

影像處理導論

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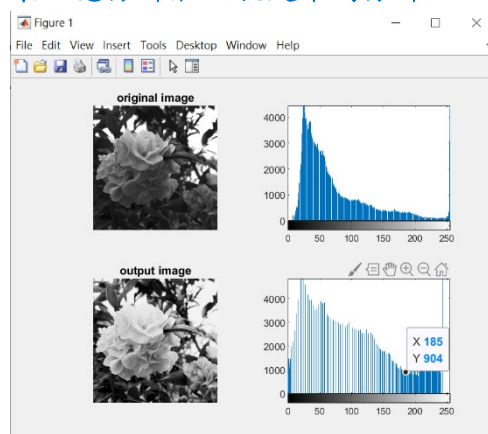
Project goal

Apply histogram-specification method to the image below, assume desired histogram: $nk=1248$, $0 \leq k \leq 63$ and $192 \leq k \leq 255$, $nk=800$, $64 \leq k \leq 191$.

Determine the transformation function $z = T(r)$ and the output image after applying the transformation function to the image.

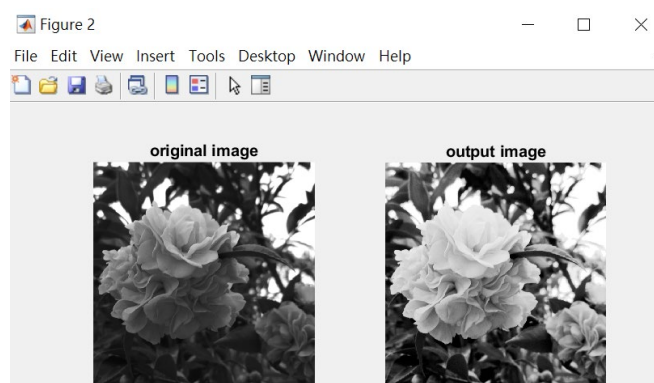
A. Figures of the original and output histograms

在 Histogram 的分佈中我們可以觀察到，如果 Histogram 分佈的峰值靠近左側(靠近 0)，則代表這張影像偏暗；如果 Histogram 分佈的峰值靠近右側(靠近 255)，則代表這張影像偏亮；如果 Histogram 分佈的峰值非常集中在中間，則明暗的對比就不太明顯。，Histogram Equalization 最理想分佈狀況就是平均分佈



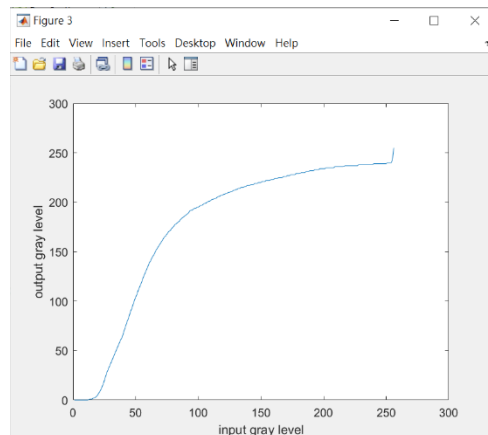
B. Figure of the output image after applying the histogram-specification scheme

從結果來看經過灰階均化後圖形效果較能看到細節的部分也較為清晰



C. Table of transformation function to show the mapping from the input gray level r to the output gray level z

將做完轉換的灰階值存放在一個矩陣內



Output gray level:

0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	2	2
3	4	6	8	10	13	16	20	24	28	31	34	37	40	43	46		
49	52	55	58	61	63	67	71	75	79	82	86	90	93	97	101		
104	107	111	114	117	120	124	127	130	133	136	139	141	144	146	148		
151	153	155	157	159	161	163	165	166	168	170	171	172	174	175	177		
178	179	180	181	183	184	185	186	187	188	189	191	192	192	193	194		
194	195	195	196	197	197	198	199	199	200	201	201	202	203	203	204		
204	205	206	206	207	207	208	208	209	209	210	210	211	211	212	212		
213	213	214	214	215	215	215	216	216	217	217	217	218	218	218	219		
219	219	220	220	220	221	221	221	222	222	222	222	223	223	223	224		
224	224	225	225	225	225	226	226	226	227	227	227	228	228	228	228		
229	229	229	229	230	230	230	230	231	231	231	232	232	232	232	233		
233	233	233	234	234	234	234	234	235	235	235	235	235	235	235	236		
236	236	236	236	236	236	236	237	237	237	237	237	237	237	237	237		
237	237	238	238	238	238	238	238	238	238	238	238	238	238	238	239	239	
239	239	239	239	239	239	239	239	239	240	240	240	240	243	255			

D. Source codes

本次實驗使用 Matlab 軟體分析(含註解)

```
clc;
```

```
clear;
```

```
close;
```

```
a = imread('camellia (mono) 512x512.tif');
```

```
%Read the Image
```

```
b = size(a);
```

```

scale = 1;
shift = 0;
r = 0:255;
d = round(scale*r)+ shift;
function
count = zeros(3,256);
spec = zeros(1,256);
ep = zeros(b);
transform = zeros(b);
%loop for spec gray level accumulation
for i= 0:255
    if i>63 && i<192
        spec(1,i+1)=spec(1,i)+800;
    elseif i==0
        spec(1,i+1)=1248;
    else
        spec(1,i+1)=spec(1,i)+1248;
    end
end
%loop for count input image gray level
for i=1:b(1)
    of image
        for j=1:b(2)
            columns of image
                t=(a(i,j)+1);
                ep(i,j)=d(t);
            using
                count(1,ep(i,j))=count(1,ep(i,j))+1;
            end
        end
    end
    %loop for count input gray level accumulation
    for i= 0:255
        if i==0
            count(2,i+1)=0;
        else
            count(2,i+1)=count(2,i)+count(1,i+1);
        end
    end
end

```

%Defining input pixels
 %linear Transformation

 %loop tracing the rows

 %loop tracing thes

 %pixel values in image
 %Making the ouput image

 %counting

```

%loop for comparsion
for i=1:256
array count
    for j=1:256
columns of image
        if count (2,i)>spec(1,j)
            count (3,i)=j;
        end
    end
end

%transform
for i=1:b(1)
of image
    for j=1:b(2)
columns of image
        t=(a(i,j)+1);
        ep(i,j)=d(t);
using
        transform(i,j)=count(3,ep(i,j));
    end
end

%Procedure for plotting histogram
hist1 = zeros(1,256);
input histogram
hist2 = zeros(1,256);
output histogram

for i1=1:b(1)
of image
    for j1=1:b(2)
Columns of image
        for k1=0:255
graylevel
            if a(i1,j1)==k1

```

%loop tracing the
 %loop tracing thes
 %loop tracing the rows
 %loop tracing thes
 %pixel values in image
 %Making the ouput image
 %counting
 %preallocation space for
 %preallocation space for
 %loop tracing the rows
 %loop tracing the
 %loop checking which
 %match found at k1

```

            hist1(k1+1)=hist1(k1+1)+1;           %increase the value at k1
        end
        if transform(i1,j1)==k1                   %for output
image
            hist2(k1+1)=hist2(k1+1)+1;
        end
    end
end
end
end

```

%Plotting input image output image and their respective histograms

```

subplot(2,2,1);
imshow(a);
title('original image');
subplot(2,2,3);
imshow(uint8(transform));
title('output image');
subplot(2,2,2);
plot(hist1);
subplot(2,2,4);
plot(hist2);

```

%Plotting input image output image

```

figure;
subplot(1,2,1);
imshow(a);
title('original image');
subplot(1,2,2);
imshow(uint8(transform));
title('output image');

```

```

%%
figure;
plot(count(3,:));
xlabel('input gray level');

```

```
ylabel('output gray level');
```