

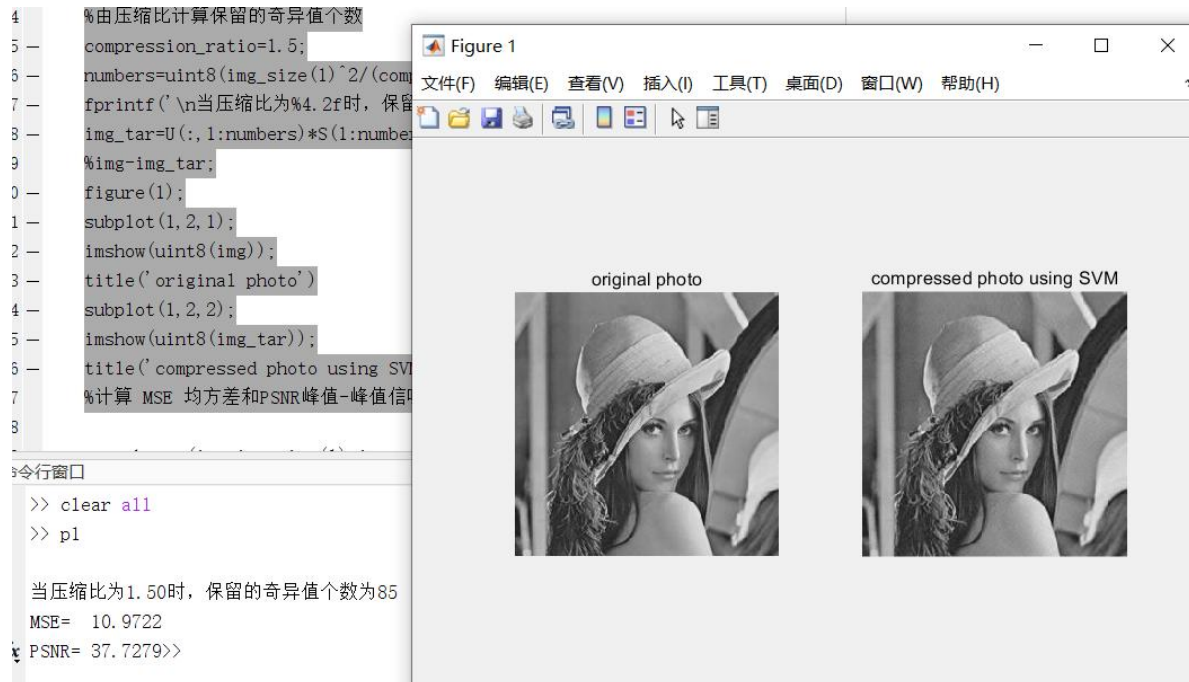
Problem1

- (1) 计算压缩比 $\rho = 1.5$ 时应该取奇异值的个数 k ?

答：由公式 $\rho = \frac{n^2}{k(2n+1)}$ 知， $k = \frac{n^2}{\rho(2n+1)} = 85$

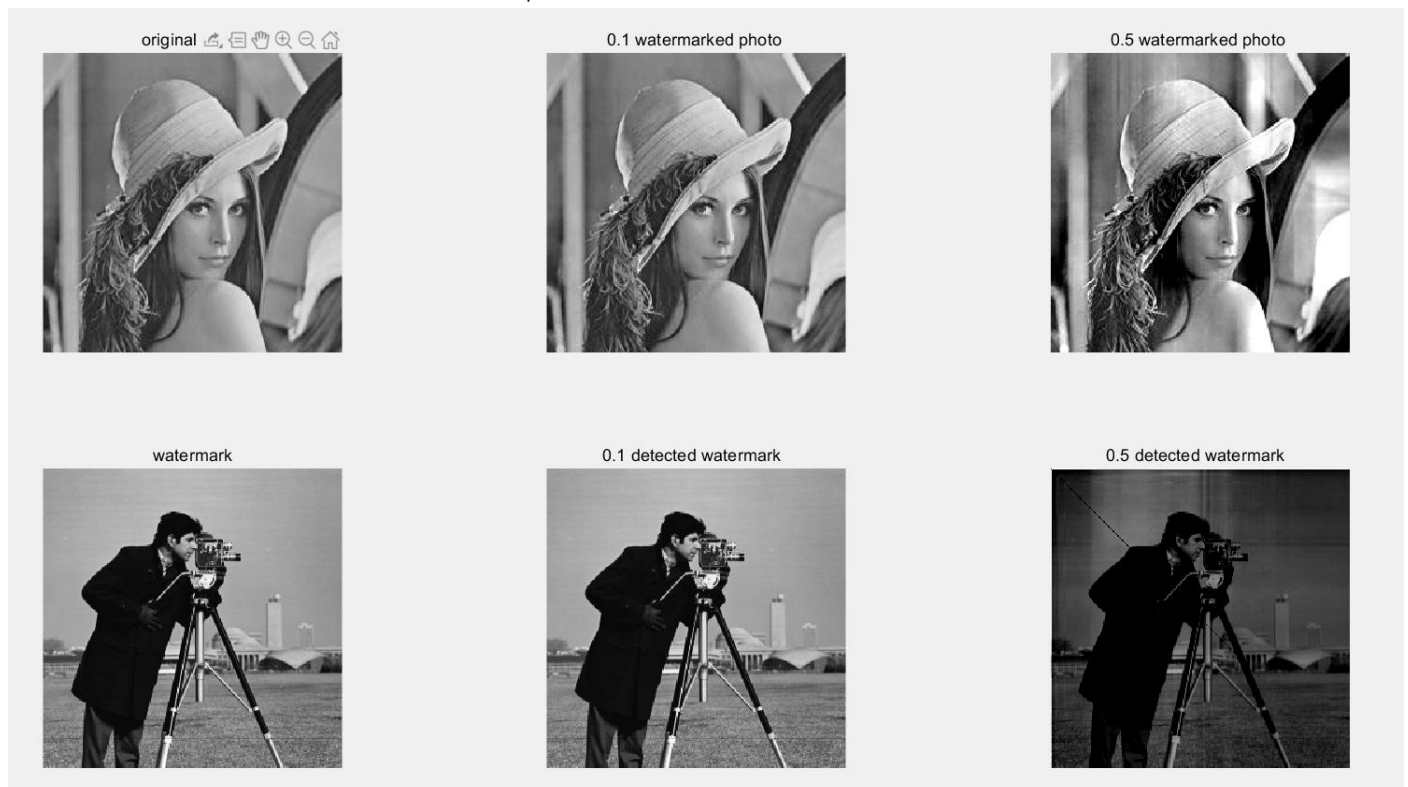
- (2) 给出利用 SVD 图像压缩的 MATLAB 程序和相应的压缩后的图像，与原图像进行对比 显示，并计算相应的 MSE 和 PSNR。

答：运行结果如下图所示，MSE= 10.9722，PSNR= 37.7279；代码见压缩包内 p1.m



Problem 2:

运行结果见下图，matlab 程序见压缩包内 p2.m



Problem 3:

```
命令窗口
>> H=[1+i, 3+i, 7; 5-0.1*i, 4+i, 8-i; 2+3*i, 6-i, 1+3*i]

H =

    1.0000 + 1.0000i    3.0000 + 1.0000i    7.0000 + 0.0000i
    5.0000 - 0.1000i    4.0000 + 1.0000i    8.0000 - 1.0000i
    2.0000 + 3.0000i    6.0000 - 1.0000i    1.0000 + 3.0000i

>> [U, S, V]=svd(H);
>> fprintf(' \nThe pre-filtering matrix is V\n'); disp(V);
fprintf(' \nThe post-filtering matrix is UH\n'); disp(inv(U));

The pre-filtering matrix is V
-0.4206 + 0.0000i    0.2913 + 0.0000i   -0.8592 + 0.0000i
-0.4477 - 0.1281i   -0.1901 + 0.7843i    0.1547 + 0.3286i
-0.7614 - 0.1629i   -0.0723 - 0.5086i    0.3482 - 0.0927i

The post-filtering matrix is UH
-0.5074 + 0.1743i   -0.7299 + 0.1063i   -0.2862 + 0.2935i
-0.2672 + 0.1884i   -0.2001 + 0.1837i    0.2860 - 0.8588i
 0.7607 + 0.1632i   -0.5827 - 0.2064i    0.0732 - 0.0849i

>> fprintf(' \n等效增益为\n'); disp(diag(S))

等效增益为
    13.7272
     5.8734
     2.2530
```

框图见下一页

