Homework 3

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1 First Answer

Matlab Code

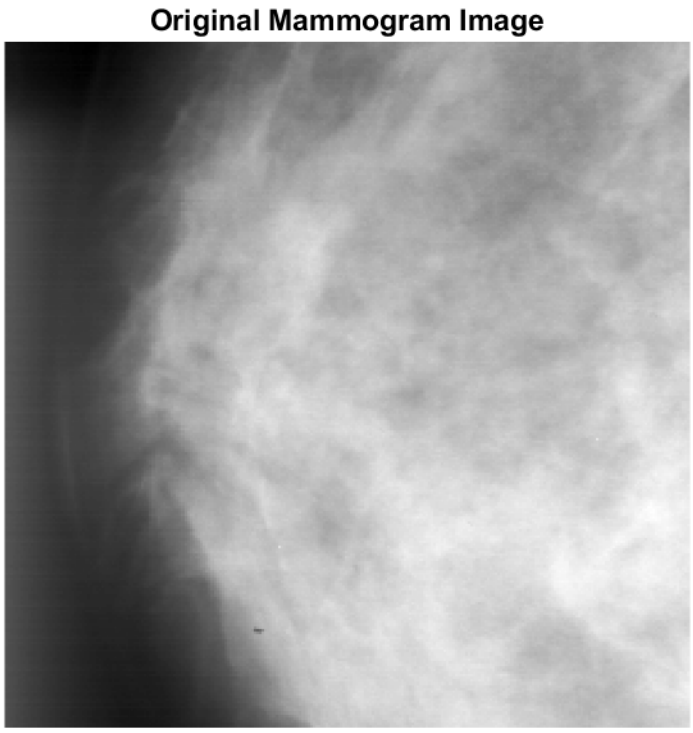
```
fidMammogram = fopen('Mammogram.bin','r');
[Mammogram,junk] = fread(fidMammogram,[256,256],'uchar');
Mammogram = Mammogram' ; % you must trasnpose the image
figure(1);
colormap(gray(256));
image(Mammogram);
axis image;
axis off;
title('Original Mammogram Image');
print -dtiff M_Mammogram.tif; % write figure as tif
print (figure(1),'Original Mammogram','-dpng');%writing out
    image for LaTeX purpose
fidOut = fopen('Outfile.bin','w+');
MammogramOut = Mammogram';
fwrite(fidOut,MammogramOut,'uchar'); % write raw image data
fclose(fidMammogram);
fclose(fidOut);
T=96;
J = 255 * (Mammogram >= T);
figure(2);
colormap(gray(256));
image(J);
title('Threshold Image');
axis image;
axis off;
print (figure(2),'Thresholded Mammogram','-dpng');%writing out
    image for LaTeX purpose
G=zeros(256,256);
for m=2:255
```

```
28      for n=2:255
29          if J(m,n)==0
30              if J(m-1,n)==255 || J(m,n-1)==255 || J(m,n+1)==255
                    || J(m+1,n)==255
31                  G(m,n)=255;
32              end
33          end
34      end
35  end
36  figure(3);
37  colormap(gray(256));
38  image(G);
39  title('Approximate contour representation');
40  axis image;
41  axis off;
42  print (figure(3),'Approximate Contour','-dpng');%writing out
      image for LaTeX purpose
```

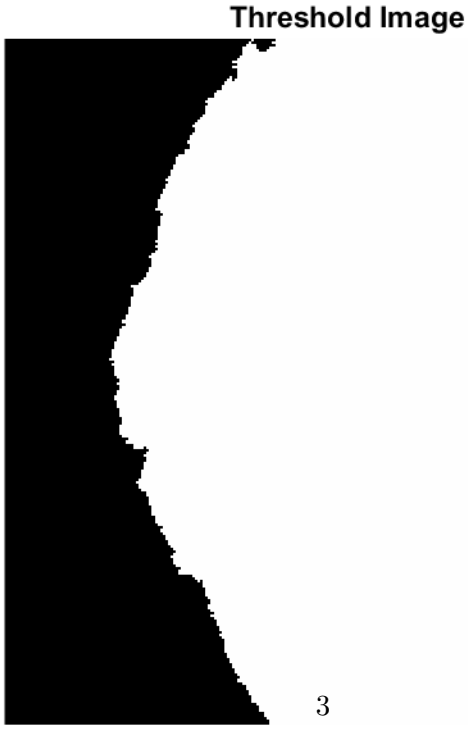
Output Images:

1(c):Yes, a chain code can be used to represent main contour in the obtained contour image. That's because the contour obtained can be represented by storing sequence of direction codes and it would traverse according to contour if at all initial coordinate is specified.

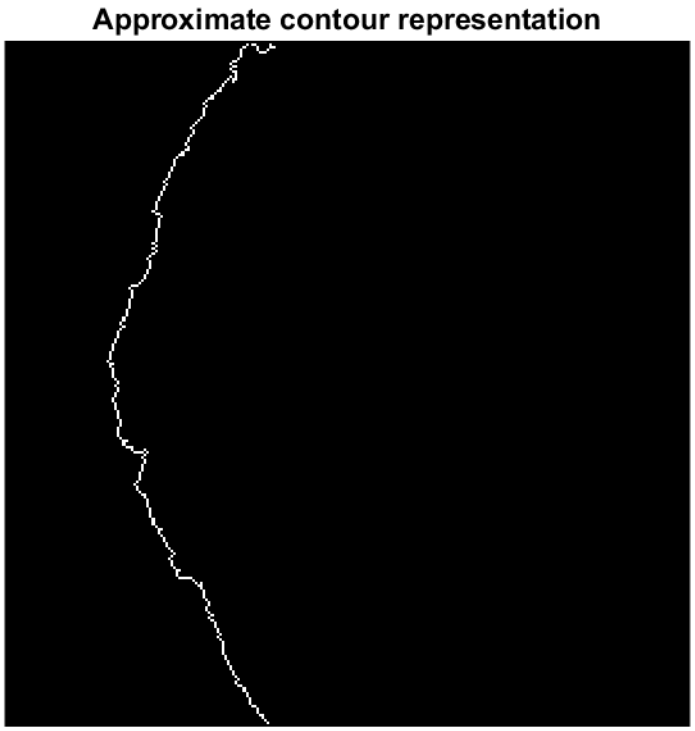
Mammogram.png Mammogram.png



Mammogram.png Mammogram.png



Contour.png Contour.png



2 Second Answer

Matlab Code

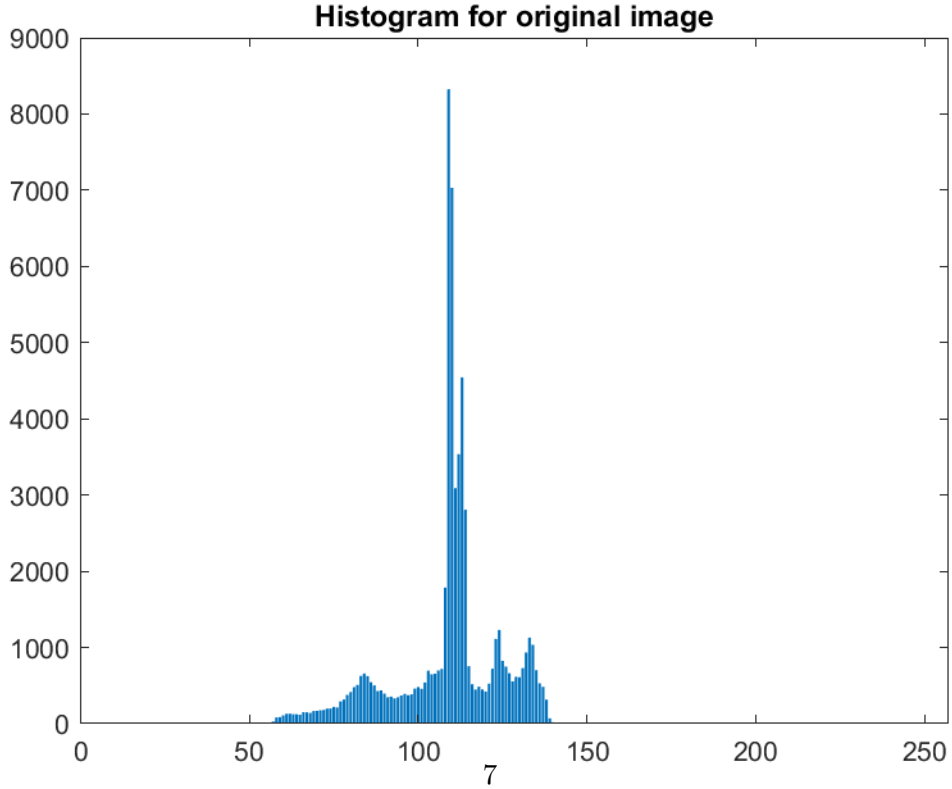
```
clc;
close all;

fidlady = fopen('lady.256','r');
[lady,junk] = fread(fidlady,[256,256],'uchar');
lady = lady' ; % you must trasnpose the image
figure(1);colormap(gray(256));
image(lady);
title('Original lady Image');
axis image;
axis off;
print (figure(1),'Original_Lady','-dpng');%writing out image
    for LaTeX purpose

R=lady;
h=sum(hist(R,0:255)');
figure(2);
bar(h);
title('Histogram for original image');
print (figure(2),'Original_Hist','-dpng');%writing out image
    for LaTeX purpose

A=55;
B=144;
J=zeros(256,256);
for m=1:256
     for n=1:256
          J(m,n)=(255/89)*(R(m,n)-55);
     end
end
figure(3);colormap(gray(256));
image(J);
title('Full scale contrast stretch image');
axis image;
axis off;
print (figure(3),'Contrast_Image','-dpng');%writing out image
    for LaTeX purpose

h1=sum(hist(J,0:255)');
figure(4);
```

```
38 bar(h1);
39 title('Histogram after full scale contrast stretch');
40 print (figure(4),'Contrasted_Hist','-dpng');%writing out image
       for LaTeX purpose
```

Output Images:

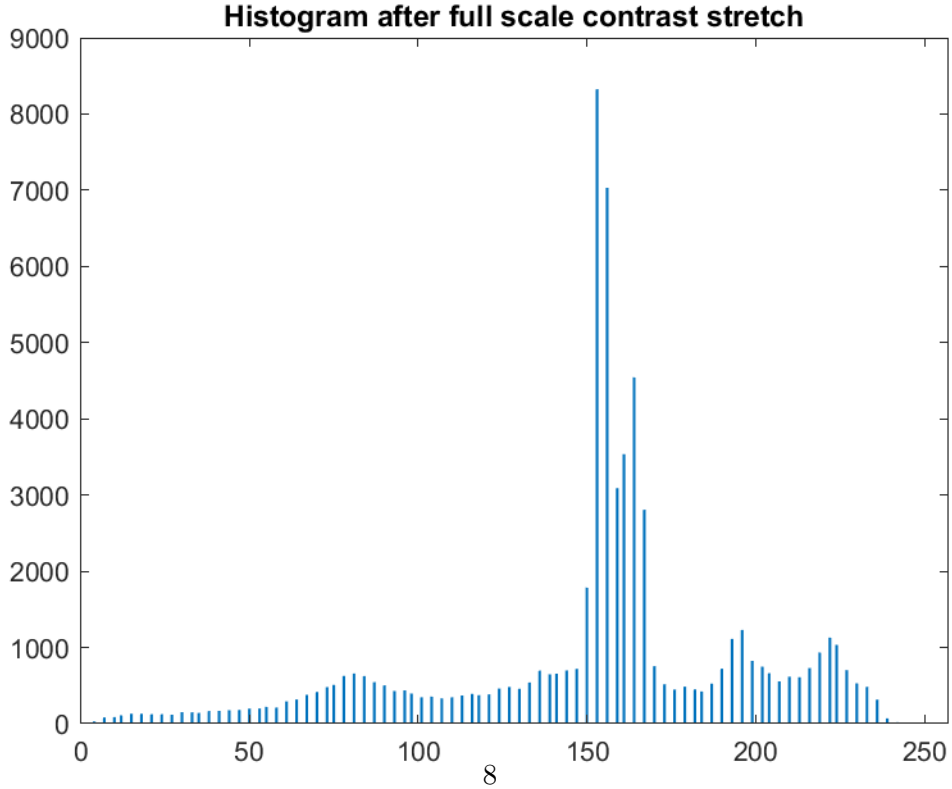
Original lady Image

Histogram for original image



Full scale contrast stretch image

Histogram after full scale contrast stretch



3 Third Answer

Matlab Code

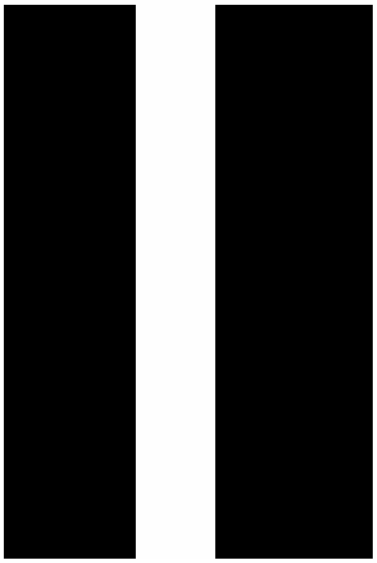
```
clc;
fidactontBin = fopen('actontBin.bin','r');
[actontBin,junk] = fread(fidactontBin,[256,256],'uchar');
actontBin = actontBin' ; % you must trasnpose the image
figure(1);colormap(gray(256));
image(actontBin);
title('Original actontBin Image');
axis image;
axis off;
print (figure(1),'Original_ActonBin','-dpng');%writing out
    image for LaTeX purpose

J=actontBin;
print -dtiff M_actontBin.tif; % write figure as tif
fidOut = fopen('Outfile.bin','w+');
actontBinOut = actontBin';
fwrite(fidOut,actontBinOut,'uchar'); % write raw image data
fclose(fidactontBin);fclose(fidOut);
I=zeros(26,14);
I(:,6:8)=255;
I(1:5,:)=255;
p=26;
q=14;
figure(2);colormap(gray(256));
image(I);
title('Template');
axis image;
axis off;
print (figure(2),'Template','-dpng');%writing out image for
    LaTeX purpose

X=zeros(p,q);
k=1/(p*q);
for m=1:256-p
    for n=1:256-q
        X=~(xor(I,J(m:p+m-1,n:q+n-1)));
        X2(m,n)=sum(sum(X));
        X3(m,n)=k*X2(m,n);
    end
end
```

```
figure(3);
imshow(X3);
title('Output Image');
axis image;
axis off;
print (figure(3),'Output_Image','-dpng');%writing out image for
    LaTeX purpose

G=zeros(256,256);
for m=1:256-p
    for n=1:256-q
        if X3(m,n)>0.9
            G(m:m+p-1,n:n+q-1)=and(I,J(m:m+p-1,n:n+q-1));
        end
    end
end
figure(4);
imshow(G);
title('After thresholding the output image');
axis image;
axis off;
print (figure(4),'After_Threshlding_Image','-dpng');%writing
   out image for LaTeX purpose
```

Output Images:

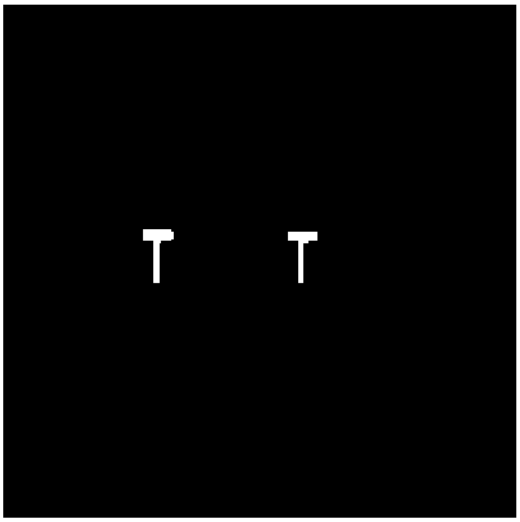
Original actontBin Image

Template



Output Image

After thresholding the output image



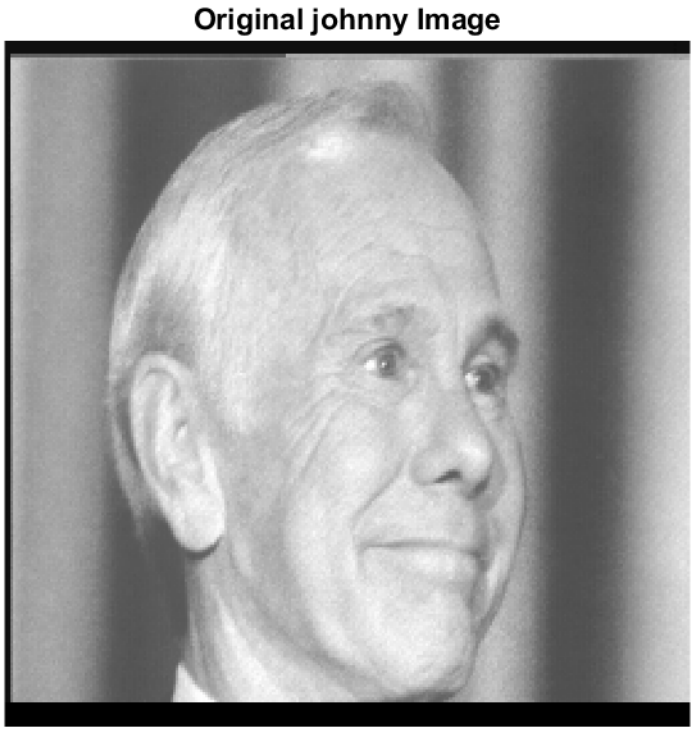
4 Fourth Answer

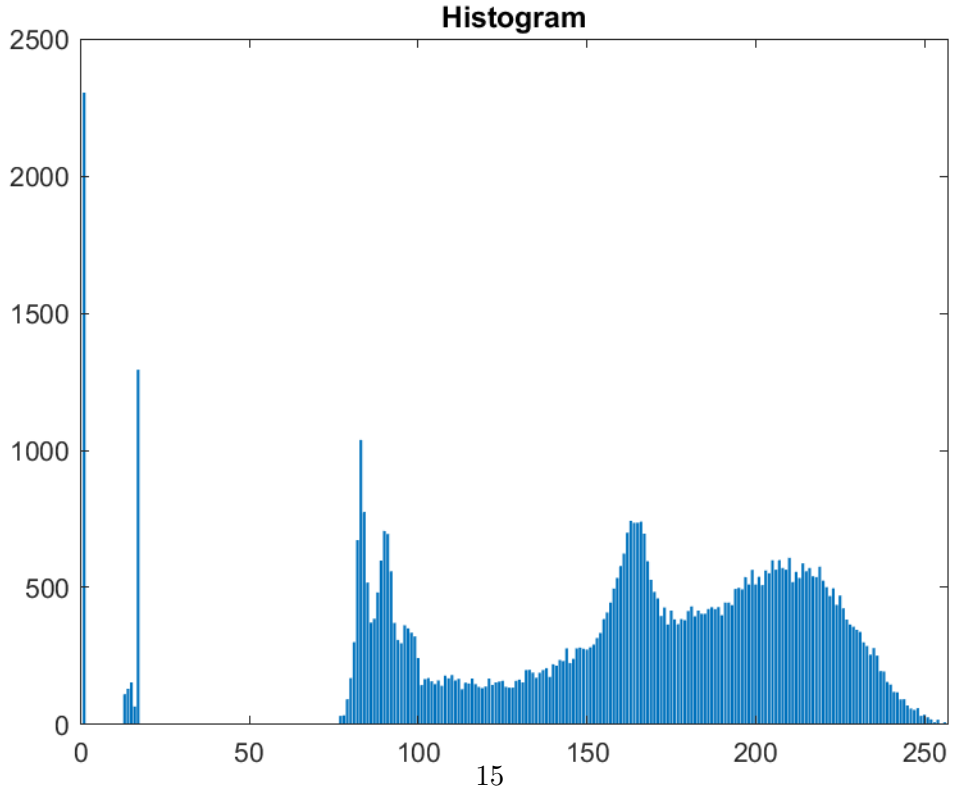
Matlab Code

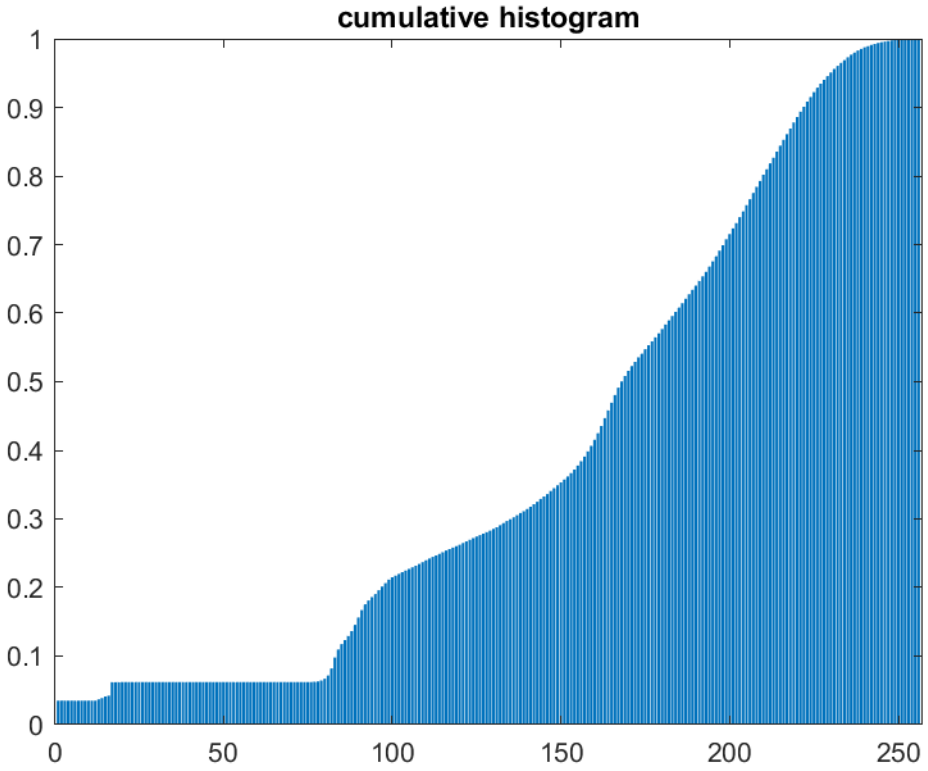
```
clc;
close all;

fidjohnny = fopen('johnny.bin','r');
[johnny,junk] = fread(fidjohnny,[256,256],'uchar');
johnny = johnny' ; % you must trasnpose the image
figure(1);colormap(gray(256));
image(johnny);
title('Original johnny Image');
axis image;
axis off;
print (figure(1),'Original_Johny_Image','-dpng');%writing out
    image for LaTeX purpose
print -dtiff M_johnny.tif; % write figure as tif

fidOut = fopen('Outfile.bin','w+');
johnnyOut = johnny';
fwrite(fidOut,johnnyOut,'uchar'); % write raw image data
fclose(fidjohnny);fclose(fidOut);
R=johnny;
h=sum(hist(R,0:255)');
figure(2);
bar(h);
title('Histogram');
print (figure(2),'Johny_Hist','-dpng');%writing out image for
    LaTeX purpose

p=zeros(1,256);
for n=1:256
    p(1,n)=h(1,n)/(256*256);
end
P=zeros(1,256);
for r=1:256
    P(r)=sum(p(1,1:r));
end
figure(3);
bar(P);
title('cumulative histogram');
print (figure(3),'Cumulative_Hist','-dpng');%writing out image
    for LaTeX purpose
```

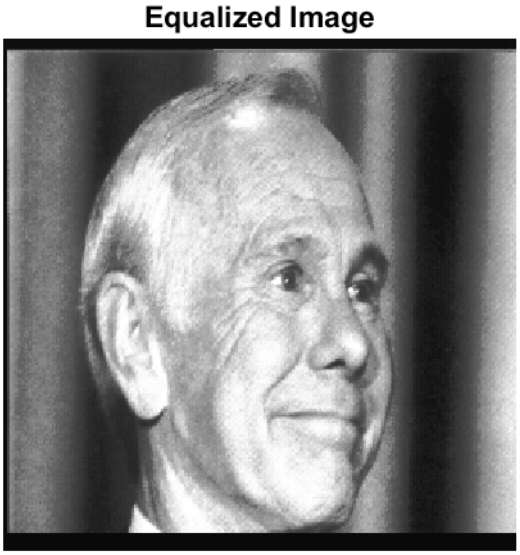
```
38
39 J=zeros(256,256);
40 for i=1:256
41     for j=1:256
42         J(i,j)=P(1,R(i,j)+1);
43     end
44 end
45 figure(4);
46 imshow(J);
47 title('Equalized Image');
48 axis image;
49 axis off;
50 print (figure(4),'Equalized_Image','-dpng');%writing out image
       for LaTeX purpose
51
52 h3=sum(hist(J,0:255));
53 figure(5);
54 bar(h3);
55 title('Equalized Image Histogram');
56 print (figure(5),'Equalized_Hist','-dpng');%writing out image
       for LaTeX purpose
```

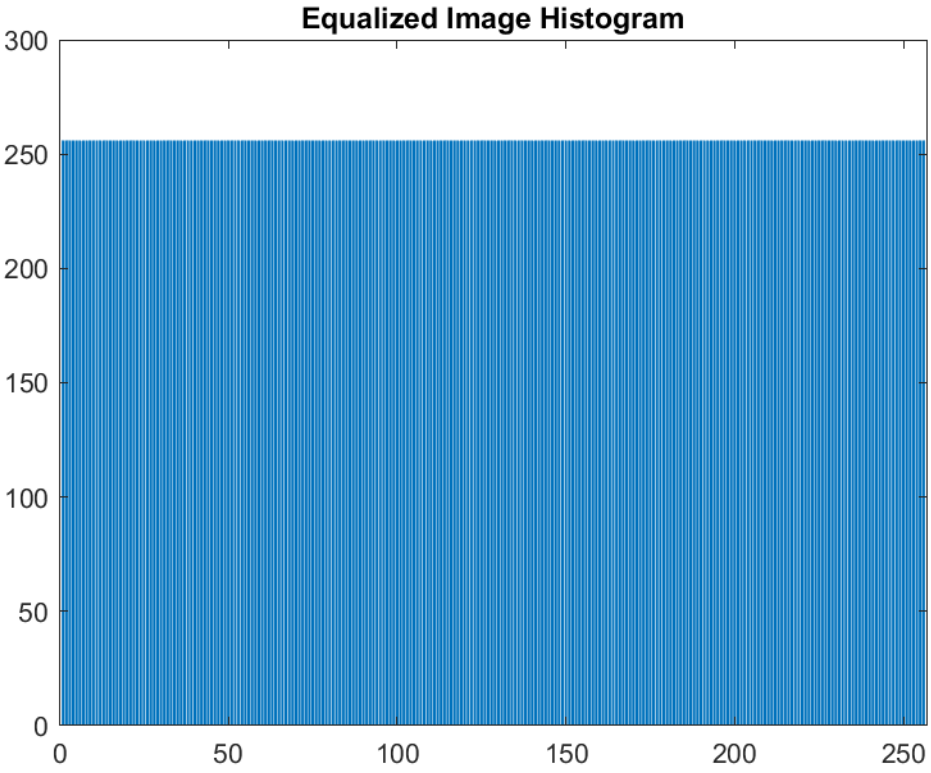
Output Images:


Original johnny Image


Histogram
2500
2000
1500
1000
500
0
0
50
100
150
200
250


cumulative histogram
1
0.9
0.8
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0
0
50
100
150
200
250


Equalized Image


Equalized Image Histogram
300
250
200
150
100
50
0
0
50
100
150
200
250