

CH2

5.

```
>> imfinfo('wombats.jpg')

ans =

    struct with fields:

        Filename: 'D:\PROGRAM\wombats.jpg'
        FileModDate: '14-Mar-2019 11:16:37'
        FileSize: 17883
        Format: 'jpg'
        FormatVersion: ''
        Width: 256
        Height: 256
        BitDepth: 8
        ColorType: 'grayscale'
        FormatSignature: ''
        NumberOfSamples: 1
        CodingMethod: 'Huffman'
        CodingProcess: 'Sequential'
        Comment: {}
```

JPEG (FileSize:17883)

(實驗)

```
filename = get_full_filename(filename);

>> imread('wombats.png');
>> imshow('wombats.png')
>> imfinfo('wombats.png')

ans =

    struct with fields:

        Filename: 'D:\PROGRAM\wombats.png'
        FileModDate: '26-Jun-2015 15:19:10'
        FileSize: 60918
        Format: 'png'
        FormatVersion: []
        Width: 256
        Height: 256
        BitDepth: 8
        ColorType: 'grayscale'
        FormatSignature: [137 80 78 71 13 10 26 10]
        Colormap: []
        Histogram: []
        InterlaceType: 'none'
        Transparency: 'none'
        SimpleTransparencyData: []
        BackgroundColor: 1
        RenderingIntent: []
        Chromaticities: []
        Gamma: 1
```

PNG (FileSize:60918)

(實驗)

```
Comment: {}

>> imwrite(x,'wombats.bmp')
>> iminfo('wombats.bmp')

ans =

struct with fields:

    Filename: 'D:\PROGRAM\wombats.bmp'
    FileModDate: '14-Mar-2019 11:27:31'
    FileSize: 66614
    Format: 'bmp'
    FormatVersion: 'Version 3 (Microsoft Windows 3.x)'
    Width: 256
    Height: 256
    BitDepth: 8
    ColorType: 'indexed'
    FormatSignature: 'BM'
    NumColormapEntries: 256
    Colormap: [256x3 double]
    RedMask: []
    GreenMask: []
    BlueMask: []
    ImageDataOffset: 1078
    BitmapHeaderSize: 40
```

BMP (FileSize:66614)

(實驗)

6.

```
Variable CODE SIMULINK ENVIRONMENT RESOURCES

Command Window
>> imshow('wombats.png')
>> iminfo('wombats.png')

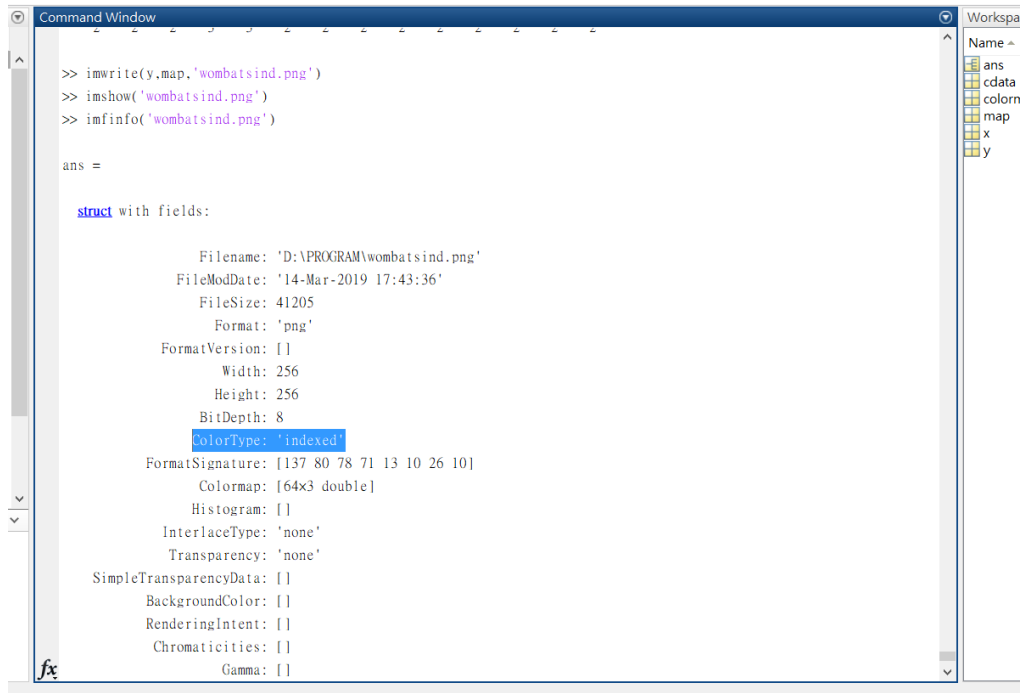
ans =

struct with fields:

    Filename: 'D:\PROGRAM\wombats.png'
    FileModDate: '26-Jun-2015 15:19:10'
    FileSize: 60918
    Format: 'png'
    FormatVersion: []
    Width: 256
    Height: 256
    BitDepth: 8
    ColorType: 'grayscale'
    FormatSignature: [137 80 78 71 13 10 26 10]
    Colormap: []
    Histogram: []
    InterlaceType: 'none'
    Transparency: 'none'
    SimpleTransparencyData: []
    BackgroundColor: 1
    RenderingIntent: []
    Chromaticities: []
    Gamma: 1
    XResolution: 2834
    YResolution: 2834
    ResolutionUnit: 'meter'
```

二元影像檔案。

(實驗)



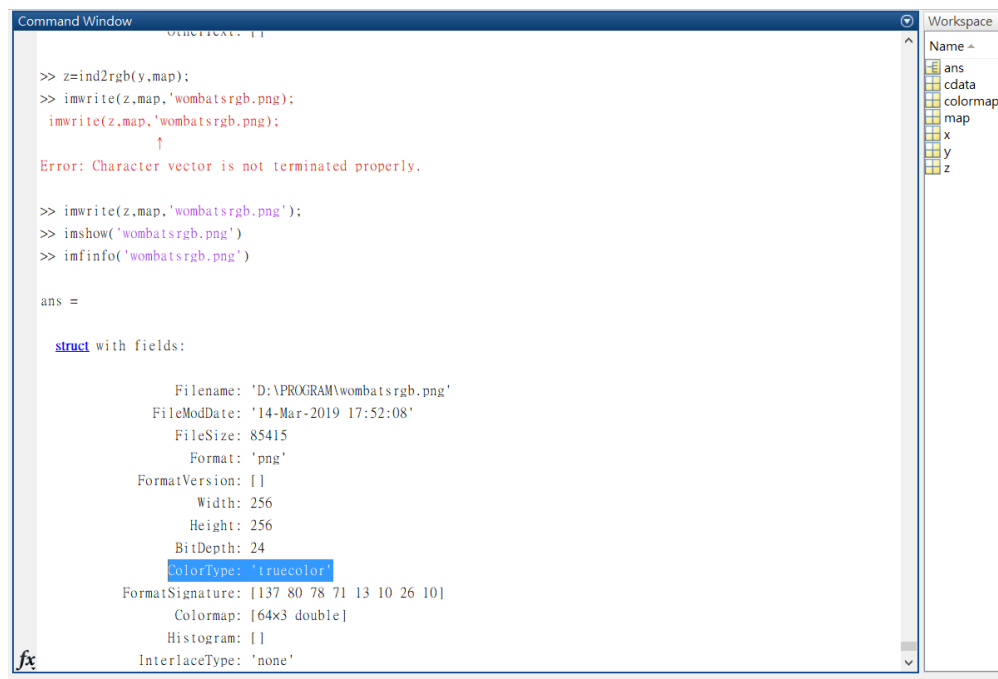
```
>> imwrite(y,map,'wombatsind.png')
>> imshow('wombatsind.png')
>> imfinfo('wombatsind.png')

ans =

    struct with fields:

        Filename: 'D:\PROGRAM\wombatsind.png'
        FileModDate: '14-Mar-2019 17:43:36'
        FileSize: 41205
        Format: 'png'
        FormatVersion: []
        Width: 256
        Height: 256
        BitDepth: 8
        ColorType: 'indexed'
        FormatSignature: [137 80 78 71 13 10 26 10]
        Colormap: [64x3 double]
        Histogram: []
        InterlaceType: 'none'
        Transparency: 'none'
        SimpleTransparencyData: []
        BackgroundColor: []
        RenderingIntent: []
        Chromaticities: []
        Gamma: []
```

索引彩色檔案。
(實驗)



```
>> z=ind2rgb(y,map);
>> imwrite(z,map,'wombatsrgb.png');
>> imwrite(z,map,'wombatsrgb.png');
      ↑
Error: Character vector is not terminated properly.

>> imwrite(z,map,'wombatsrgb.png');
>> imshow('wombatsrgb.png')
>> imfinfo('wombatsrgb.png')

ans =

    struct with fields:

        Filename: 'D:\PROGRAM\wombatsrgb.png'
        FileModDate: '14-Mar-2019 17:52:08'
        FileSize: 85415
        Format: 'png'
        FormatVersion: []
        Width: 256
        Height: 256
        BitDepth: 24
        ColorType: 'truecolor'
        FormatSignature: [137 80 78 71 13 10 26 10]
        Colormap: [64x3 double]
        Histogram: []
        InterlaceType: 'none'
```

全彩檔案。
(實驗)

CH3

1.

```
>> d=imread('cameraman.png');  
>> whos d
```

Name	Size	Bytes	Class	Attributes
d	256x256	65536	uint8	

unit8
(實驗)


2.

Command Window

BackgroundColor: 1

R Figure 1

File Edit View Insert Tools Desktop Window Help



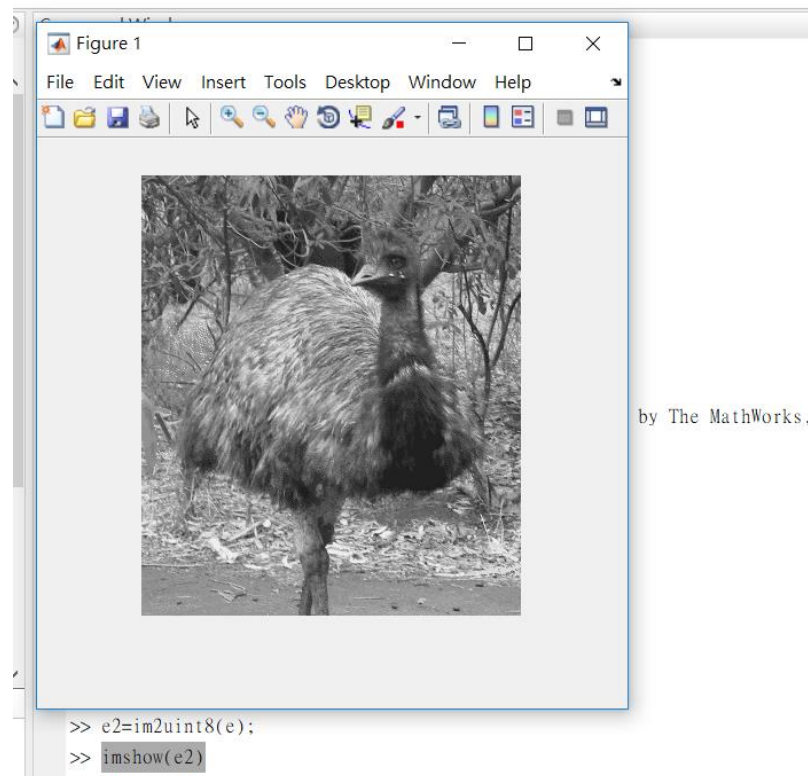
S

>> [em,map]=imread('emu.png');
>> e=ind2gray(em,map);
>> imshow(e)

ks, Inc. with permission f

(實驗)

3.



im2uint8 函數可以將圖片轉換為 unit8 型態的影像。

(a) 影像的外觀、(b)影像矩陣的元素都不會影響。
(實驗)

4.

```
>> c=imread('cameraman.png');
>> c2=im2uint8(c);
>> imshow(w2)
Undefined function or variable 'w2'.

>> imshow(c2)
>> figure2,imshow(c);
Undefined function or variable 'figure2'.

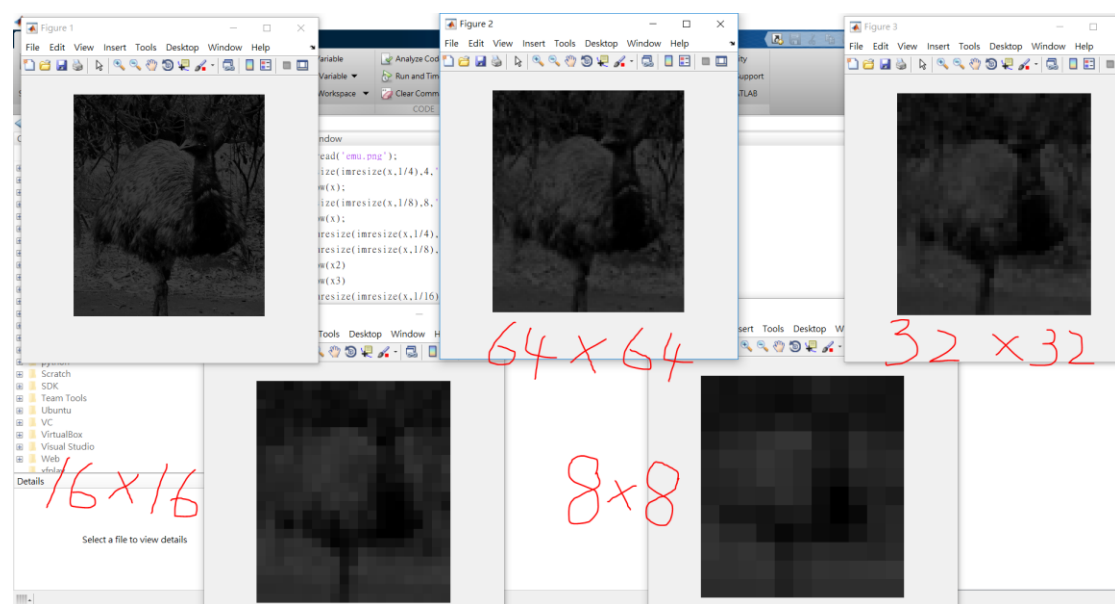
>> figure(2),imshow(c);
>> whos c c2
```

Name	Size	Bytes	Class	Attributes
c	256x256	65536	uint8	
c2	256x256	65536	uint8	

不會發生什麼事。

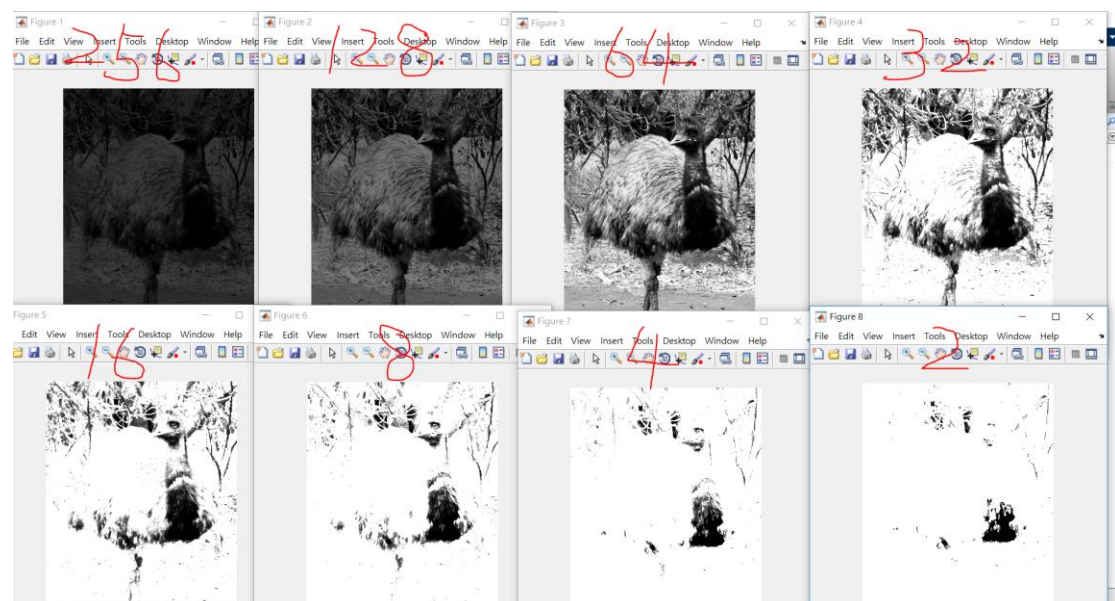
(實驗)

5.



在有效解析度 8×8 時，圖片已無法辨識。
(討論)

6.

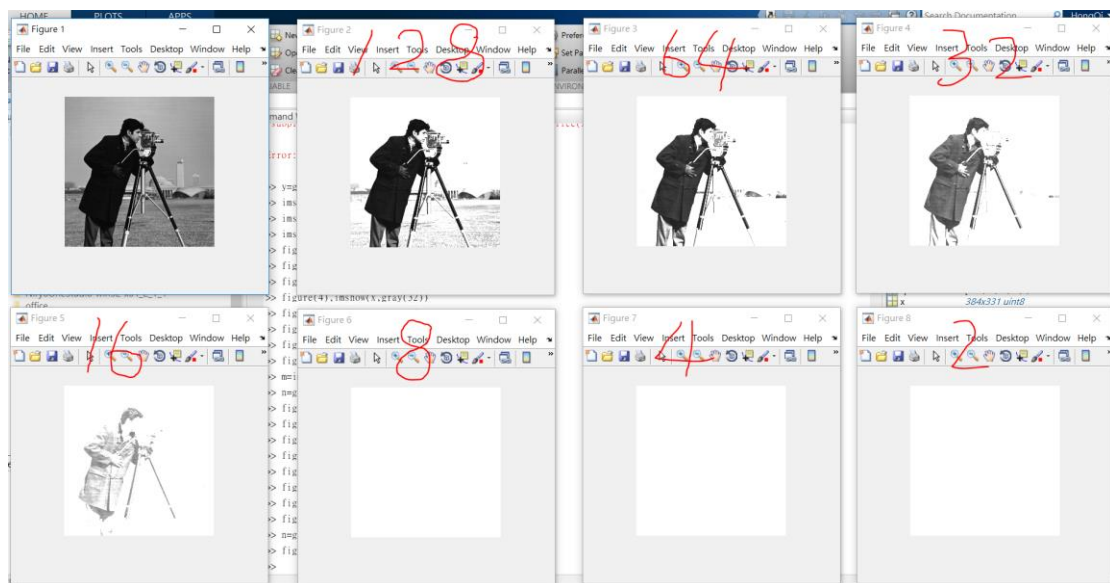


```

>> y=grayscale(x,4);
>> imshow(x,gray(4))
>> imshow(x,gray(8))
>> imshow(x,gray(256))
>> figure(1),imshow(x,gray(256))
>> figure(2),imshow(x,gray(128))
>> figure(3),imshow(x,gray(64))
>> figure(4),imshow(x,gray(32))
>> figure(5),imshow(x,gray(16))
>> figure(6),imshow(x,gray(8))
>> figure(7),imshow(x,gray(4))
>> figure(8),imshow(x,gray(2))

```

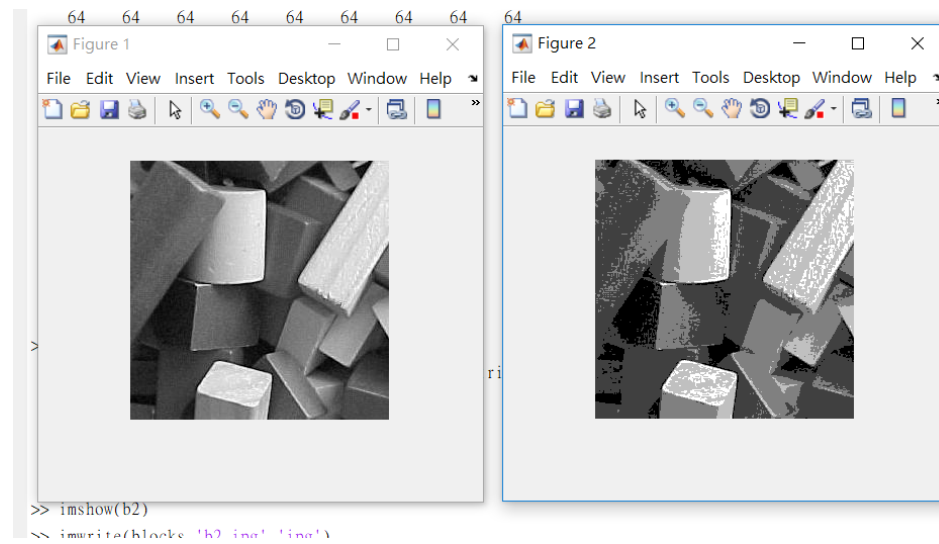
emu.png 這張影像在量化為 8 灰階之後嚴重劣化，並不可辨識。
(討論)



cameraman.png 這張影像在量化為 16 灰階之後嚴重劣化，8 灰階不可辨識。
(討論)

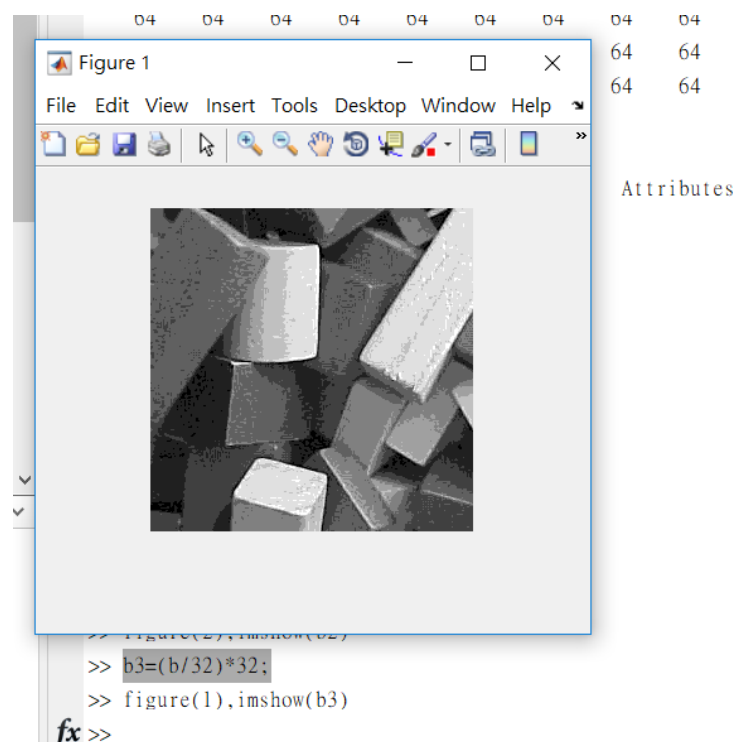
CH4

2.



原本影像為 256 灰階，經公式運算過後，量化為 4 灰階。
(實驗)

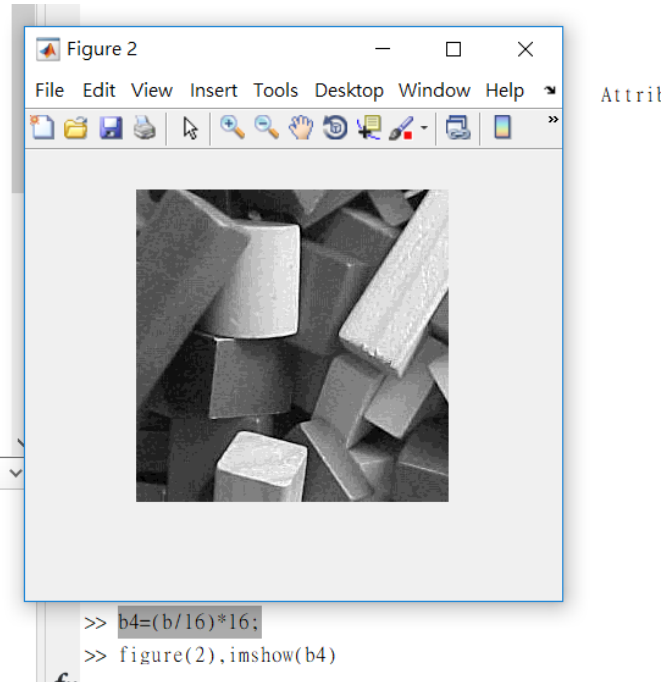
3.



$b3=(b/32)*32$

量化為 8 灰階。

(實驗)



$$B4=(b/32)*32$$

量化為 16 灰階。

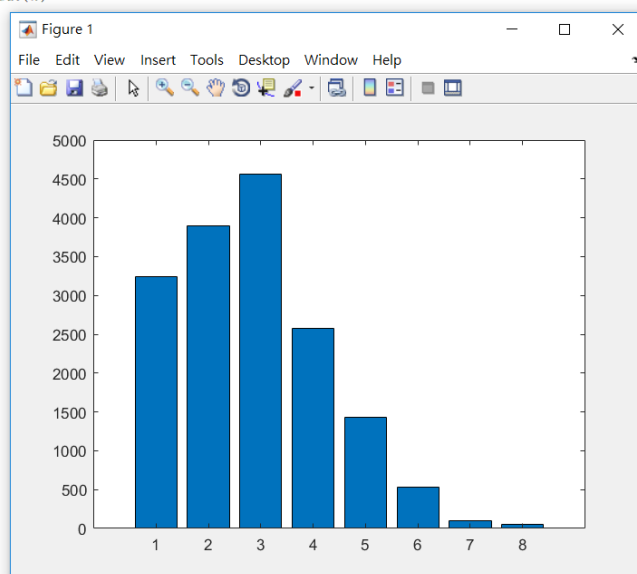
(實驗)

5.

原始灰階像數目：

0	1	2	3	4	5	6	7
3244	3899	4559	2573	1428	530	101	50

```
>> x=[3244,3899,4559,2573,1428,530,101,50];
>> bar(x)
>>
```



原直方圖。

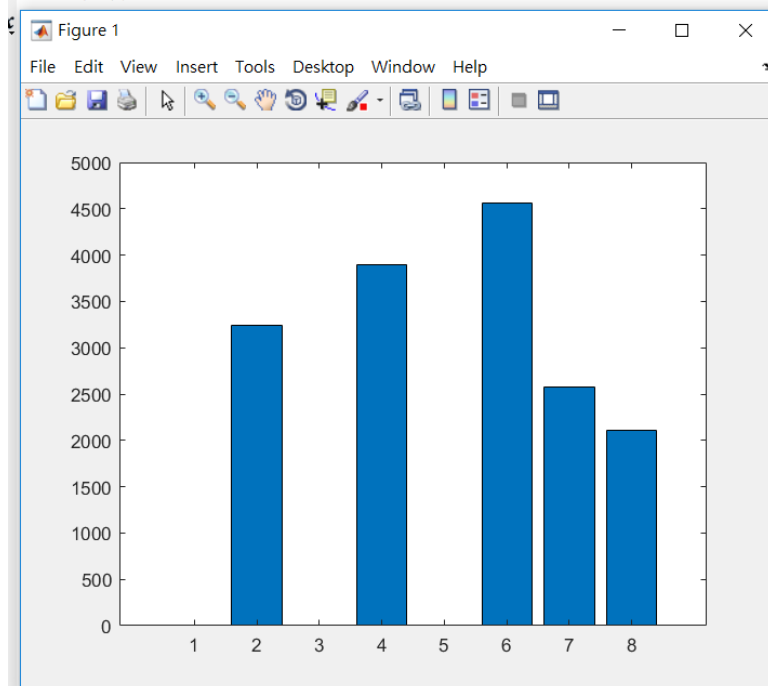
接著轉換出最終灰階值：

原始灰階 i	0	1	2	3	4	5	6	7
最終灰階 j	1	3	5	6	7	7	7	7

等化後的灰階值像素目：

0	1	2	3	4	5	6	7
0	3244	0	3899	0	4559	2573	2109

```
>> x2=[0,3244,0,3899,0,4559,2573,2109];
>> bar(x2);
```



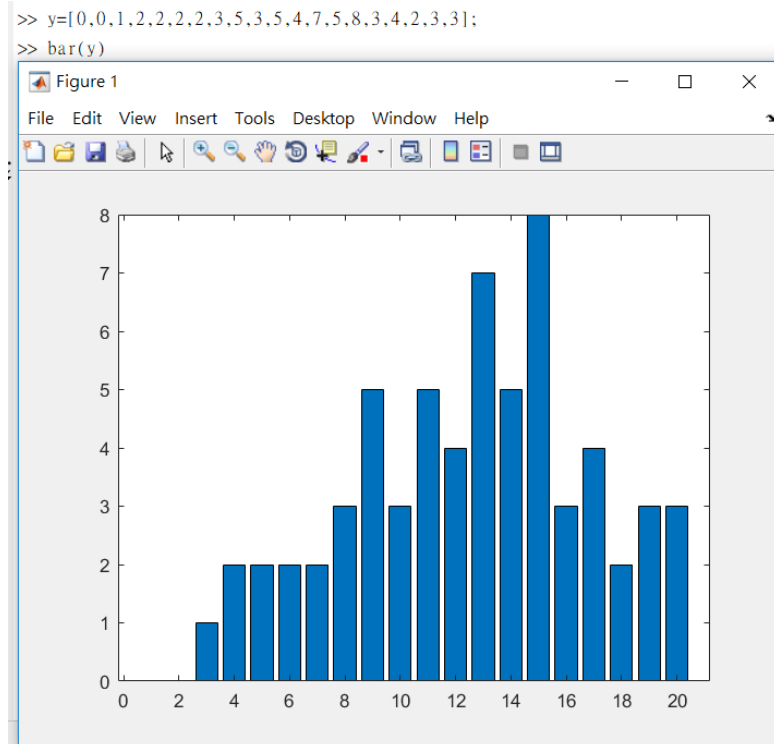
等化後直方圖。

(討論)

7.

原始灰階像數目：

0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19
0	0	1	2	2	2	2	3	5	3	5	4	7	5	8	3	4	2	3	3



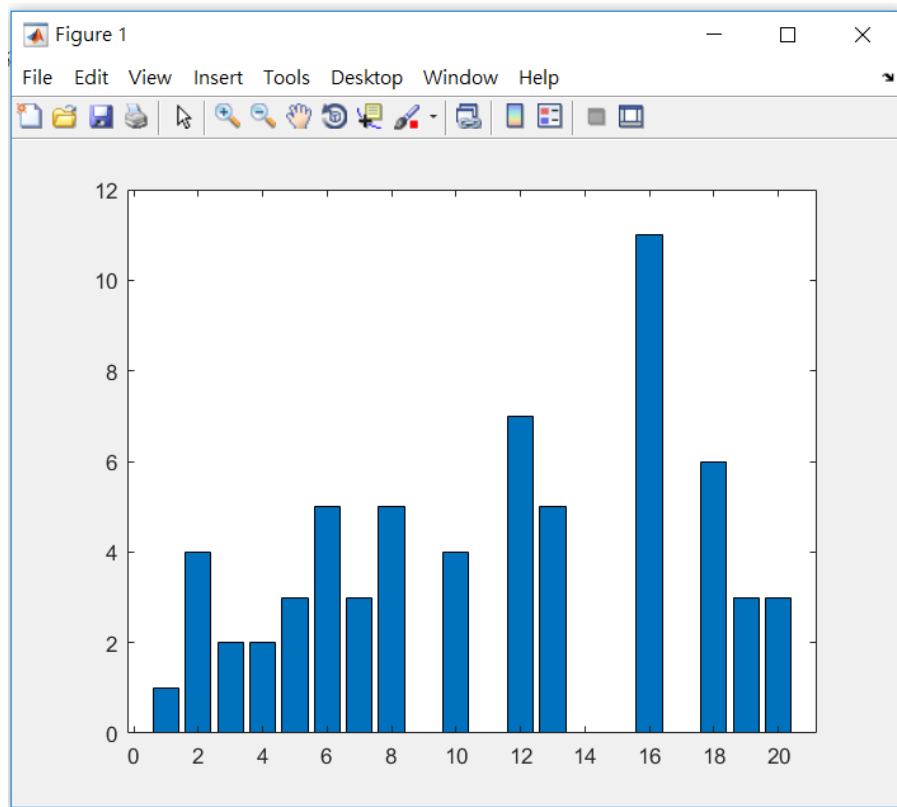
原直方圖。

接著轉換出最終灰階值：

原始灰階 i	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19
最終灰階 j	0	0	0	1	1	2	3	4	5	6	7	9	11	12	15	15	17	17	18	19

等化後的灰階值像素目：

0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19
1	4	2	2	3	5	3	5	0	4	0	7	5	0	0	11	0	6	3	3

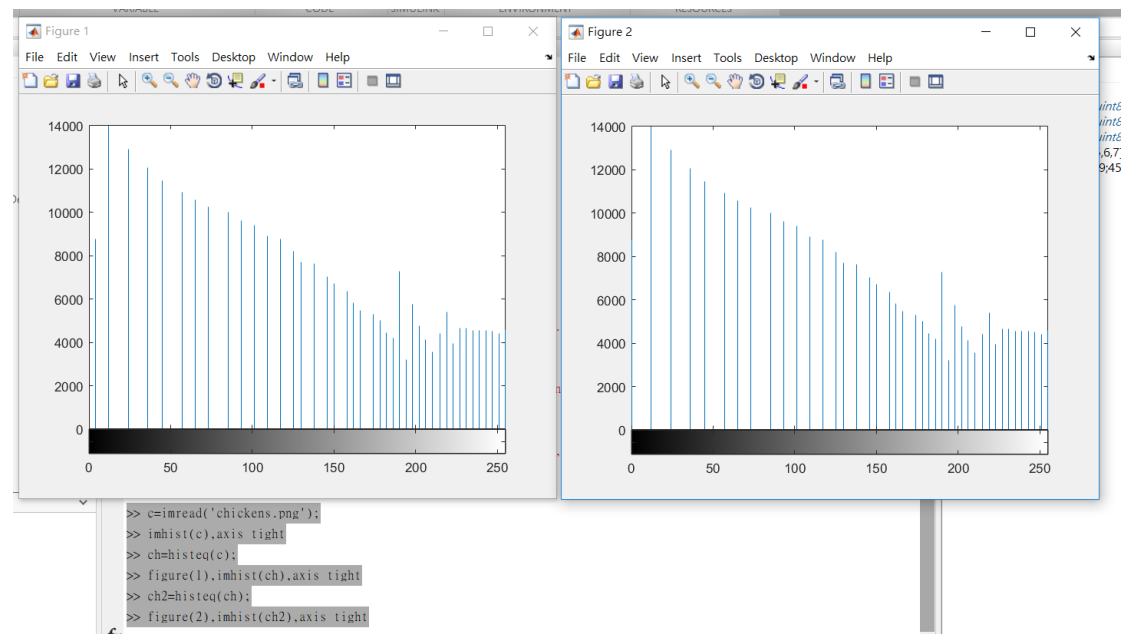


等化後直方圖。

11	3	2	12	15	15	17	15
9	7	5	2	5	9	15	15
6	5	1	1	4	11	18	19
7	4	1	0	7	11	12	17
17	6	12	12	17	19	19	17
11	7	15	15	18	18	17	15
9	5	7	11	15	12	15	15
5	3	1	4	6	9	11	11

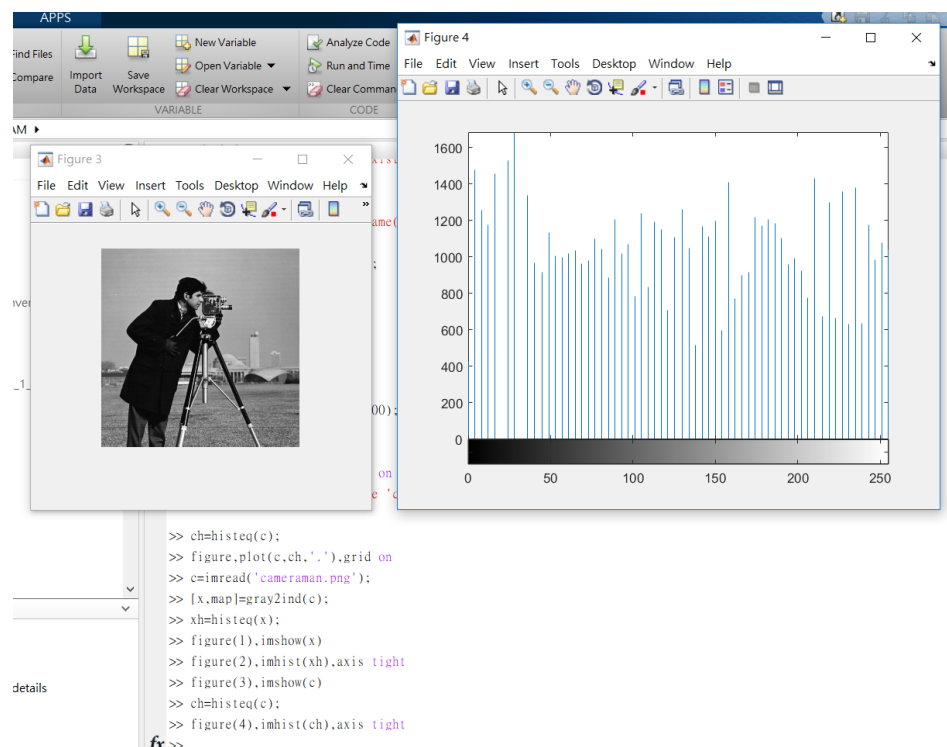
(討論)

8.

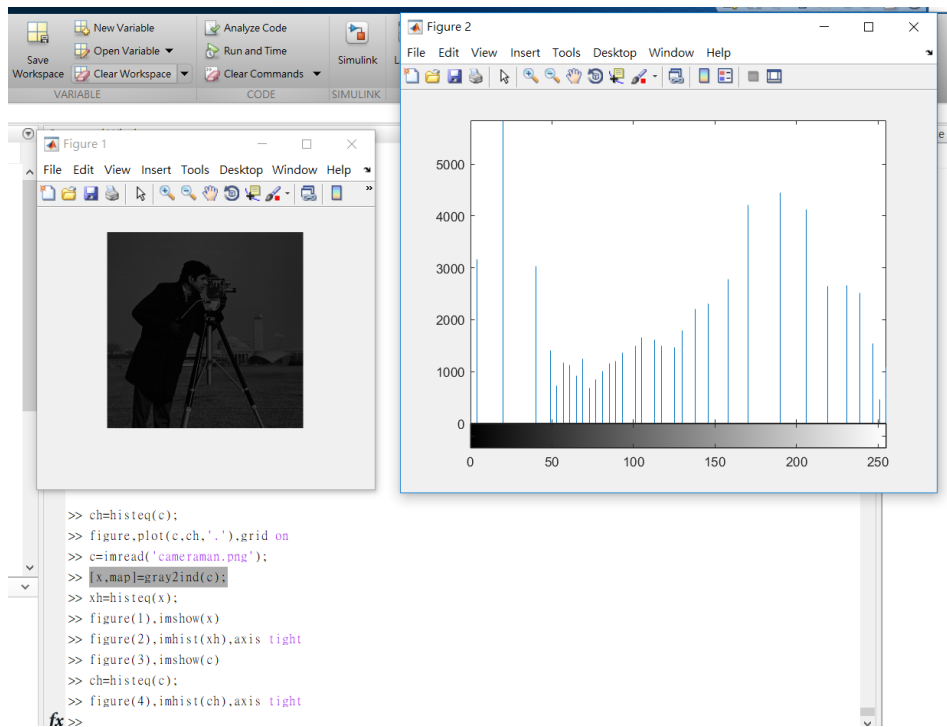


直方圖等化運算為等冪，執行兩次直方圖等化結果與執行一次相同。
(實驗)

10.

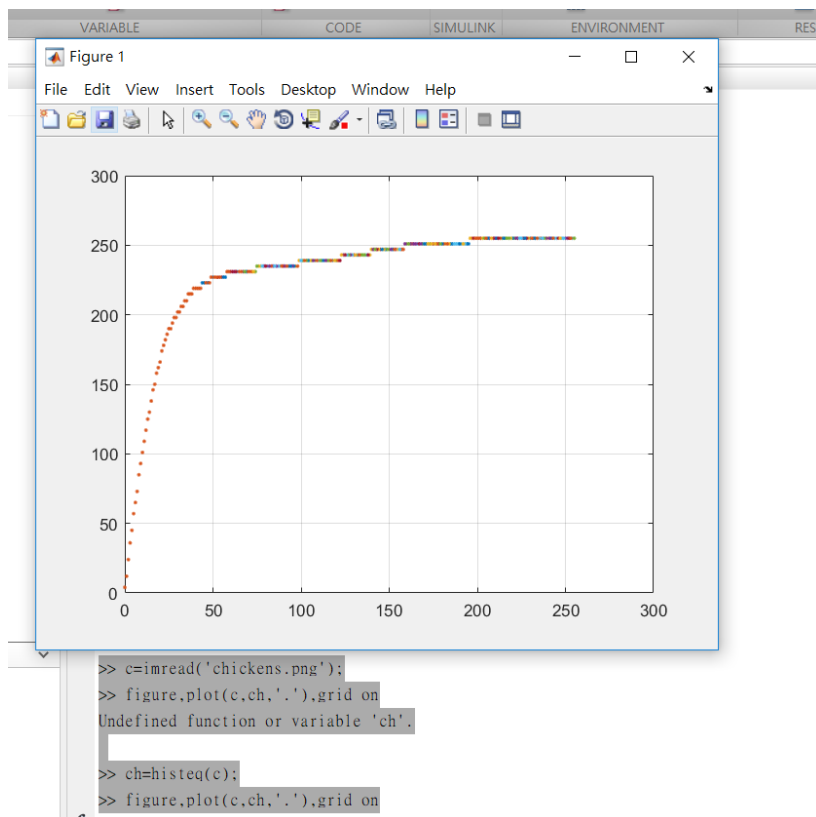


原圖



經處理後暗色影像，直方圖等化。
(實驗)

11.



執行 plot 函數便可觀察到 imadjust 擴展函數。
(實驗)