```
% DIP Homework Assignment #1
% 03 26, 2018
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% 只要執行每題的execute code 就可以得到該題需要的檔案或答案
```
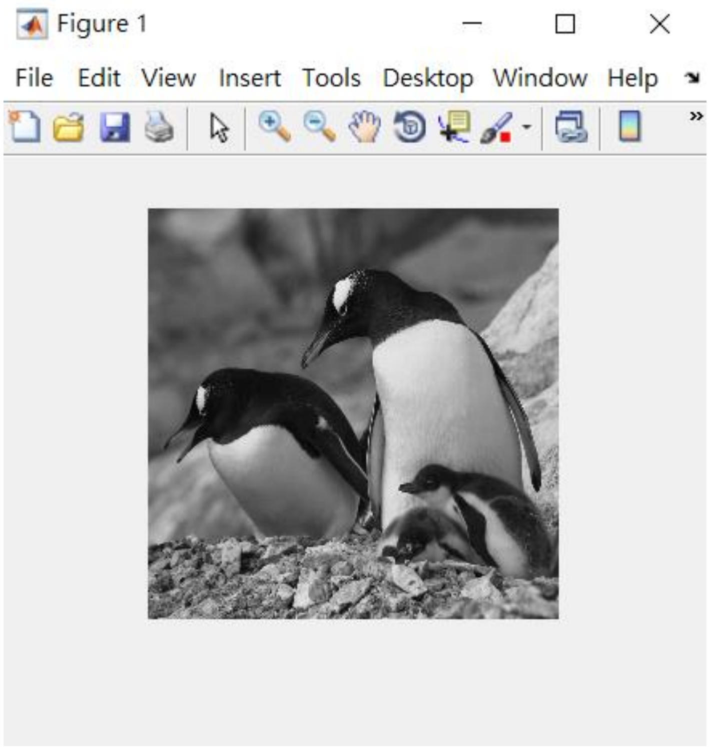

WARM-UP: SIMPLE MANIPULATIONS

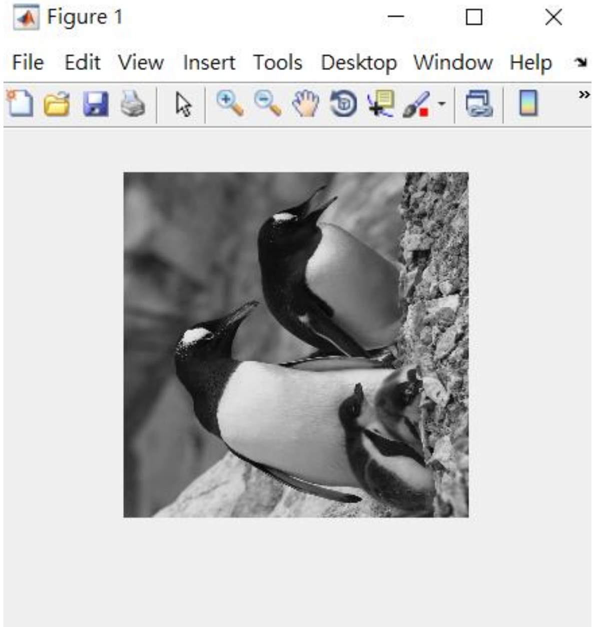
```
%Implementation:1.RGB to grylevel 2. diagonal flipping
%M-file name:rgbtogrey.m
%Usage:greylevel image to RGB image
%Output image:"A.raw","B.raw"
%Paramete:0.2126*R+0.7152*G+0.0722*B
%excuute code:rgbtogrey("sample1.raw")
```

a. 我的grey level image 會用0.2126*R+0.7153*G+0.0722*B來做 component是google查詢到的最佳合成比例,flipping則是對grey level matrix作轉置
b. “sample1.raw”
c. “A.raw”,”B.raw”
d. 我試過用直接把(R+G+B)再*1/3,但是結果沒有用最佳合成比例來的好,所以 我還是選擇使用了最佳合成比例的參數

A.raw



B.raw

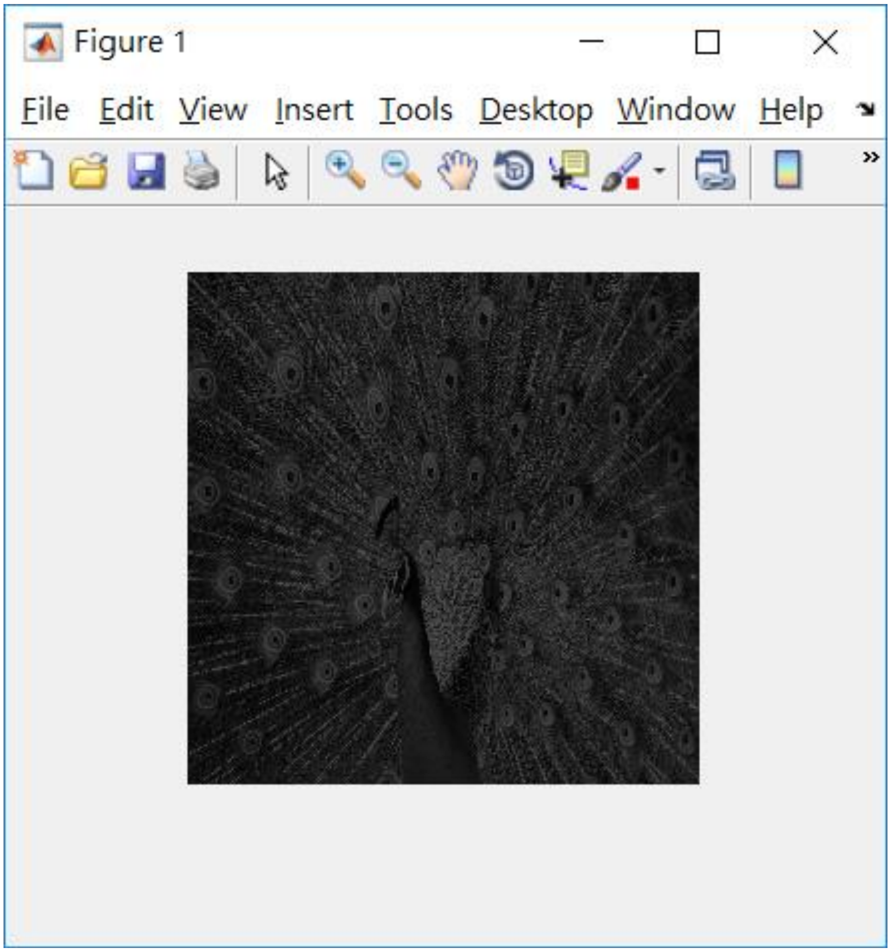


Problem 1(a): Noise intensity decrease by 3

```
% Implementation 1: Linear Transformation
% M-file name: linear_amp.m
% Usage: linear_amp
% Output image: "D.raw"
% Parameters: decrease by 3
%execute code:linear_amp("sample2.raw",1/3)
```

a. 這題想法很直覺的就是用pixel直接做linear transform,想調暗或調亮就直接對矩陣做乘法
b. “sample2.raw”
c. “D.raw”
d. 雖然這題的概念很簡單,但是再做影像處理應該不會單單對影像作linear transform,應該還會需要搭配其他處理

D.raw



Problem 1(b): Plot the histagram of "sample2.raw" and "D.raw"

```
% Implementation 1: count the pixel and bar them
% M-file name: plot_hist.m
% Usage: linear_amp
% Output image: no
% Parameters: no
%execute code:plot_hist("sample2.raw")
%              plot_hist("D.raw")
```

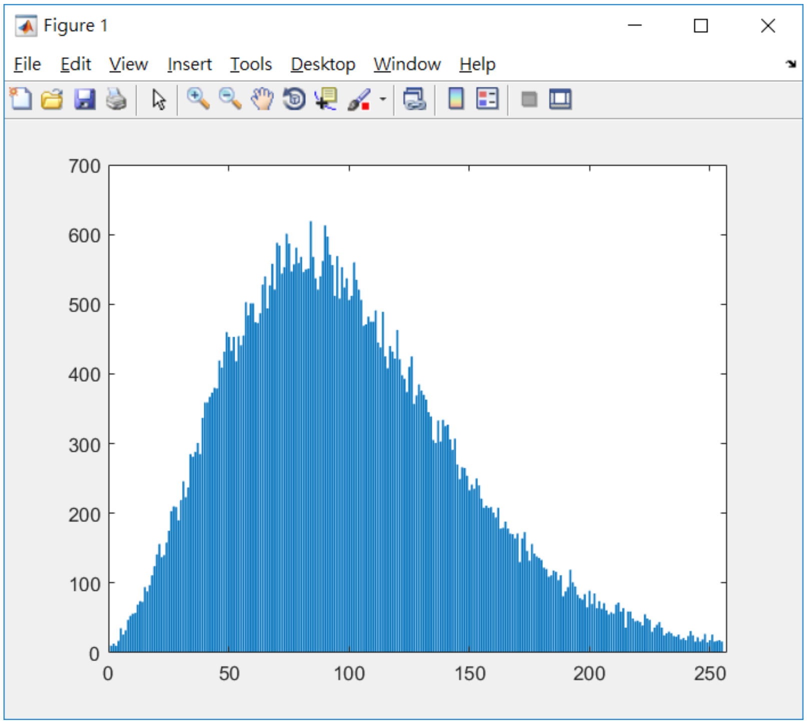
a. 由於不能直接使用matlab的build in函數,所以必須count 各個pixel出

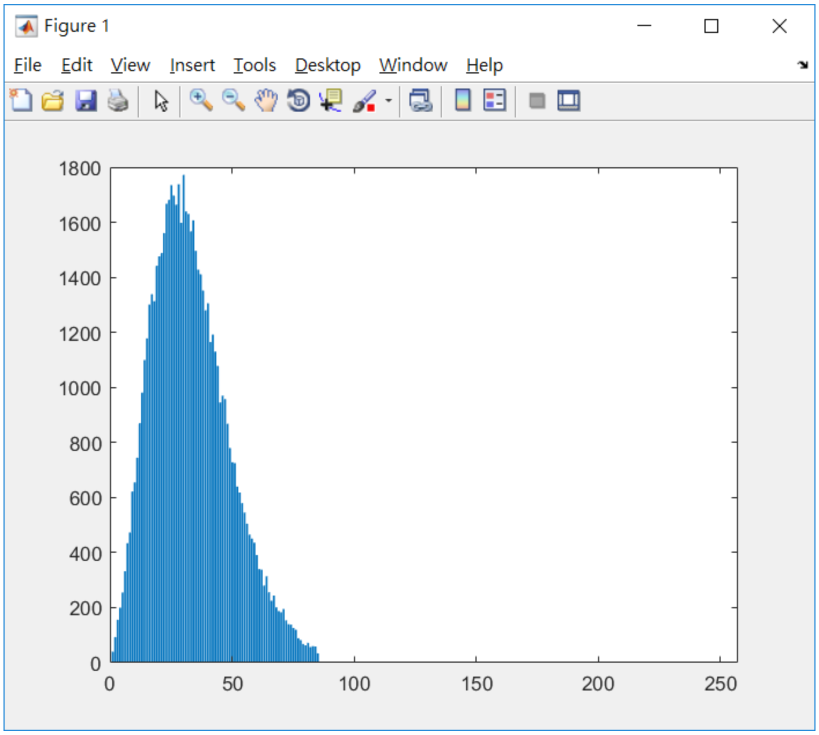
現的次數,再用bar把他print出來

b. “sample2.raw”,”D.raw”

c. No

d. 看得出來亮度調暗的圖片的histogram的pixel會集中在左半部,這個結果也是很合理的,因為pixel的值被線性調小了





Problem 1(c):Perform histagram equalization on "D.raw"

```
% Implementation 1: equalize the pixel that the pixel
distribute uniformly
% M-file name: histogrameq.m
% Usage: hitogramequalization
% Output image: "H.raw'
% Parameters: no
%execute code:histogrameq("D.raw")
```

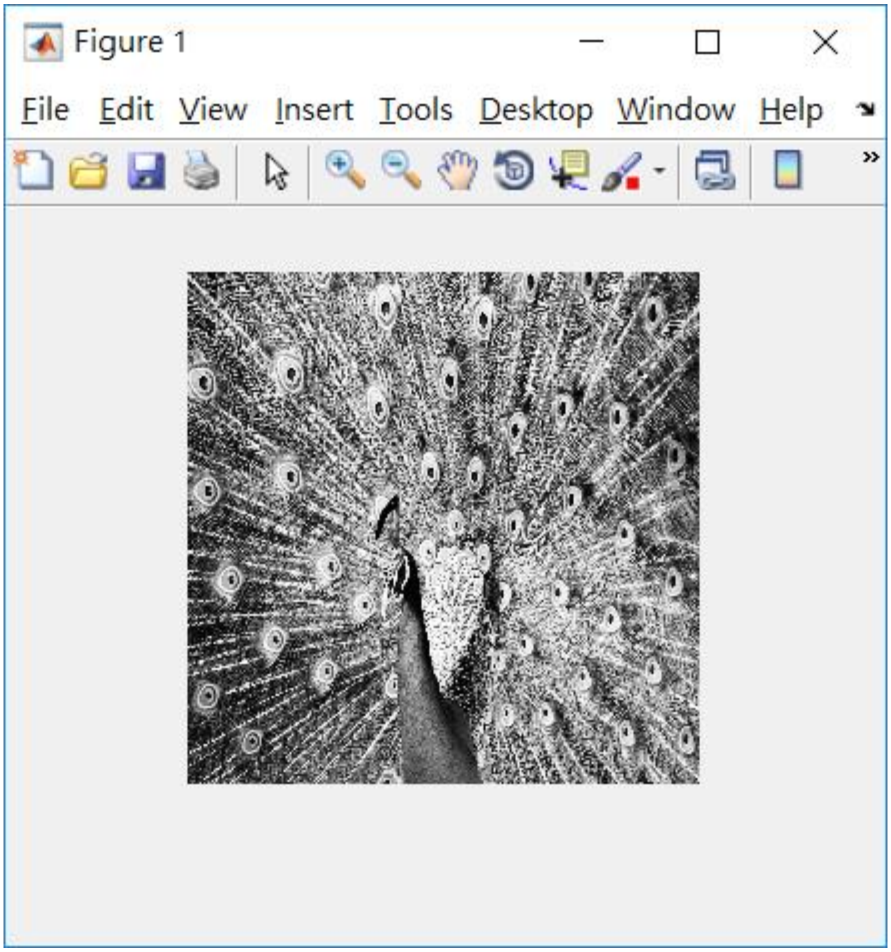
a. 這題主要是先count個個pixel出現的pixel數,做相加的動作,讓圖片的色調變比較均勻

b. “D.raw”

c. “H.raw”

d. 做完histogram equalization後,原本暗道快看不見的圖片,又變得比較清晰了,因為每個pixel之間的對比變強了

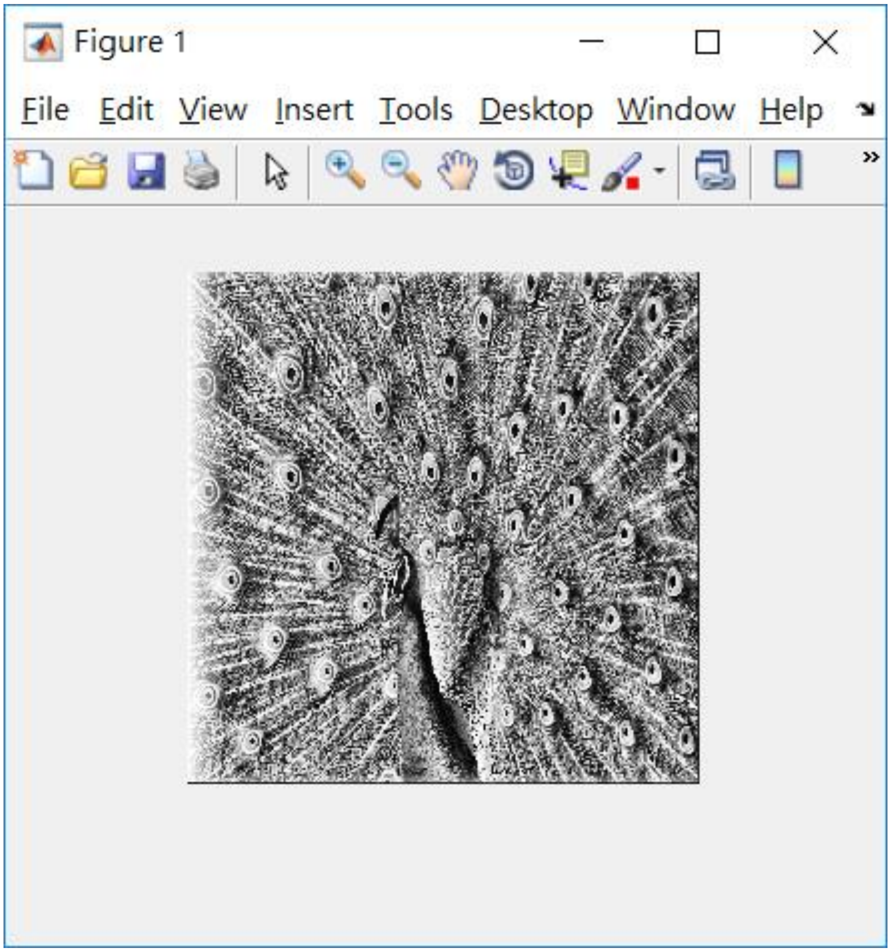
H.raw



Problem 1(d):Perform local histogram equalization on "D.raw"

```
% Implementation 1: local equalize the pixel that the pixel
distribute uniformly
% M-file name: histogrameqal.m
% Usage: local hitogramequalization
% Output image: "L.raw"
% Parameters: 10*20 windows
%execute code:localhisteqal("D.raw")
```

a. local histogram equalization 會讓histogram變得更加平滑,且讓色調變較均匀
b. “D.raw”
c. “L.raw”
d. 做完local histogram equalization後,pixel的分布狀況會受到windows的大小而影響,如果windows越小,pixel的分布就會越集中

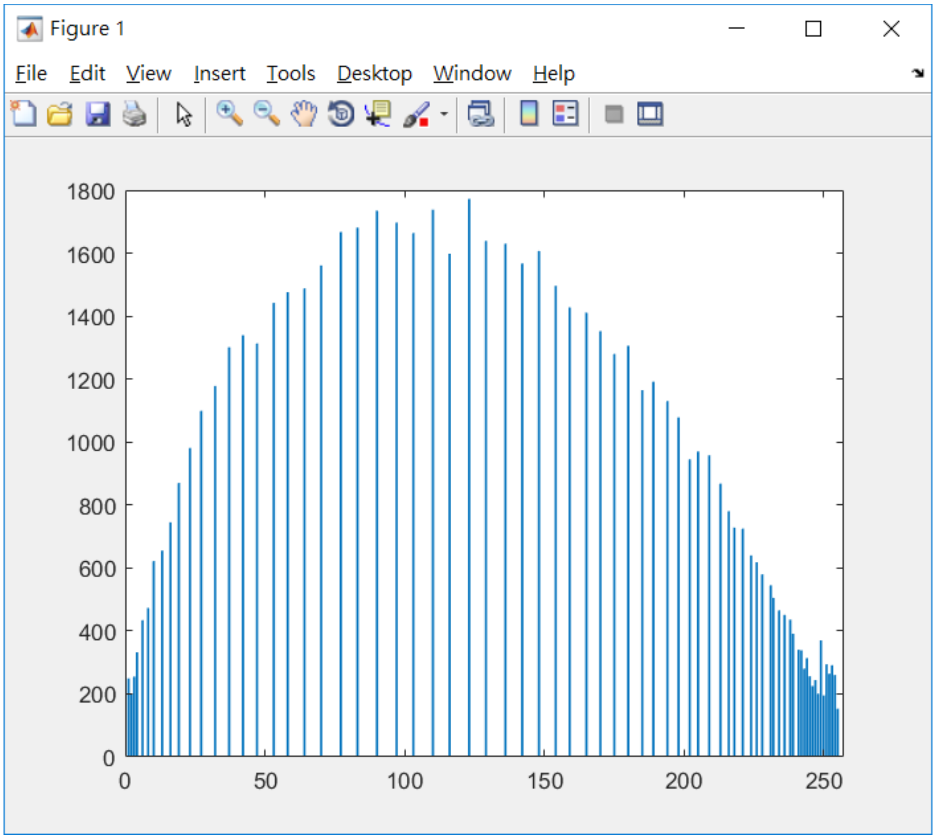


Problem 1(e):point out the main difference of "H.raw" and "D.raw'

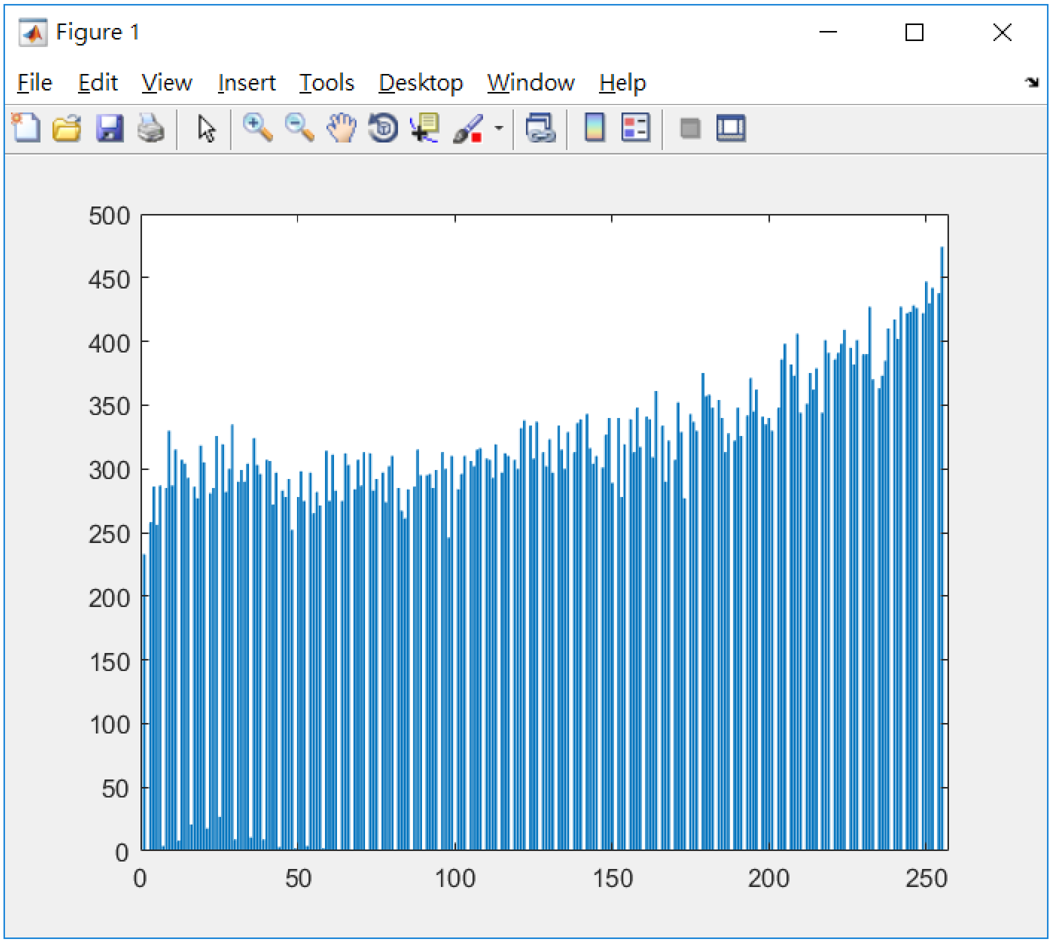
```
% Implementation 1: global equalization amd local equaliztion
% M-file name: histogrameqal.m
% Usage: local global hitogram equalization+local histogram eqealization
% Output image: no
% Parameters: 10*20 windows(local)
%execute code:no code(直接比較兩張圖及histogram上的結果)
```

a. 這題我主要是看histogram上的差別及output image的顏色差異來做判斷
b. “D.raw”
c. No
d. 從histogram的分布可以看得出來,local的分布較均勻,幾乎所有的pixel之間數量都是一樣的,這是global做不到的

Global H.raw



Local L.raw



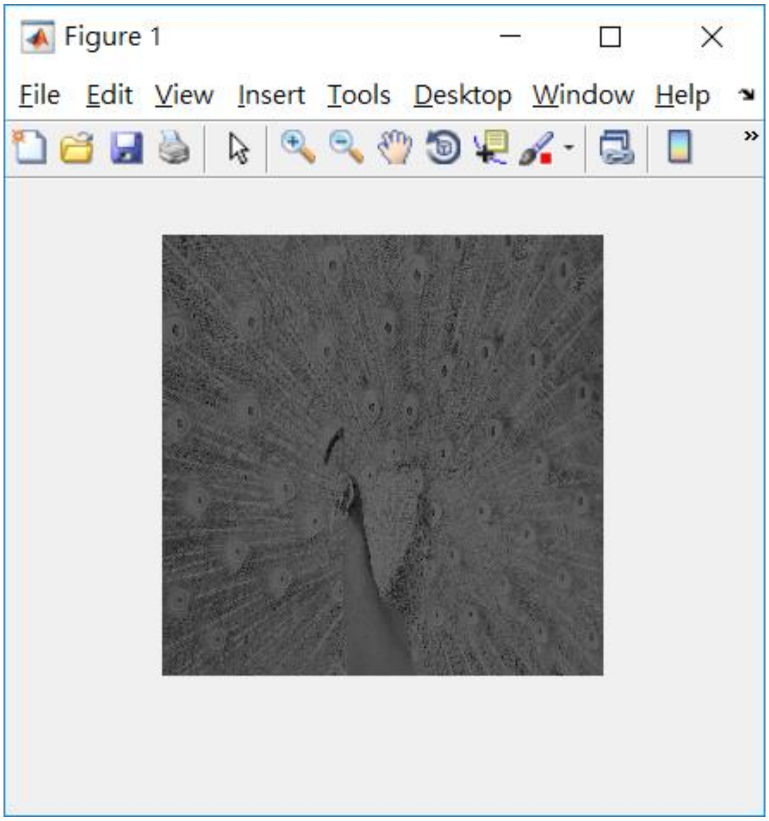
Problem 1(f):Perform log , inverse log, power-law transform to enhance

```
% "D.raw"
% Implementation 1: log , inverse log, power-law transform
% M-file name: logtrans.m,inverselog.m,powerlaw.m
% Usage: to enhance the image
% Output image: "log.raw","incerselog.raw","power.raw"
% Parameters: log(c=55),inverselog(c=7),powerlaw(c=-2)
%execute code:logtrans("D.raw")
%              inverselog("D.raw")
%              powerlaw("D.raw")
```

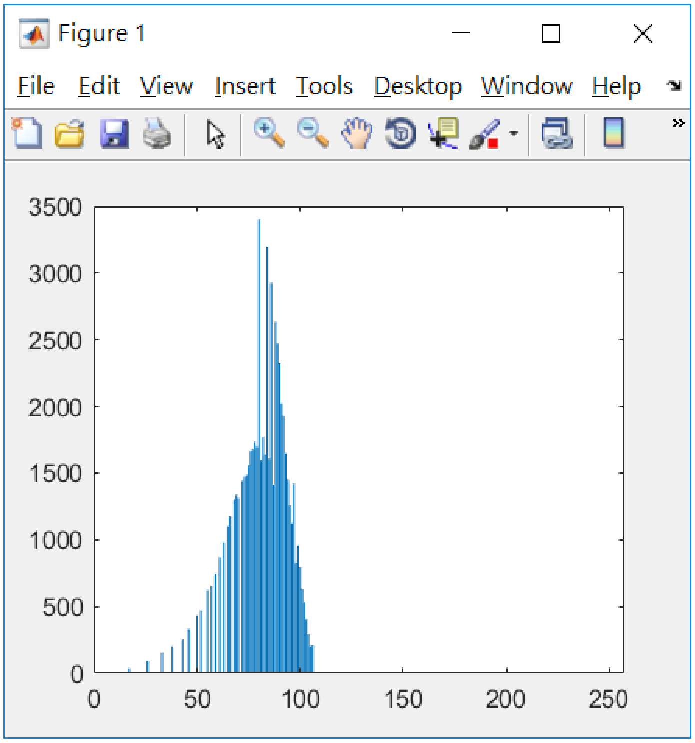
a. 這題主要是對image做不一樣的enhancement看哪一種的效果最好
b. “D.raw”
c. “log.raw”,”inverselog.raw”,”power.raw”
d.inverselog transform 跟 power-law transform都可以達到色調均勻

化的效果,其中又以inverselog較為接近原本尚未被調暗的結果,有較佳的enhance結果

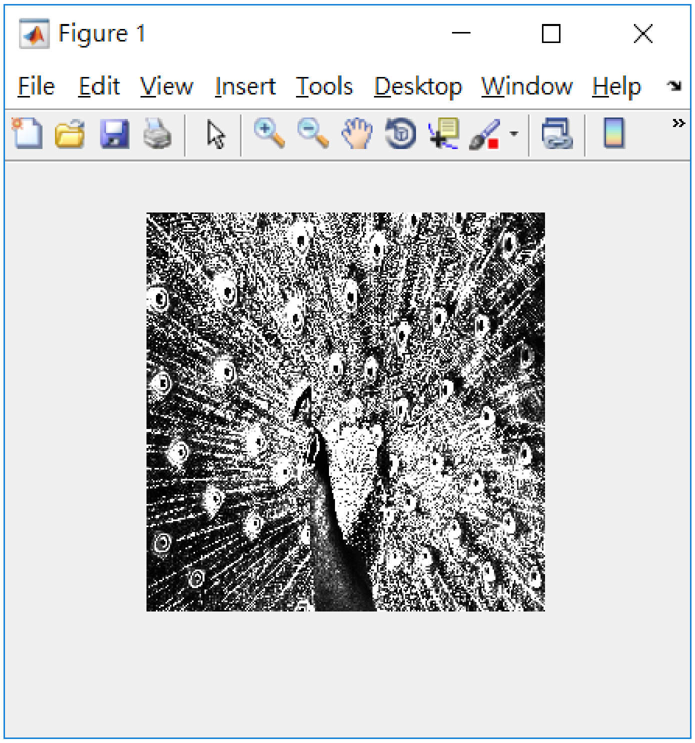
Log.raw



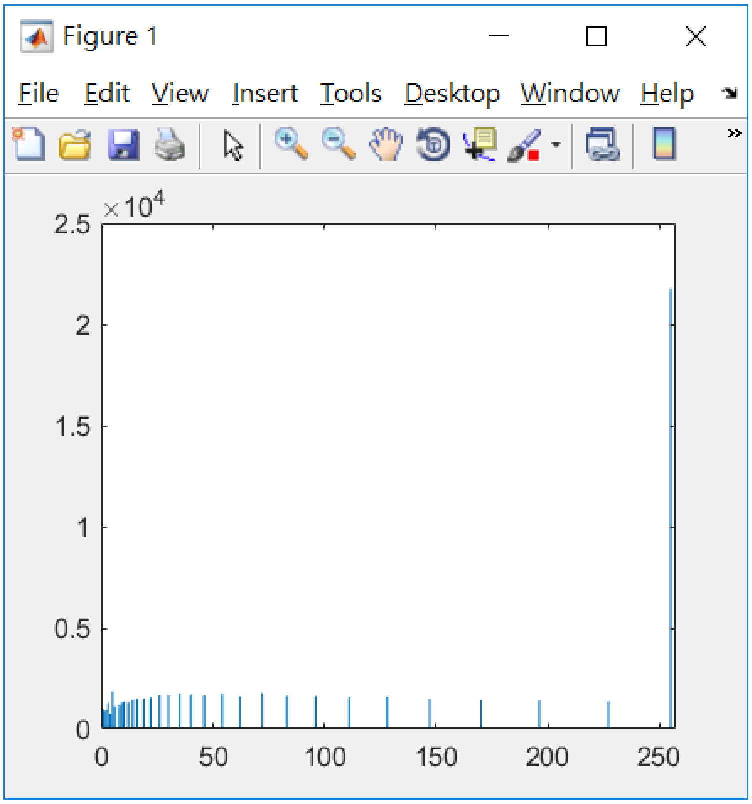
Log.raw



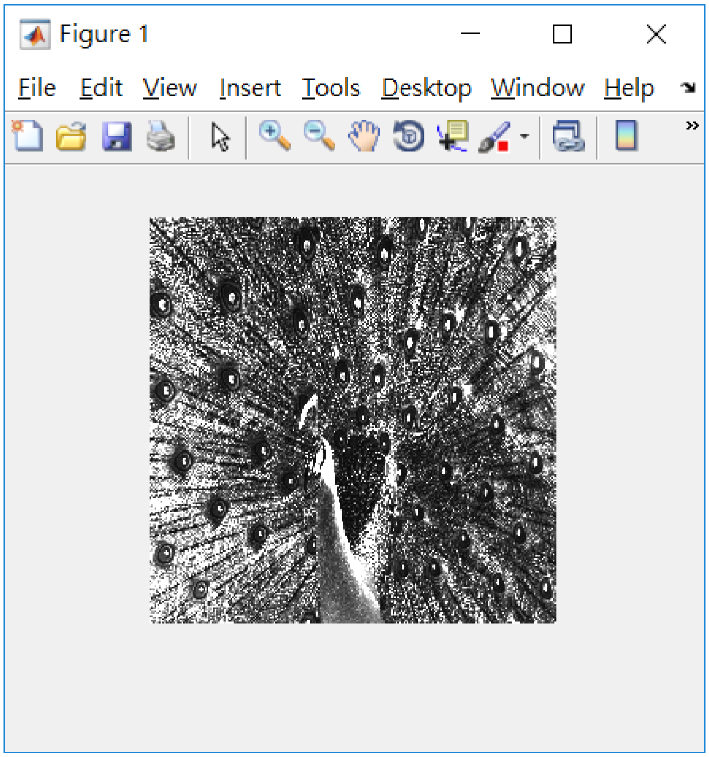
Inverselog.raw



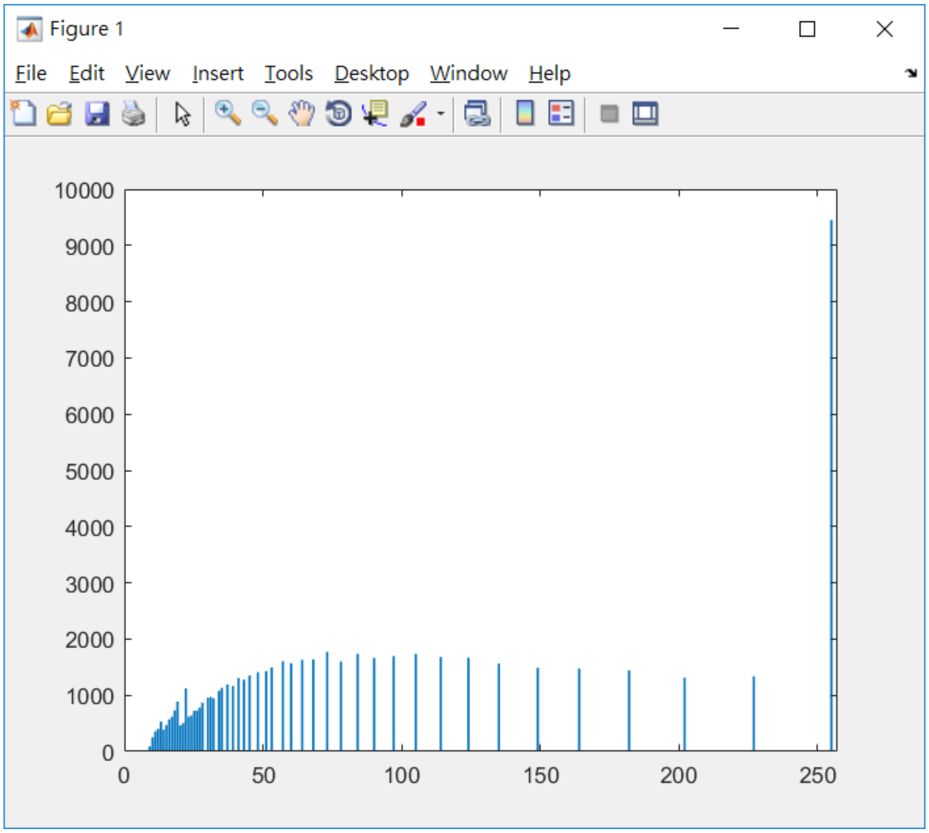
Inverselog.raw



Power.raw



Power.raw



Problem 2(a):Generate Gaussian noise with two different

```
parameters
% Implementation 1: Generate uniform noise
% M-file name: gengaus.m
% Usage: to enhance the image
% Output image: "G1.raw","G2.raw"
% Parameters: G1(5,7.5),G2(20,17.5)
%execute code:gengaus("sample3.raw")
```

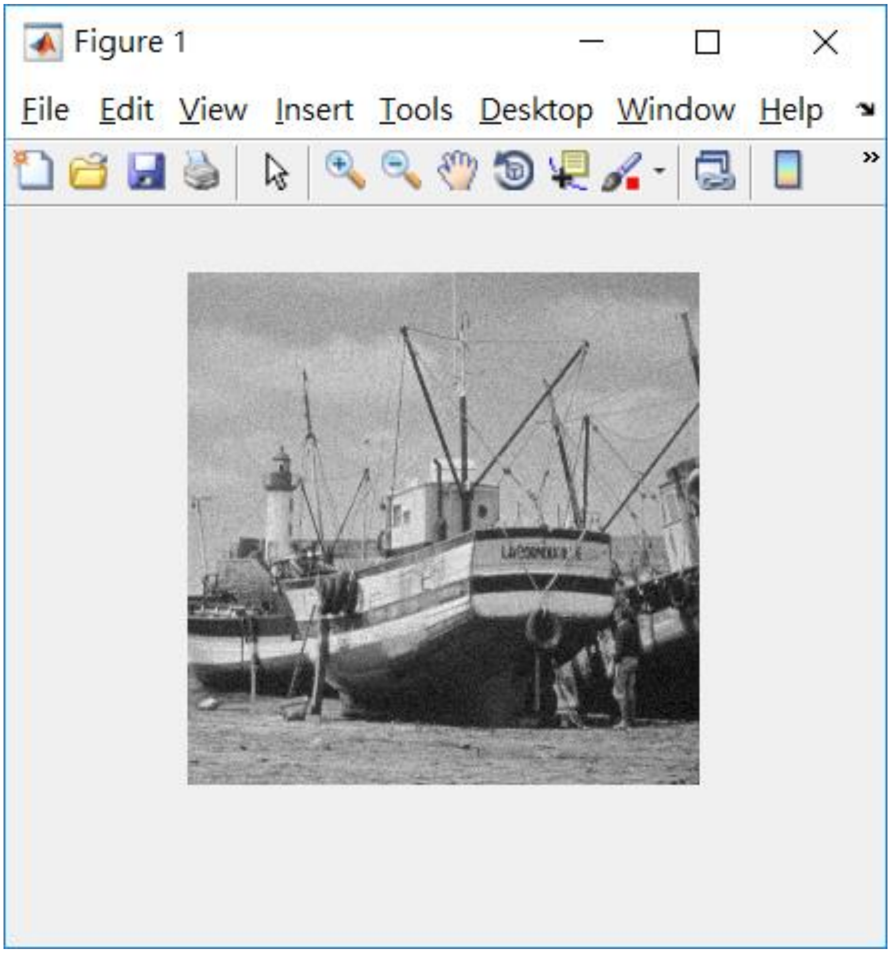
a.I use the function random()ro generate uniform random number in 256*256 shape,and add it to the image “sample3.raw”,and will get the result I want

b.”sample3.raw”

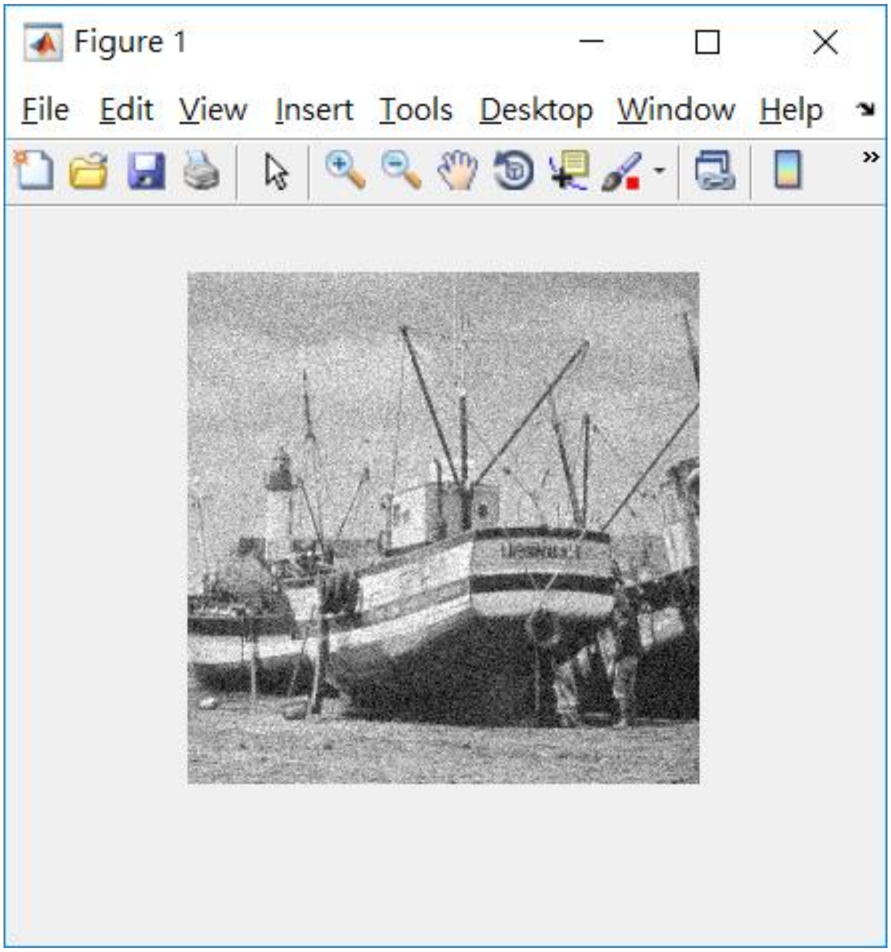
c.”G1.raw”,”G2.raw”

d.the result depends on the parameter I choose,if I tune the parameter bigger,the noise will appear apparently

G1.raw



G2.raw

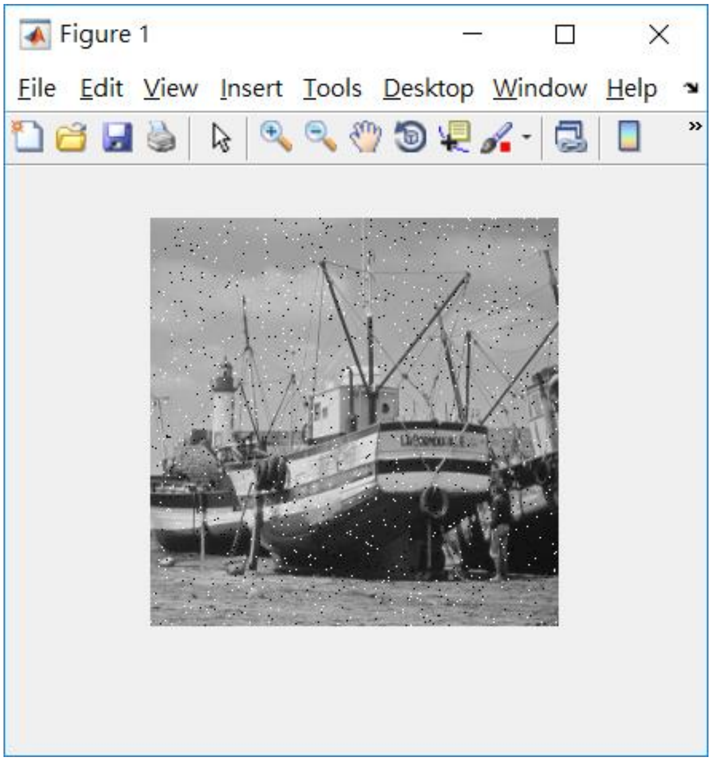


Problem 1(B):adding salt and pepper noise with two different parameter

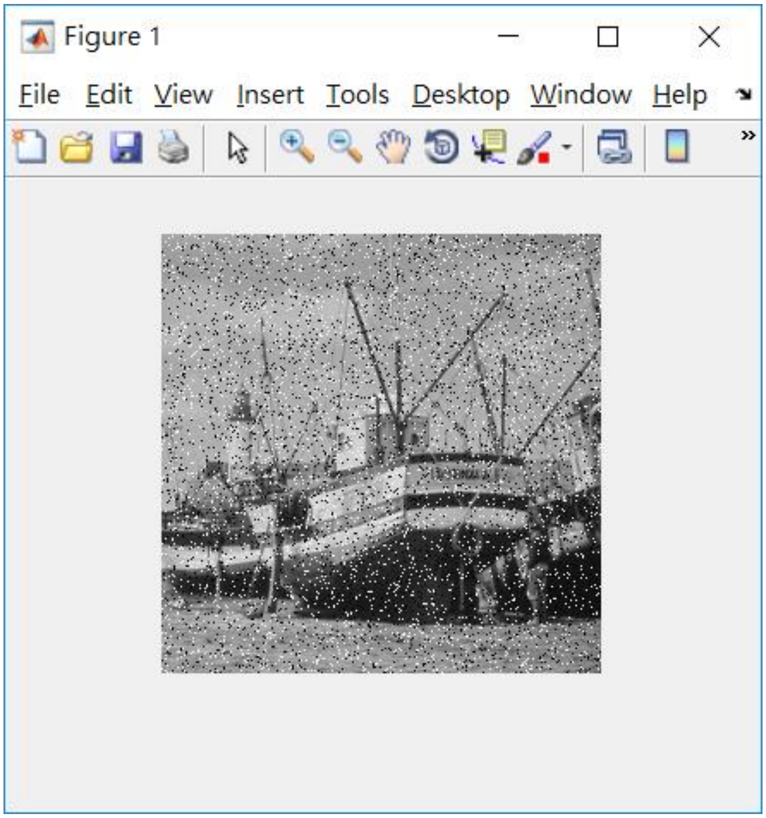
```
% Implementation : generate salt and pepper noise
% M-file name: pepper.m
% Usage: to generate impulse noise
% Output image: "S1.raw","S2.raw"
% Parameters: S1(0.01),S2(0.05)
%execute code:pepper("sample3.raw")
```

a. 我的做法主要是先產生一個長度為256的random uniform distribution 的array 然後再設定一個thershold ,讓大於256-thershold的pixel 都變成255,讓小於thershold的pixel都變成0
b. “sample3.raw”
c. “S1.raw”,”S2.raw”
d. 從結果可以得知,如果把thershold調大的話,pepper and salt所造成的雜訊會更加明顯

S1.raw



S2.raw

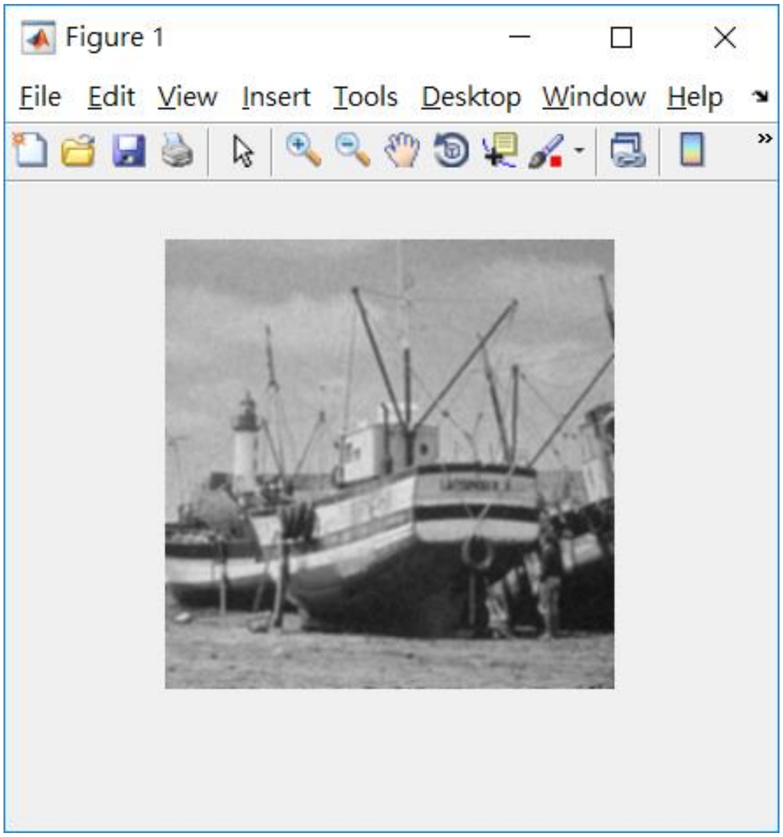


Problem 1(c):remove gaussian noise and salt and pepper

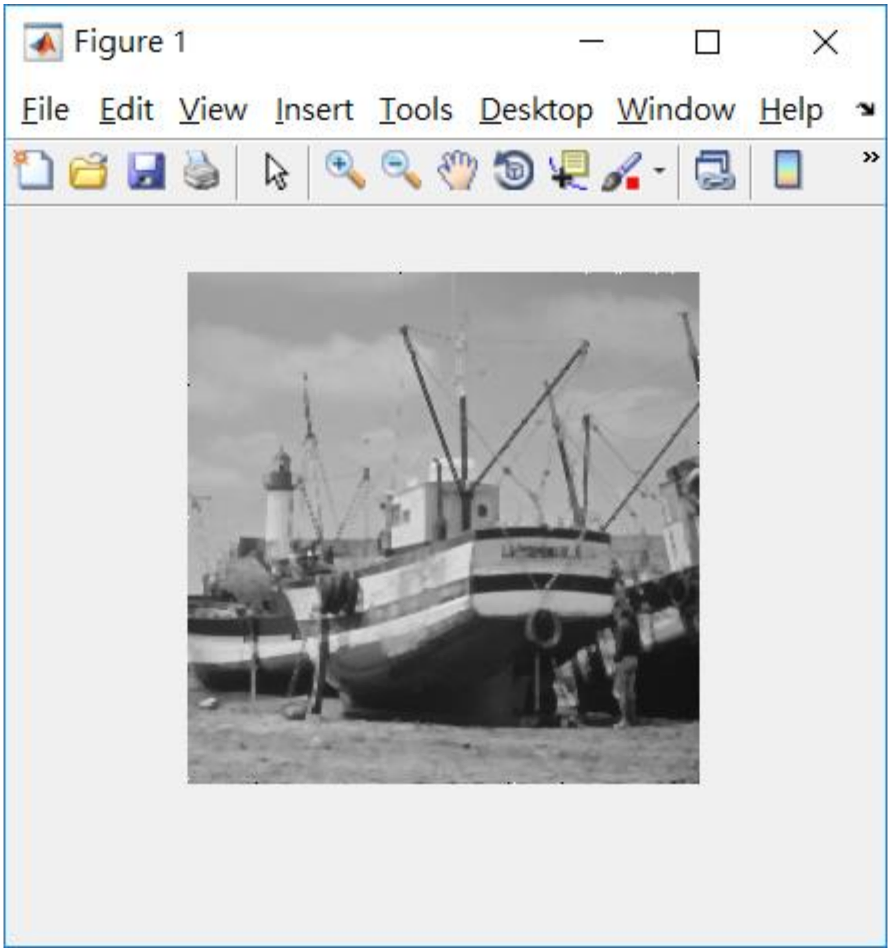
```
noise
% Implementation : low pass filter and median pass filter
% M-file name: rmunifnoise.m,rmnoisemed.m
% Usage: to remove uniform noise and impulse noise
% Output image: "RG.raw","RS.raw"
% Parameters: S1(0.01),S2(0.05)
%execute code: rmunifnoise("G1.raw")
%             rmnoisemed("S1.raw")
```

a. 用low pass filter 可以用來消除uniform的雜訊,因為這些雜訊通常都是高頻雜訊,如:gausian noise
   使用median pass filter 對impulse noise這種non-linear的雜訊效果也不錯
b. “G1.raw”,”S1.raw”
c. “RG.raw”,”RS.raw”
d. 使用low pass filter 對雜訊的消除雖然有幫助,但是效果有限,而且還會讓原本的影像變得有點模糊,median filter 對雜訊的消除則較未顯著,只剩一些白點尚未消除乾淨

RG.raw



RS.raw



Problem 1(d):compute the PSNR of RS and RG,and provide some discussion

```
% Implementation : MSE and PSNR
% M-file name: PSNR.m
% Usage: to compute the simularity of tow images
% Output image: no
% Parameters: no
%execute code: PSNR("sample3.raw","RG.RAW")
%             PSNR("sample3.raw","RS.RAW")
```

a. both of MSE and PSNR is use to compute the differences between two images,the bigger the PSNR ,相似程度越高,其中sample3.raw跟RG.raw的PSNR為27.5346,sample3.raw跟RS.raw的PSNR為29.6350
b. “sample3.raw”,”RG.raw”,”RS.raw”
c. No
d. 雖然使用median pass filter 處理過的pepper noise image上還有一些白點,但是PSNR還是較low pass fillter 處理過後的image相似度高,

代表整體來說,median filter在處理impulse noise 的效果是還不錯的

Problem 2-2:to remove the wrinkles of the face of a given image

```
% Implementation :median pass filter
% M-file name: rmwrinkles.m
% Usage: to remove the low and high frequency noise
% Output image: wrinkle.raw
% Parameters: no
%execute code: rmwrinkles("sample4.raw")
```

a. 因為我對影像處理這門學問還是個超級新手,所以目前會的方法還不多,所以便使用了median filter 來濾掉高頻高低頻的雜訊,試看看效果如何
b. "sample4.raw"
c. "wrinkle.raw"
d. 雖然說皺紋還是很明顯,但是比起一開始的照片,細紋有撫平許多

Wrinkle.raw

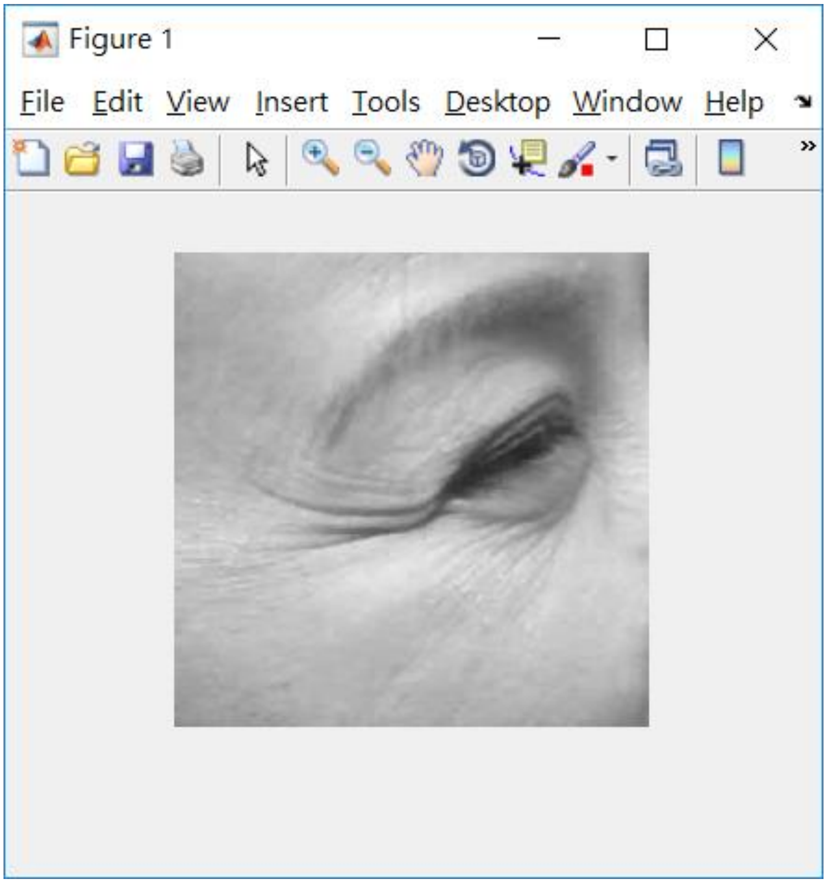


Figure 1
File Edit View Insert Tools Desktop Window Help