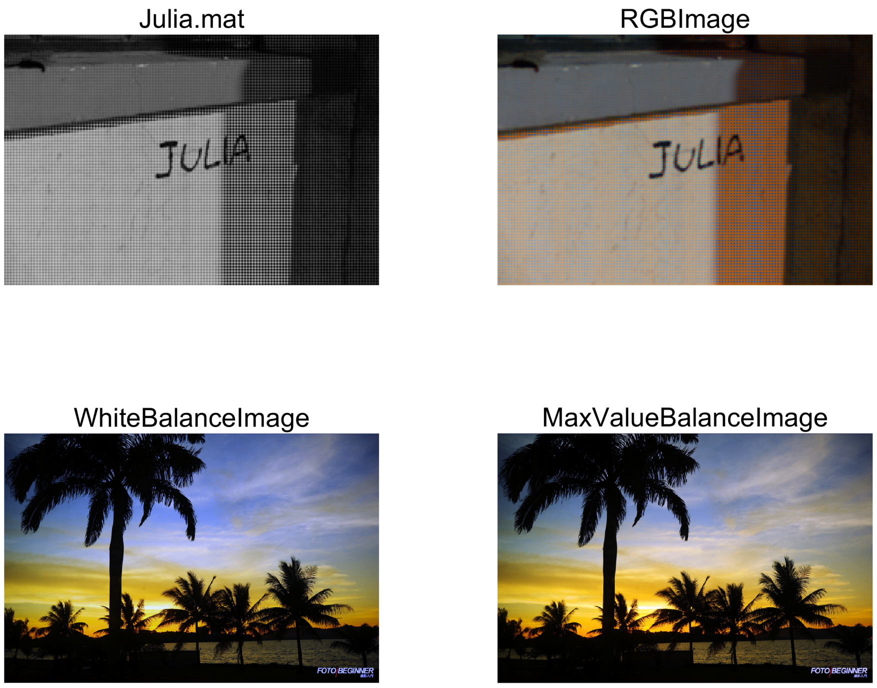
```matlab
clear all;
clf;
load 'Q1\Julia.mat';
[n,m]=size(Julia);
a=double(Julia);
img_B=uint8(zeros(n,m));
img_G=uint8(zeros(n,m));
img_R=uint8(zeros(n,m));

for i=[2:n-1]
    for j=[2:m-1]
        x1=a(i-1,j)+a(i+1,j)+a(i,j-1)+a(i,j+1);%相邻 4 个
        x1=uint8(x1/4);
        x2=a(i-1,j-1)+a(i-1,j+1)+a(i+1,j-1)+a(i+1,j+1);%角上 4 个
        x2=uint8(x2/4);
        x3=a(i,j-1)+a(i,j+1);%左右 2 个
        x3=uint8(x3/2);
        x4=a(i-1,j)+a(i+1,j);%上下 2 个
        x4=uint8(x4/2);
        if mod(i,2)==1%奇数行
            if mod(j,2)==1%蓝色
                img_B(i,j)=uint8(a(i,j));
                img_G(i,j)=x1;
                img_R(i,j)=x2;
            else%绿色
                img_B(i,j)=x4;
                img_G(i,j)=uint8(a(i,j));
                img_R(i,j)=x3;
            end
        else
            if mod(j,2)==1%绿色
                img_B(i,j)=x4;
                img_G(i,j)=uint8(a(i,j));
                img_R(i,j)=x3;
            else%红色
                img_B(i,j)=x2;
                img_G(i,j)=x1;
                img_R(i,j)=uint8(a(i,j));
            end
        end
    end
end
img_B(1,1)=uint8(a(1,1));
img_G(1,1)=uint8((a(2,1)+a(1,2))/2);
img_R(1,1)=uint8(a(2,2));
img_B(n,1)=uint8(a(n,1));
img_G(n,1)=uint8((a(n-1,1)+a(n,2))/2);
img_R(n,1)=uint8(a(n-1,2));
img_B(1,m)=uint8(a(1,m-1));
img_G(1,m)=uint8(a(1,m));
img_R(1,m)=uint8(a(2,m));
img_B(n,m)=uint8(a(n,m-1));
img_G(n,m)=uint8(a(n,m));
```

```
img_R(n,m)=uint8(a(n-1,m));
for i=[2:n-1]
    if mod(i,2)==1
        img_B(i,1)=uint8(a(i,1));
        img_G(i,1)=uint8((a(i-1,1)+a(i,2)+a(i+1,1))/3);
        img_R(i,1)=uint8((a(i-1,2)+a(i+1,2))/2);
        img_B(i,m)=uint8(a(i,m-1));
        img_G(i,m)=uint8(a(i,m));
        img_R(i,m)=uint8((a(i-1,m)+a(i+1,m))/2);
    else
        img_B(i,1)=uint8((a(i-1,1)+a(i+1,1))/2);
        img_G(i,1)=uint8(a(i,1));
        img_R(i,1)=uint8(a(i,2));
        img_B(i,m)=uint8((a(i-1,m-1)+a(i+1,m-1))/2);
        img_G(i,m)=uint8((a(i-1,m)+a(i,m-1)+a(i+1,m))/3);
        img_R(i,m)=uint8(a(i,m));
    end
end
for i=[2:m-1]
    if mod(i,2)==1
        img_B(1,i)=uint8(a(1,i));
        img_G(1,i)=uint8((a(1,i-1)+a(2,i)+a(1,i+1))/3);
        img_R(1,i)=uint8((a(2,i-1)+a(2,i+1))/2);
        img_B(n,i)=uint8(a(n,i));
        img_G(n,i)=uint8((a(n,i-1)+a(n-1,i)+a(n,i+1))/3);
        img_R(n,i)=uint8((a(n-1,i-1)+a(n-1,i+1))/2);
    else
        img_B(1,i)=uint8((a(1,i-1)+a(1,i+1))/2);
        img_G(1,i)=uint8(a(1,i));
        img_R(1,i)=uint8(a(2,i));
        img_B(n,i)=uint8((a(n,i-1)+a(n,i+1))/2);
        img_G(n,i)=uint8(a(n,i));
        img_R(n,i)=uint8(a(n-1,i));
    end
end
result=cat(3,img_R,img_G,img_B);
```

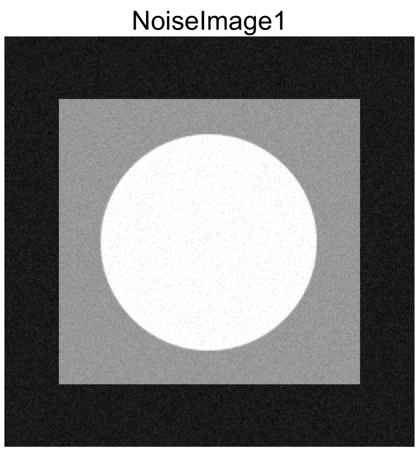
```
sky=imread('Q1\sky.jpg');
fr=sky(:,:,1);
fg=sky(:,:,2);
fb=sky(:,:,3);
i=0.299*fr+0.587*fg+0.114*fb;
imean=sum(i(:));
frmean=sum(fr(:));fgmean=sum(fg(:));fbmean=sum(fb(:));
kr=imean/frmean;kg=imean/fgmean;kb=imean/fbmean;
gr=kr*fr;gg=kg*fg;gb=kb*fb;
whitebalance=cat(3,gr,gg,gb);
```

```
[m,n]=size(fr);
rmax=max(fr(:));gmax=max(fg(:));bmax=max(fb(:));
srgb=min([rmax,gmax,bmax]);
nr=sum(sum(fr>srgb));ng=sum(sum(fg>srgb));nb=sum(sum(fb>srgb));
nmax=max([nr,ng,nb]);
r=sort(fr(:),'descend');tr=r(nmax);
g=sort(fg(:),'descend');tg=g(nmax);
b=sort(fb(:),'descend');tb=b(nmax);
kr=srgb/tr;kg=srgb/tg;kb=srgb/tb;
gr=kr*fr;gg=kg*fg;gb=kb*fb;
colorbalance=cat(3,gr,gg,gb);
```

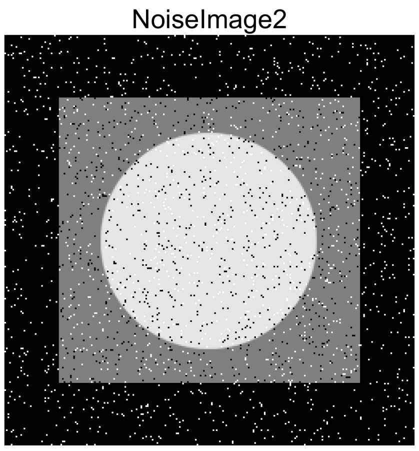
```

subplot(2,2,1);imshow(uint8(Julia));title('Julia.mat');
subplot(2,2,2);imshow(result);title('RGBImage');
subplot(2,2,3);imshow(whitebalance);title('WhiteBalanceImage')
subplot(2,2,4);imshow(colorbalance);title('MaxValueBalanceImage');
```



```
load Q2\init_img.mat
a=init_img;
b=imnoise(a,'gaussian',25/255,25/255/255);
c=imnoise(a,'salt & pepper',0.05);
imshow(b);title("NoiseImage1");
```

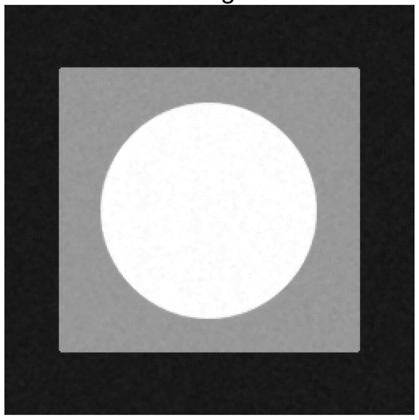


```
imshow(c);title("NoiseImage2");
```



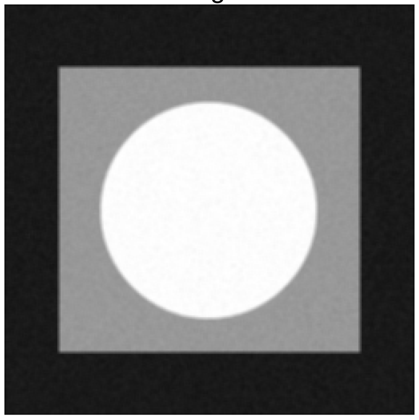
```
median_gauss=medfilt2(b);
median_saltpaper=medfilt2(c);
x=fspecial('average');
mean_gauss=imfilter(b,x);
mean_saltpaper=imfilter(c,x);
imshow(median_gauss);title("median gauss");
```

median gauss



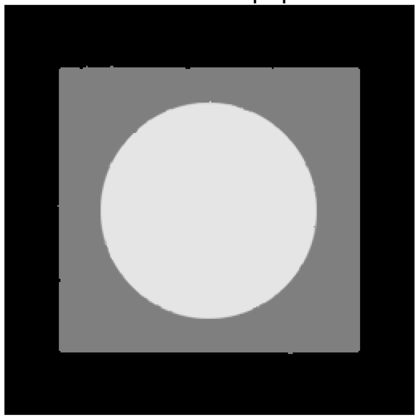
```
imshow(mean_gauss);title("mean gauss");
```

mean gauss



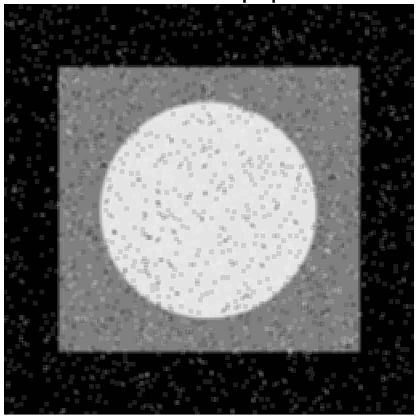
```
imshow(median_saltpaper);title("median salt&paper");
```

median salt&paper

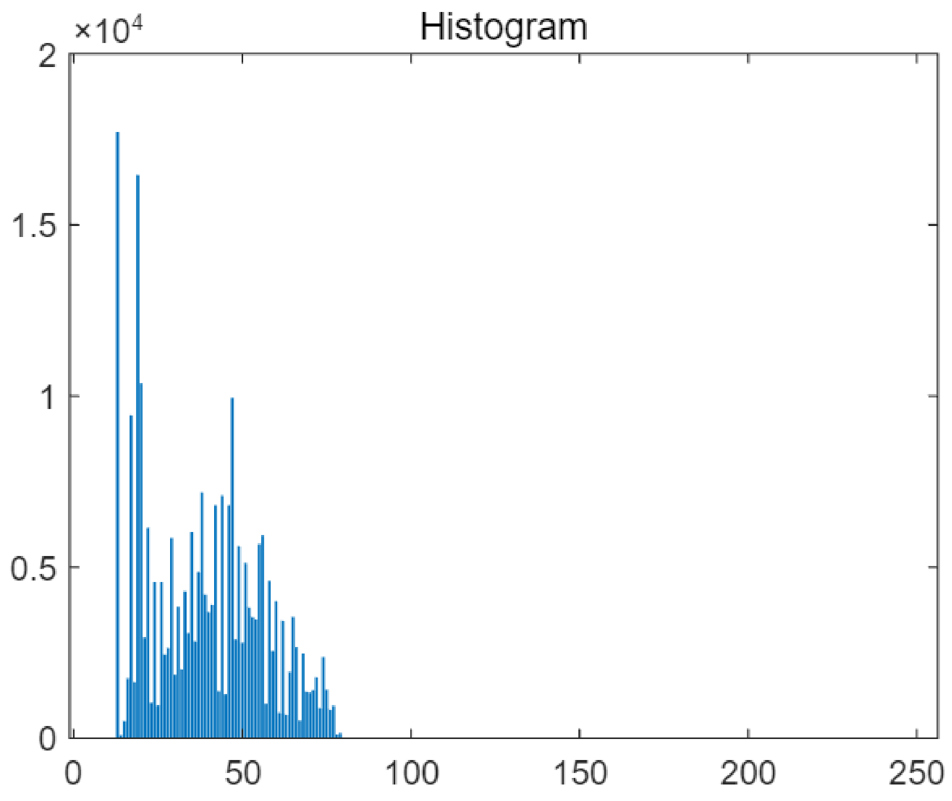


```
imshow(mean_saltpaper);title("mean salt&paper");
```

mean salt&paper



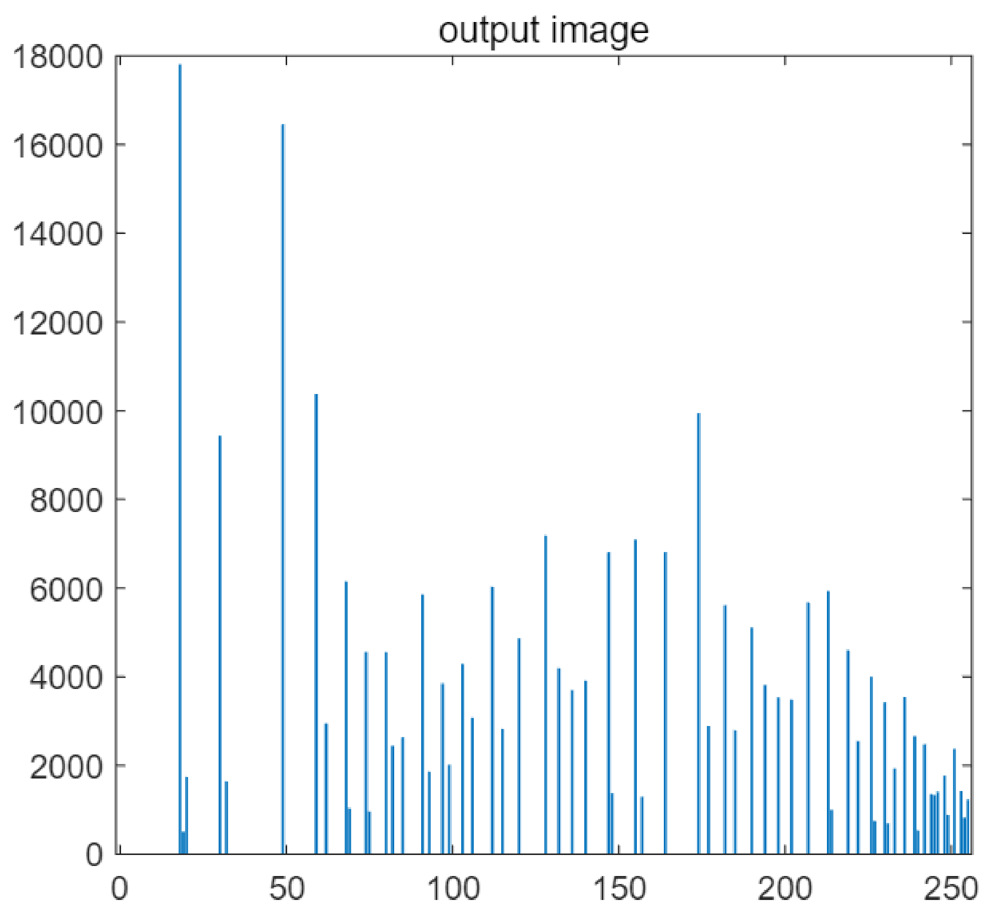
```
load Q3\original_img.mat;
source=imread("Q3\source.jpg");
target=imread("Q3\target.jpg");
[n,m]=size(original_img);
cnt=zeros(256,1);
bin=zeros(256,1);
for i=[1:256]
    bin(i,1)=i-1;
end
for i=[1:n]
    for j=[1:m]
        cnt(original_img(i,j)+1,1)=cnt(original_img(i,j)+1,1)+1;
    end
end
bar(bin,cnt);title("Histogram");
```



```
p=cnt/(n*m);
p=cumsum(p);
p=p*255;
p=round(p);
output=uint8(zeros(n,m));
for i=[1:n]
    for j=[1:m]
        output(i,j)=p(original_img(i,j)+1,1);
    end
end
imshow(output);title("output image");
```

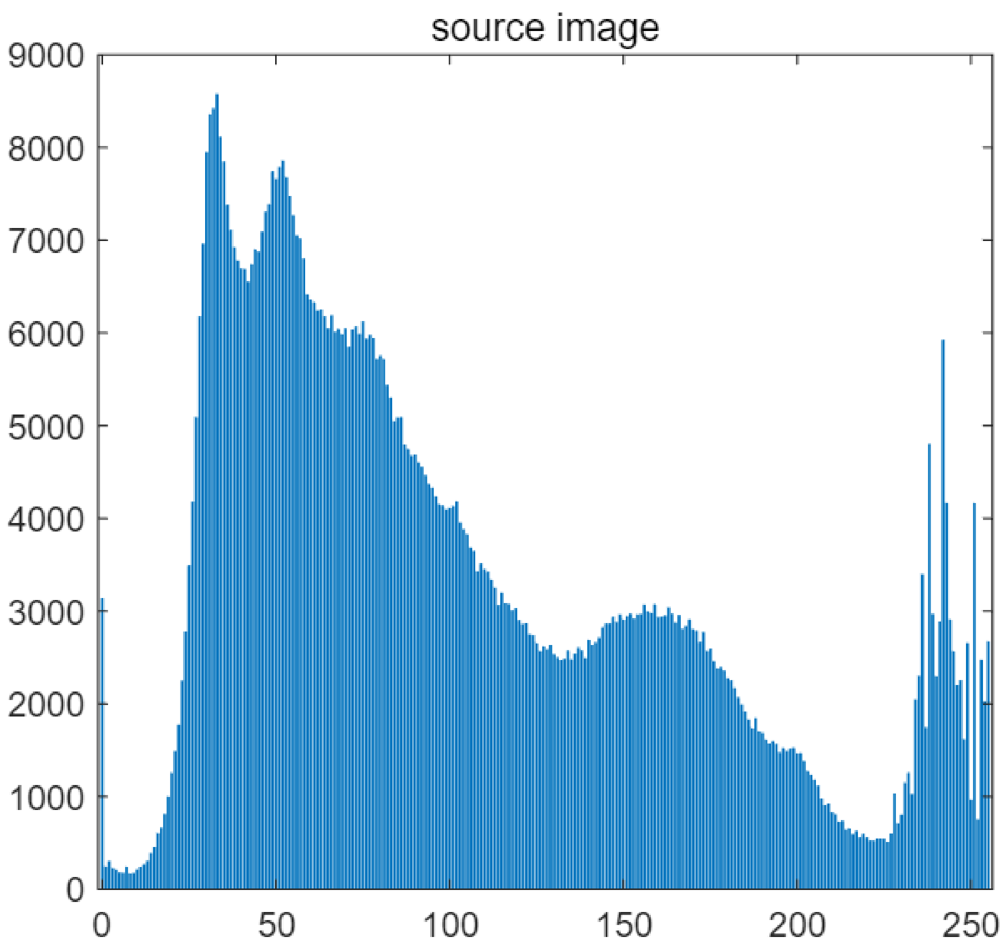
output image

```
[counts,binLocations]=imhist(output);
bar(binLocations,counts);title("output image");
```

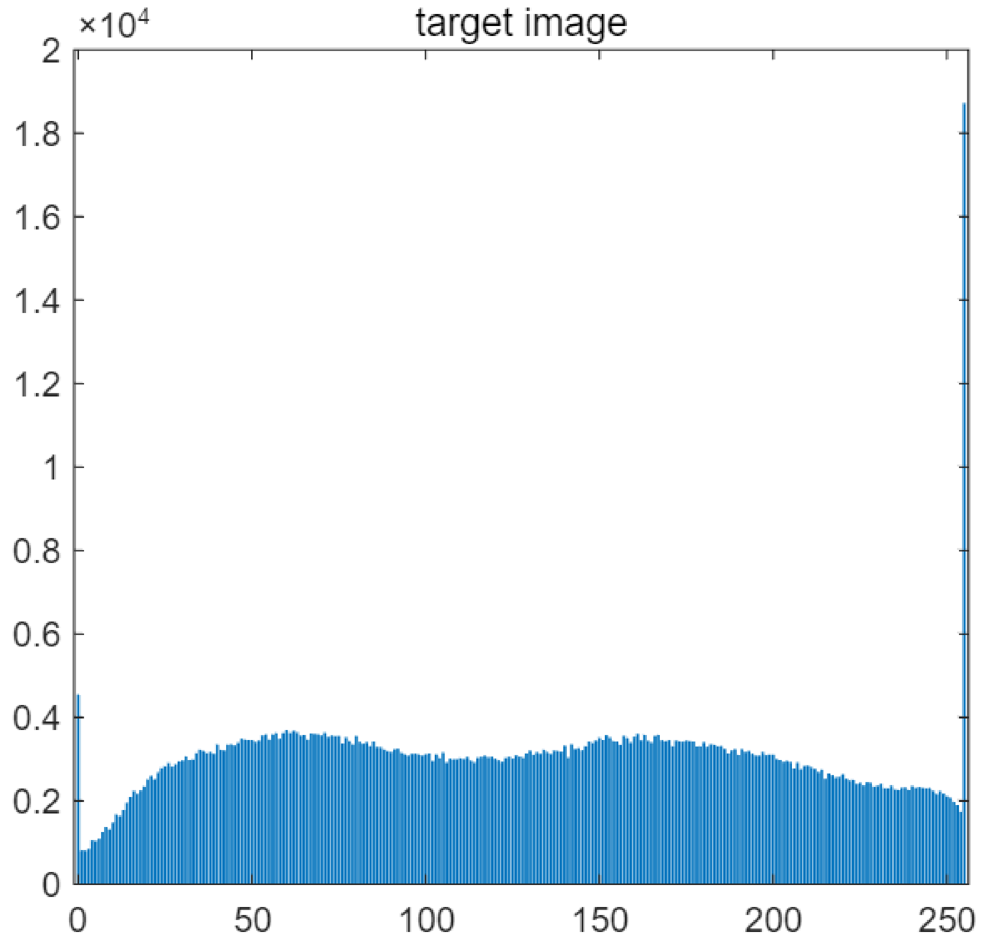


```
[source_n,source_m,dim]=size(source);
[target_n,target_m,dim]=size(target);
x=uint8(zeros(source_n,source_m,3));
for k=[1:3]
    source_x=source(:,:,k);%获取原图像 k 通道
    source_hist=imhist(source_x);%获取原图像 k 通道直方图
    target_x=target(:,:,k);%获取匹配图像 k 通道
    target_hist=imhist(target_x);%获取匹配图像 k 通道直方图
    %x(:,:,k)=histeq(source_x,target_hist);%R 通道直方图匹配,系统自带,可惜不让用
    source_p=cumsum(source_hist)/(source_n*source_m);
    target_p=cumsum(target_hist)/(target_n*target_m);
    map=zeros(1,256);%从 0 到 255 分别的映射
    %help min
    for i=[1:256]
        [val,pos]=min(abs(source_p(i)-target_p));%找到 target_p 中与 source(i)最接近的位置
        map(i)=pos-1;
    end
    x(:,:,k)=map(double(source_x)+1);
end
result=cat(3,x(:,:,1),x(:,:,2),x(:,:,3));
imshow(result);
```

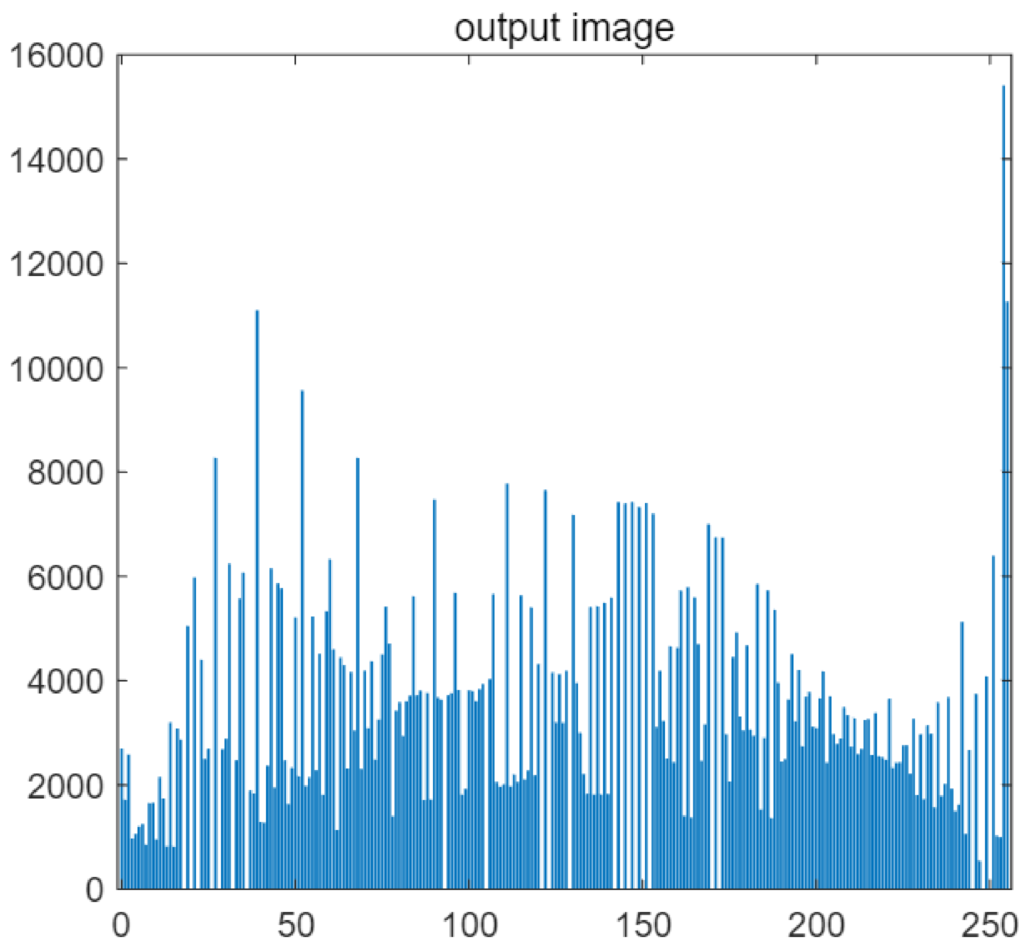
```
[counts,binLocations]=imhist(source);
bar(binLocations,counts);title("source image");
```



```
[counts,binLocations]=imhist(target);
bar(binLocations,counts);title("target image");
```



```
[counts,binLocations]=imhist(result);
bar(binLocations,counts);title("output image");
```


output image
16000
14000
12000
10000
8000
6000
4000
2000
0
0
50
100
150
200
250