```matlab
A=imread('profile.jpeg');
A=rgb2gray(A);
subplot(3,2,1);
imshow(A);
title("Original Image");

subplot(3,2,2);
imhist(A);
title("Historam of Original");

% Histogram Equalization by inbuild function

X=histeq(A);
subplot(3,2,3);
imshow(X);
title("Image by histeq()");

subplot(3,2,4);
imhist(X);
title("Historam after histeq()");

% Histogram Equalization explicit function

m=size(A,1);
n=size(A,2);
mn = m*n;

H = uint8(zeros(m,n));

%frequency of pixels
freq=zeros(256,1);
maxnum=zeros(1,1);
for i=1:1:m
    for j=1:1:n
        val = A(i,j);
        freq(val+1) = freq(val+1)+1;
        if maxnum(1)<val
            maxnum(1)=val;
        end
    end
end

% get bits to represent maximum number
maxbits=log2(maxnum);
if maxbits(1)==floor(maxbits(1))
    maxbits(1)=maxbits(1)+1;
else
    maxbits(1)=ceil(maxbits);
end

% levels
L=(2^maxbits)-1;
```

```matlab
%probability of each occurance
probf=zeros(256,1);
for i=1:size(freq)
    probf(i) = freq(i)/mn;
end

%probability distribution function
sum=0;
cdf=zeros(256,1);
s=zeros(256,1);
for i=1:size(probf)
    sum=sum+(L-1)*probf(i);
    cdf(i)=sum;
    s(i)=round(cdf(i));
end

for i=1:m
    for j=1:n
        H(i,j)=s(A(i,j)+1);
    end
end

subplot(3,2,5);
imshow(H);
title("Equalized Image");

subplot(3,2,6);
imhist(H);
title("Historam of Equalized");
```
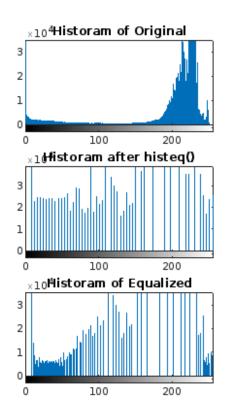
Original Image

Historam of Original

Image by histeq()

Historam after histeq()

Equalized Image

Historam of Equalized

Published with MATLAB® R2022a