

1. using desired histogram to obtain the table of transformation function for the mapping from the input gray level r to the output gray level z .

$r_k, k=0-255$	$z_k, k=0-255$
0	0
1	0
2	0
3	0
4	0
5	0
6	0
7	0
8	0
9	0
10	0
11	0
12	1
13	1
14	1
15	2
16	2
17	3
18	4
19	6
20	8
21	10
22	13
23	16
24	20
25	24
26	28
27	31
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250	240
251	240
252	240
253	240
254	243
255	255

2. Generating output image after applying the table of transformation function for original image.



Figure 1 Original image.



Figure 2 Output image.

3. original and output image histograms.

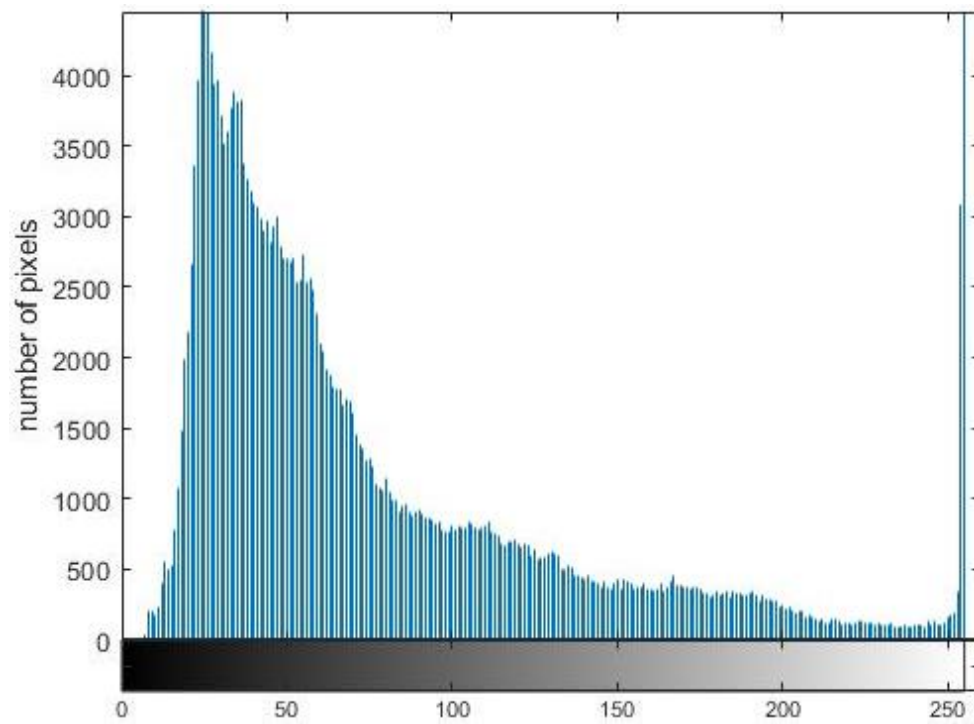


Figure 3 Original histograms.

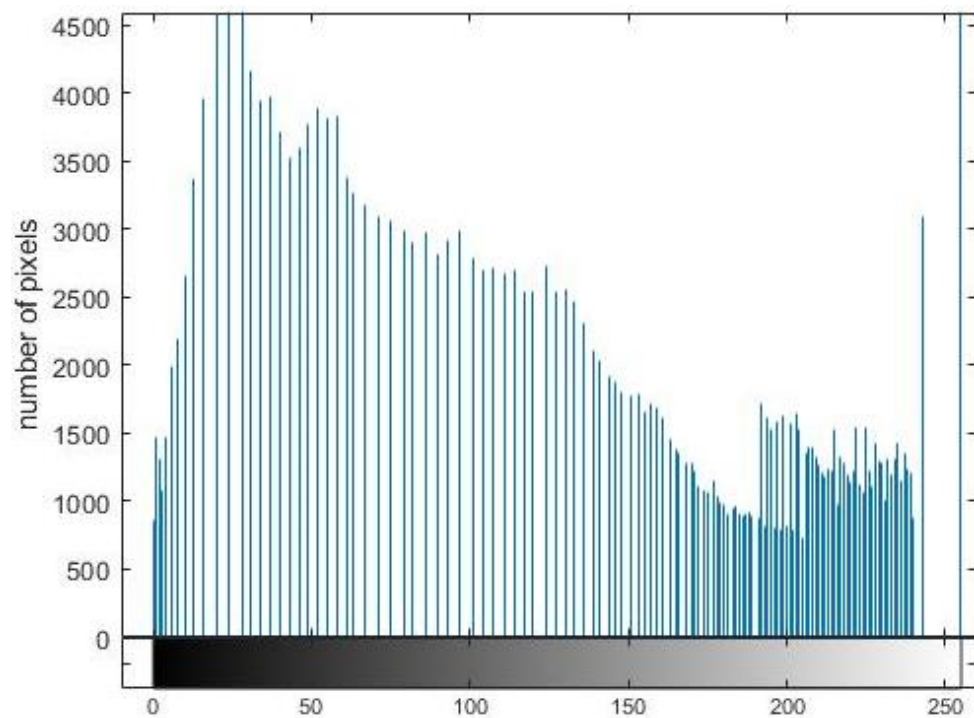


Figure 4 output histograms.

Source code:

```
% Clear all command window, temporary variables and close all MATLAB
window
clear;clc;close all;

% Read the image, data type: uint8
pic1 = imread('camellia (mono) 512x512.tif');

% % Show the input image (camellia (mono) 512x512.tif)
figure;
imshow(pic1);
title('Original image');

% Calculate the histogram of the input image
pic1_his=imhist(pic1);

% Show the histogram of the input image
figure;
imhist(pic1);
xlim([0 260]);
title('Original histograms');
ylabel('number of pixels');

% Calculate the probability each of gray-level for input image
pic1_prob=pic1_his/sum(pic1_his);

% Calculate the probability of z
pz=zeros(256,1);
for ii=1:1:64
    pz(ii,1)=1248/(512*512);
end
for ii=65:1:192
    pz(ii,1)=800/(512*512);
end
for ii=193:1:256
    pz(ii,1)=1248/(512*512);
end
```

```

% Calculate sk,sn
sk=zeros(256,1);
sn=zeros(256,1);
for ii=1:256
    total=0;
    for jj=1:ii
        total=total+pic1_prob(jj,1);
    end
    sk(ii,1)=total;
end
for ii=1:256
    total=0;
    for jj=1:ii
        total=total+pz(jj,1);
    end
    sn(ii,1)=total;
end

% Calculate min_n(sn-sk)>=0
a=zeros(256,256);
for k=1:256
    for n=1:256
        a(k,n)=sn(n,1)-sk(k,1);
    end
end
A=a.';
A(A < 0) = inf;

% Find the minimum and its row for each column
[B,C]=min(A);
new=zeros(256,1);
for n=1:256
    new(n,1)=C(1,n)-1;
end

% new output image
npic1=zeros(512,512);

```

```

for ii=1:512
    for jj=1:512
        for kk=1:1:256
            if pic1(ii,jj) == kk-1
                npic1(ii,jj)=new(kk,1);
            end
        end
    end
end

% Show the output image
figure;
imshow(uint8(npic1));
title('Output image after histogram-specification scheme');
npic1_his=imhist(uint8(npic1));

% Show the output histograms
figure;
imhist(uint8(npic1));
xlim([-10 260])
title('Output histograms');
ylabel('number of pixels');

% Show the curve of transformation function
figure;
plot(0:1:255, new);
axis([-5 260 -5 260]);
xlabel('input intensity level (r)');
ylabel('output intensity level (s)');

```