINIVASAN
```

```
function histEq(img)
%Histogram Equalization
%   Equalizes the non-uniform distribution of histogram
```

```
dim = size(img);
```

```
h = computeHist(img);
h = h/(dim(1)*dim(2));
```

```

% Computing Mapping Fn proportional to Cumulative Dist Fn

C = zeros(256,1);
for k = 1:256
    C(k)=uint8(sum(h(1:k))*255);
end;

figure; subplot(2,1,1), plot(C); title('Mapping function'); subplot(2,1,2),
bar(h,'g'); title('Histogram');

% Mapping
tic
% for x = 1:dim(1)
%     for y = 1:dim(2)
%         f = double(img(x,y))+1;
%         histEqImg(x,y) = C(f);
%     end;
% end;

histEqImg = C(double(img)+1);
tot_timeMap = toc

figure;
imshow(uint8(histEqImg));
imwrite(uint8(histEqImg), 'lena_Hist_Equalized.jpg');

end

%computeHist.m
%AUTHOR: SUMANTH SRINIVASAN

function [h] = computeHist(img)
%A function to compute the histogram of an imported image
% WORKS ONLY FOR GRAYSCALE OR MONOCHROME IMAGES AT THE MOMENT
histo = zeros(256,1);
for x = 0:255
    histo(x+1) = sum(sum(img == x));
end

% figure
% plot(histo);

h = histo;

end

```

## Sample Images, Histogram and Output



Figure 1 - Lena Grayscale Low Contrast



Figure 2 - Lena Grayscale after Histogram Equalization



Figure 3 - Lena Grayscale Low Contrast Negative

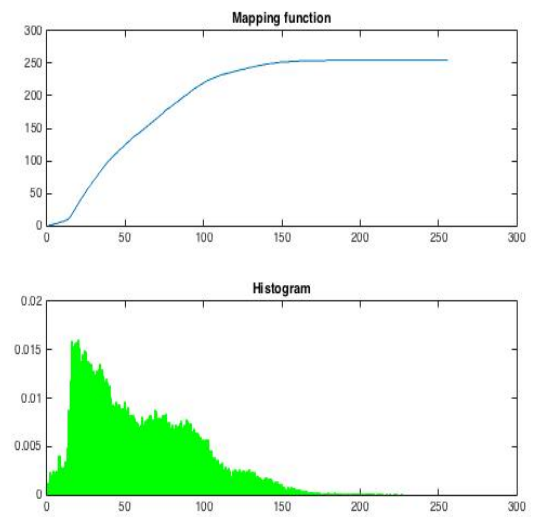


Figure 4 - Low Contrast Histogram and Mapping Function