```
%%
A = double(imread("../data/mri_image_noiseless.png"));

g1 = @(x,gamma) ((x.^2)/gamma);
g2 = @(x,gamma) (0.5*(x.^2).*(abs(x)<=gamma) + (gamma*abs(x)-0.5*gamma^2).*(abs(x)>gamma));
g3 = @(x,gamma) (gamma*abs(x) - (gamma^2)*log(1+(abs(x)/gamma)));

data=zeros([3,3,2]);
data(1,:,:)=([[1,0.08];[1,0.78];[0.9,0.82]]);
data(2,:,:)=([[1,0.16];[0.9,0.9];[1,0.9]]);
data(3,:,:)=([[1,0.24];[1,0.92];[1.1,0.92]]);
name=["low","medium","high"];

%%
for i=1:3
    Y = double(imread("../data/mri_image_noise_level_"+name(i)+".png"));
    disp("Noise Level "+name(i)+" Image");
    disp("RRMSE b/w noisy and noiseless image = " + RRMSE(Y,A));
    X=2*Y;
    for j=1:3
        partB(X,Y,data,i,j,g1,g2,g3,A);
    end
end

%%

for i=1:3
    Y = double(imread("../data/mri_image_noise_level_"+name(i)+".png"));
    disp("Noise Level "+name(i)+" Image");
    disp(" ");
    X=2*Y;
   [f] =  partCnD(X,Y,data,i,g1,g2,g3,A);
end

%%
% code to find optimal gamma given alpha
% N=30;
% obj_vec=zeros([N,1]);
% error_vec=zeros([N,1]);
% for i = 1:N
%     i
%     gamma = 0.1*i;
%     [X_opt, obj] = denoising(X, Y, g3, gamma, 0.1, 0.82);
%     error = RRMSE(X_opt,A)
%     obj_vec(i)=obj;
%     error_vec(i)=error;
% end

%%
% Code to find the optimal alpha
% N=50;
% obj_vec=zeros([N,1]);
% error_vec=zeros([N,1]);
% for i = 1:N
%     i
%     alpha = (i-1)/N;
%     [X_opt, obj] = denoising(X, Y, adaptive, 1, 0.1, alpha);
%     obj
```

```
%     error = RRMSE(X_opt,A)
%     obj_vec(i)=obj;
%     error_vec(i)=error;
% end
%%
```

Noise Level low Image

RRMSE b/w noisy and noiseless image = 0.052044

Optimal Values using g1 prior:

alpha = 0.08

gamma = 1

RRMSE(alpha,gamma) = 0.047041

RRMSE(0.8*alpha,gamma) = 0.047293

RRMSE(1.2*alpha,gamma) = 0.047079

Optimal Values using g2 prior:

alpha = 0.78

gamma = 1

RRMSE(alpha,gamma) = 0.043211

RRMSE(0.8*alpha,gamma) = 0.045301

RRMSE(1.2*alpha,gamma) = 0.057485

RRMSE(alpha,0.8*gamma) = 0.043491

RRMSE(alpha,1.2*gamma) = 0.04331

Optimal Values using g3 prior:

alpha = 0.82

gamma = 0.9

RRMSE(alpha,gamma) = 0.043324

RRMSE(0.8*alpha,gamma) = 0.0458

RRMSE(1.2*alpha,gamma) = 0.11077

RRMSE(alpha,0.8*gamma) = 0.043536

RRMSE(alpha,1.2*gamma) = 0.043423

Noise Level medium Image

RRMSE b/w noisy and noiseless image = 0.13946

Optimal Values using g1 prior:

alpha = 0.16

gamma = 1

RRMSE(alpha,gamma) = 0.12447

RRMSE(0.8*alpha,gamma) = 0.12504

RRMSE(1.2*alpha,gamma) = 0.12461

Optimal Values using g2 prior:

alpha = 0.9

gamma = 0.9

RRMSE(alpha,gamma) = 0.11983

RRMSE(0.8*alpha,gamma) = 0.12811

RRMSE(1.2*alpha,gamma) = 0.2165

RRMSE(alpha,0.8*gamma) = 0.12017

RRMSE(alpha,1.2*gamma) = 0.12034

Optimal Values using g3 prior:

alpha = 0.9

gamma = 1

RRMSE(alpha,gamma) = 0.11994

RRMSE(0.8*alpha,gamma) = 0.12802

RRMSE(1.2*alpha,gamma) = 0.21483

RRMSE(alpha,0.8*gamma) = 0.12019

RRMSE(alpha,1.2*gamma) = 0.12037

Noise Level high Image

RRMSE b/w noisy and noiseless image = 0.16113

Optimal Values using g1 prior:

alpha = 0.24

gamma = 1

RRMSE(alpha,gamma) = 0.13341

RRMSE(0.8*alpha,gamma) = 0.13387

RRMSE(1.2*alpha,gamma) = 0.13428

Optimal Values using g2 prior:

alpha = 0.92

gamma = 1

RRMSE(alpha,gamma) = 0.12847

RRMSE(0.8*alpha,gamma) = 0.14478

RRMSE(1.2*alpha,gamma) = 0.22407

RRMSE(alpha,0.8*gamma) = 0.12915

RRMSE(alpha,1.2*gamma) = 0.12903

Optimal Values using g3 prior:

alpha = 0.92

gamma = 1.1

RRMSE(alpha,gamma) = 0.12841

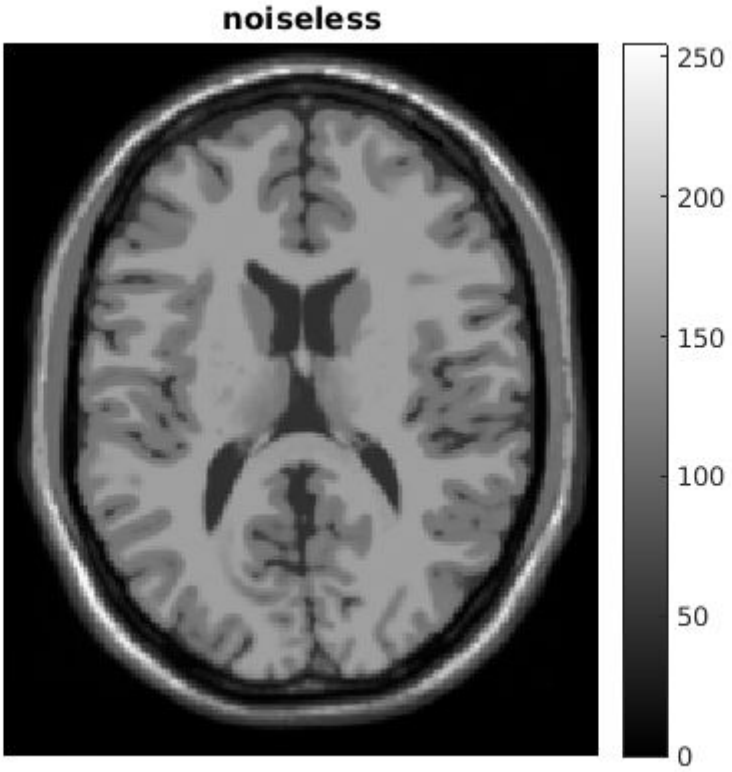
RRMSE(0.8*alpha,gamma) = 0.14456

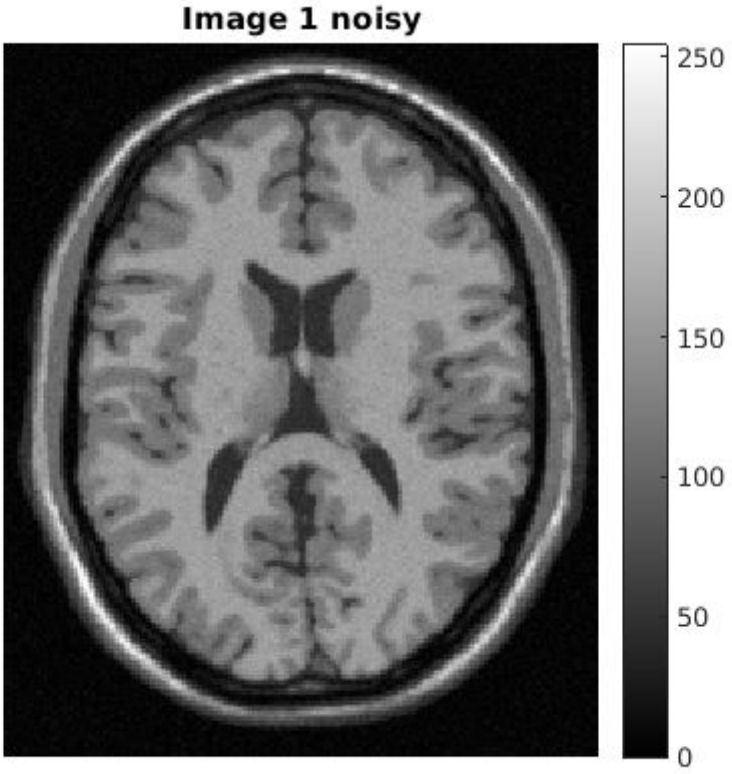
RRMSE(1.2*alpha,gamma) = 0.21989

RRMSE(alpha,0.8*gamma) = 0.12905

RRMSE(alpha,1.2*gamma) = 0.12879

Noise Level low Image





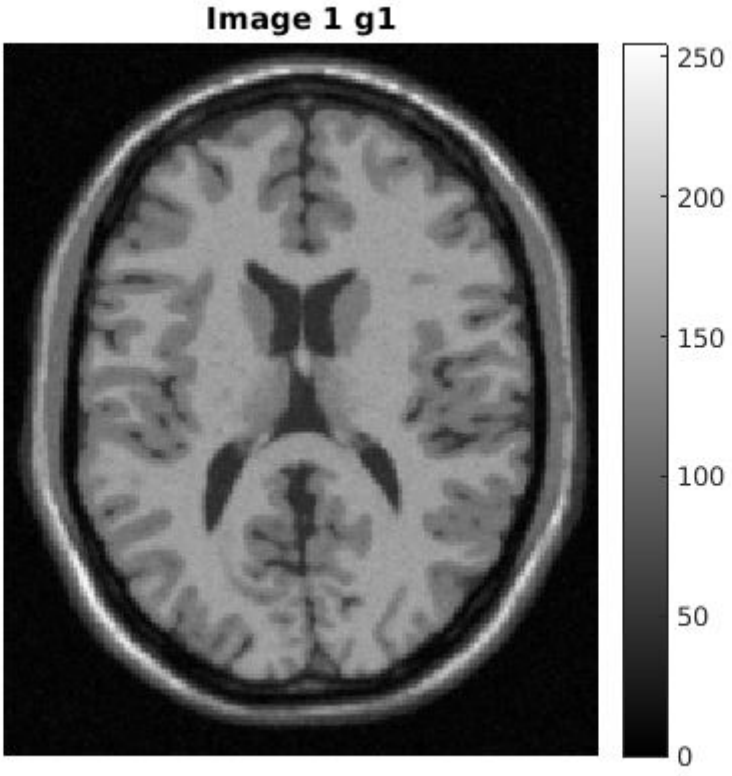


Image 1 g1
250
200
150
100
50
0

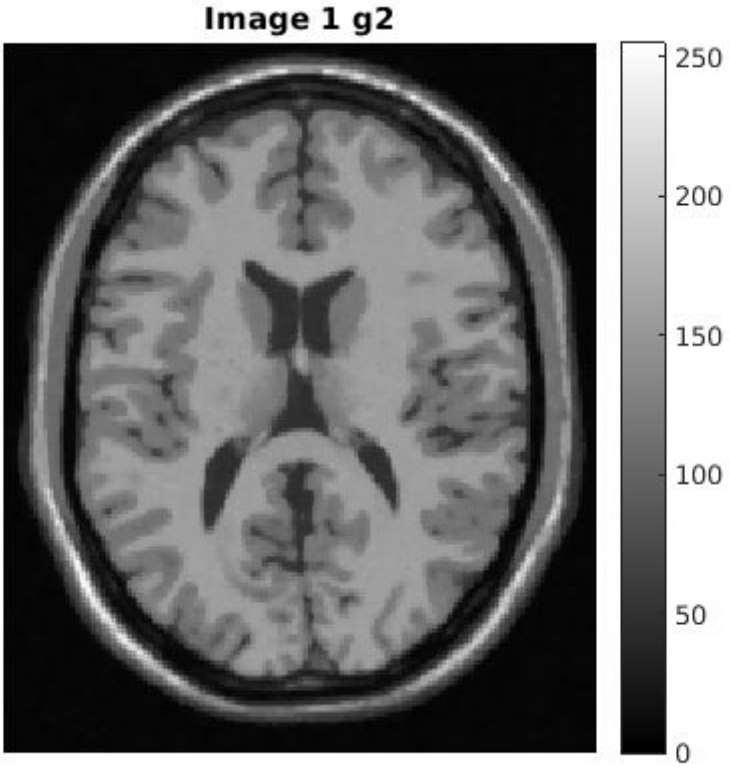


Image 1 g2
250
200
150
100
50
0

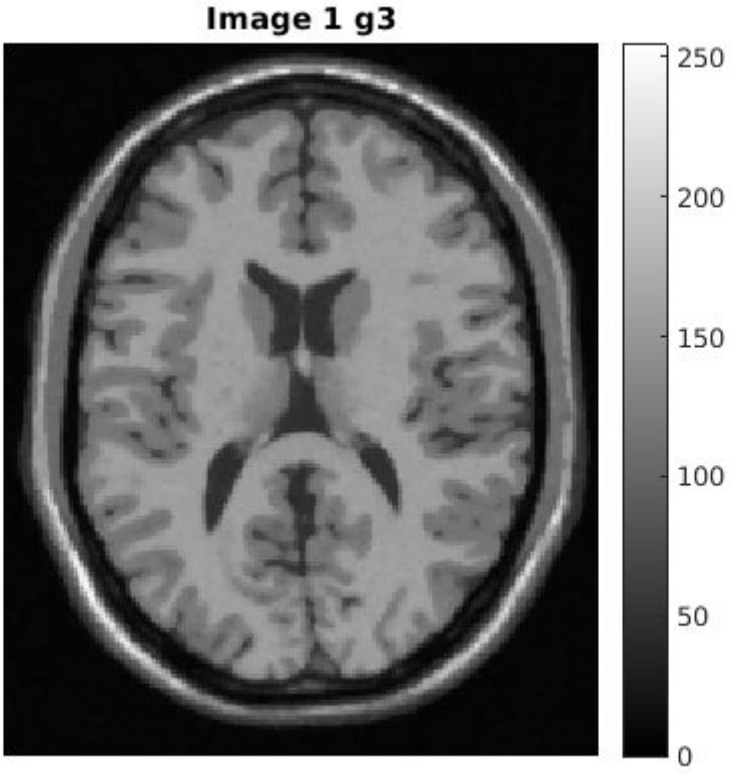


Image 1 g3
250
200
150
100
50
0

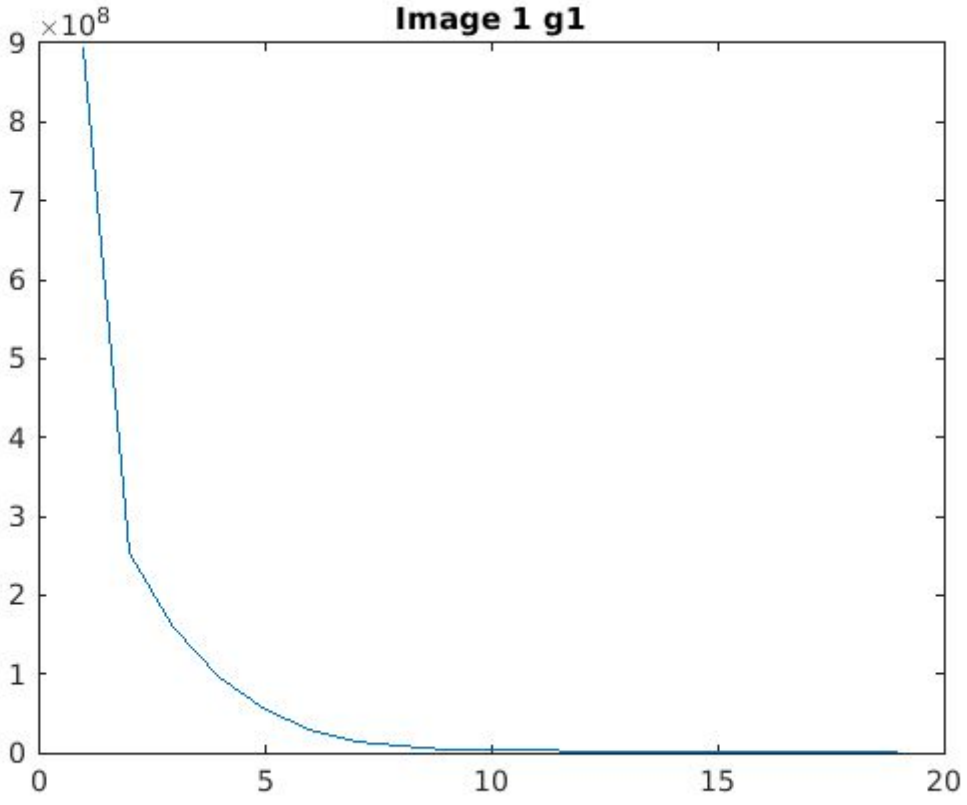


Image 1 g1
×10^8
9
8
7
6
5
4
3
2
1
0
0
5
10
15
20

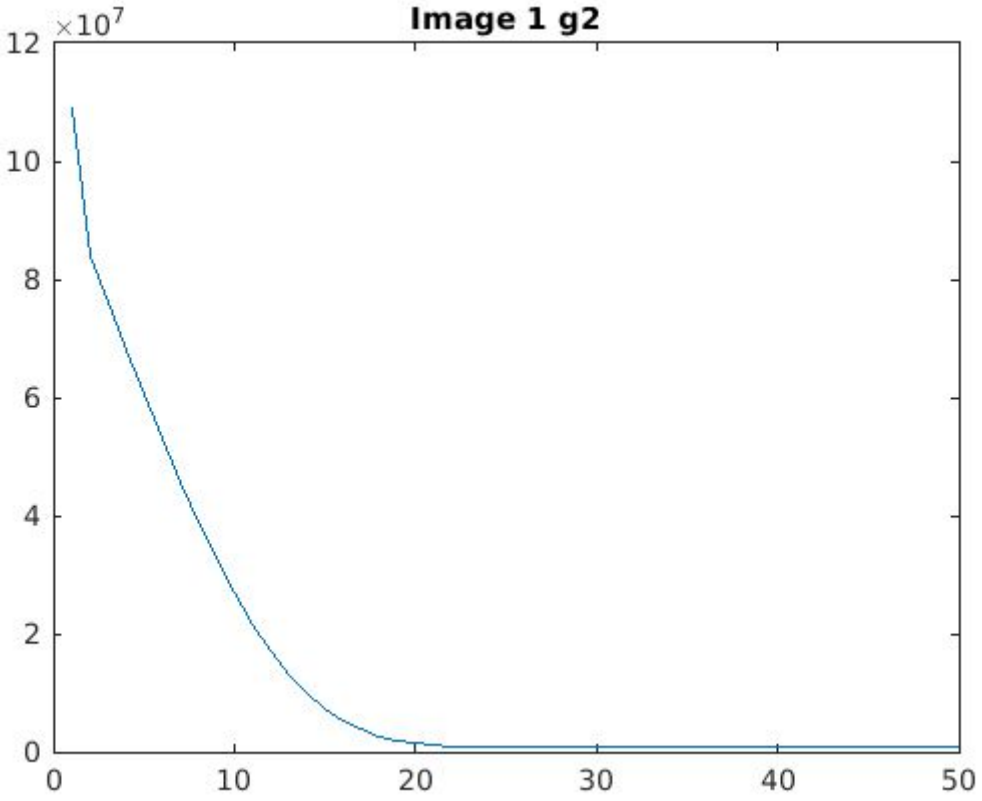


Image 1 g2
×10^7
12
10
8
6
4
2
0
0
10
20
30
40
50

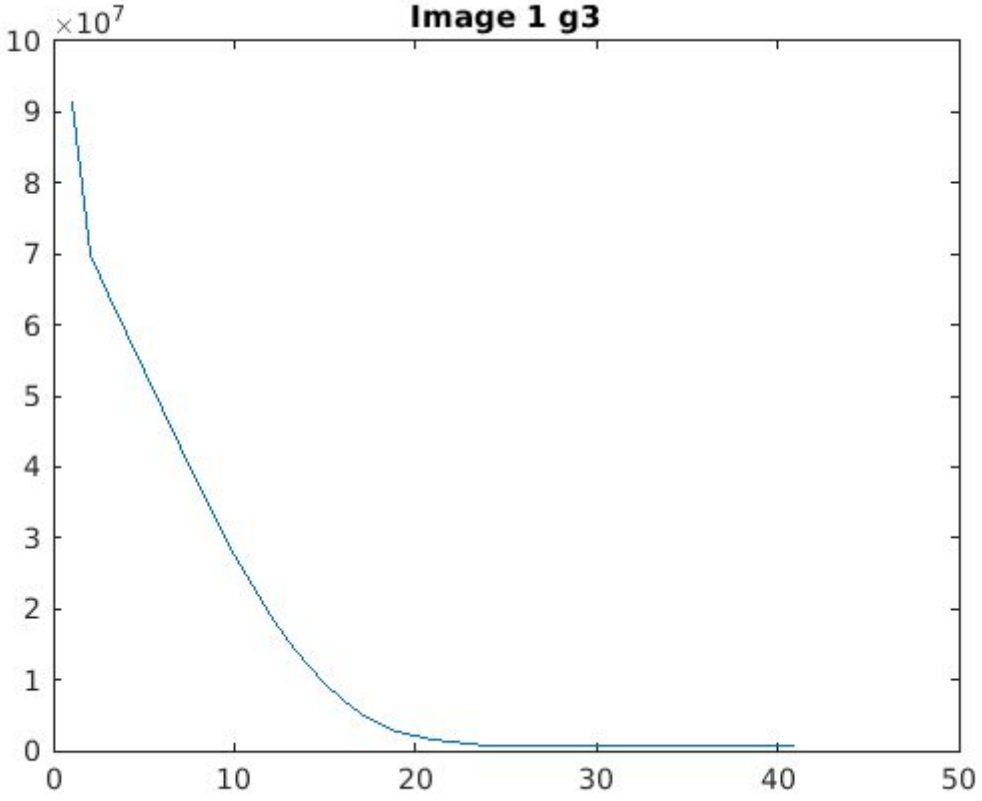
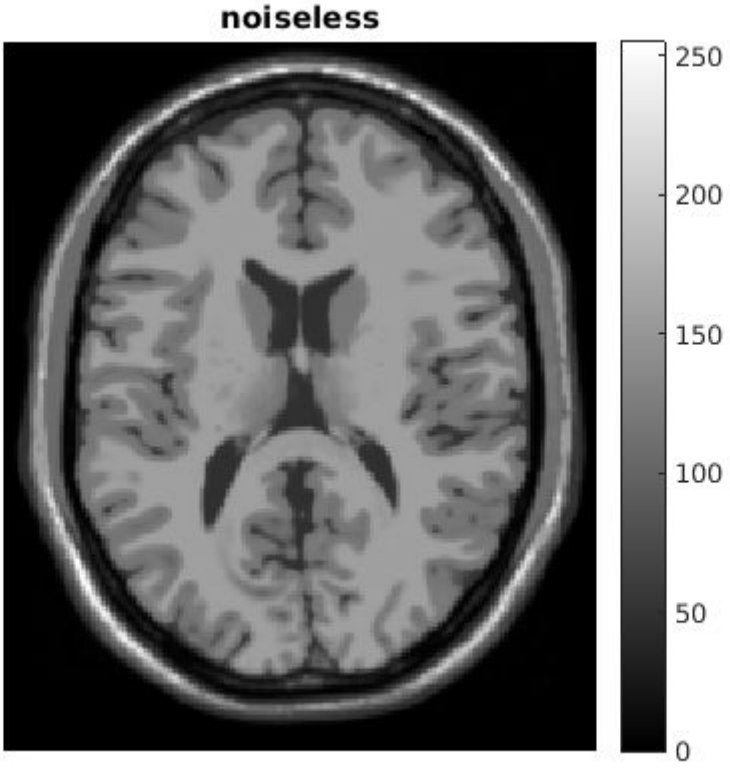


Image 1 g3
×10^7
10
9
8
7
6
5
4
3
2
1
0
0
10
20
30
40
50

Noise Level Medium Image



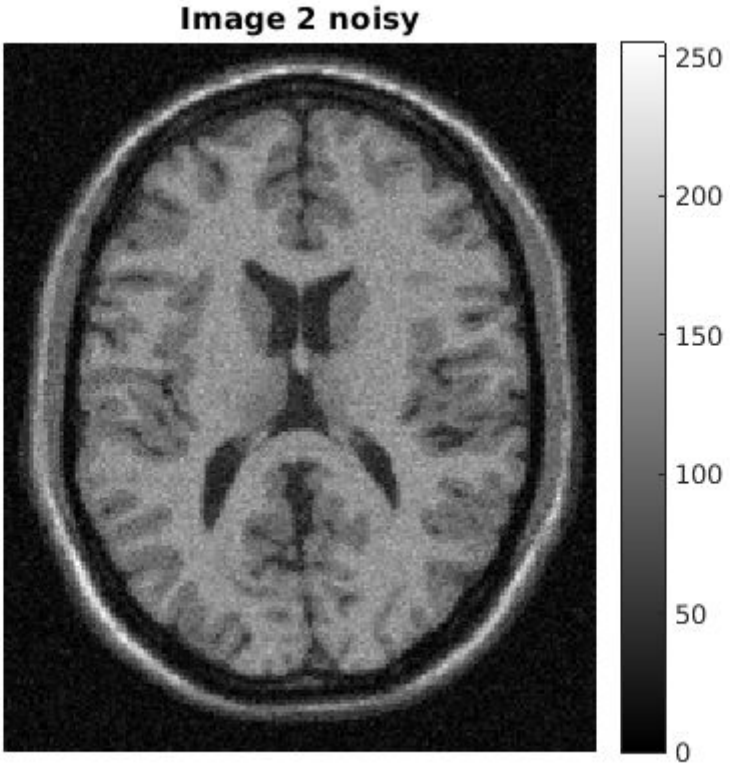


Image 2 noisy
250
200
150
100
50
0

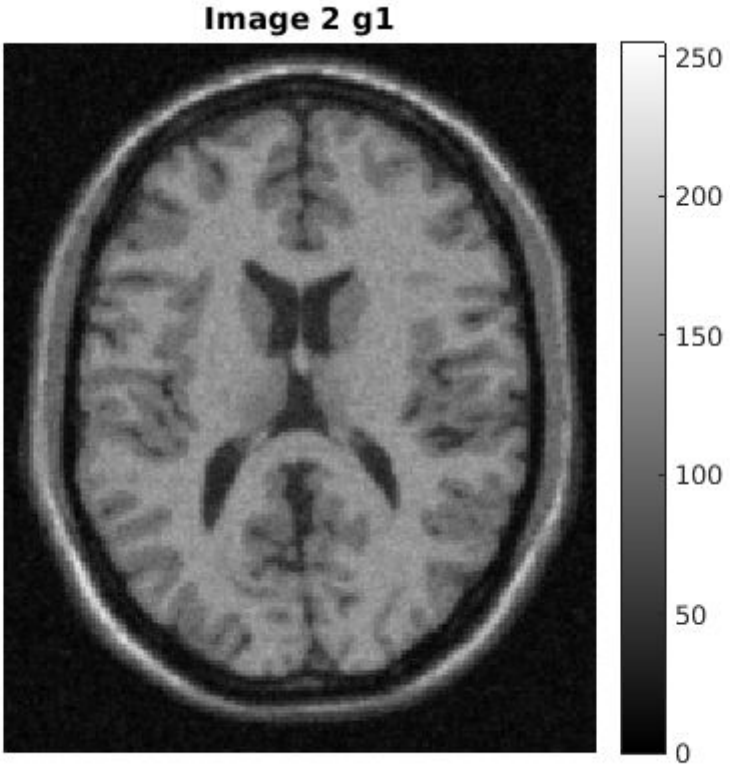


Image 2 g1
250
200
150
100
50
0

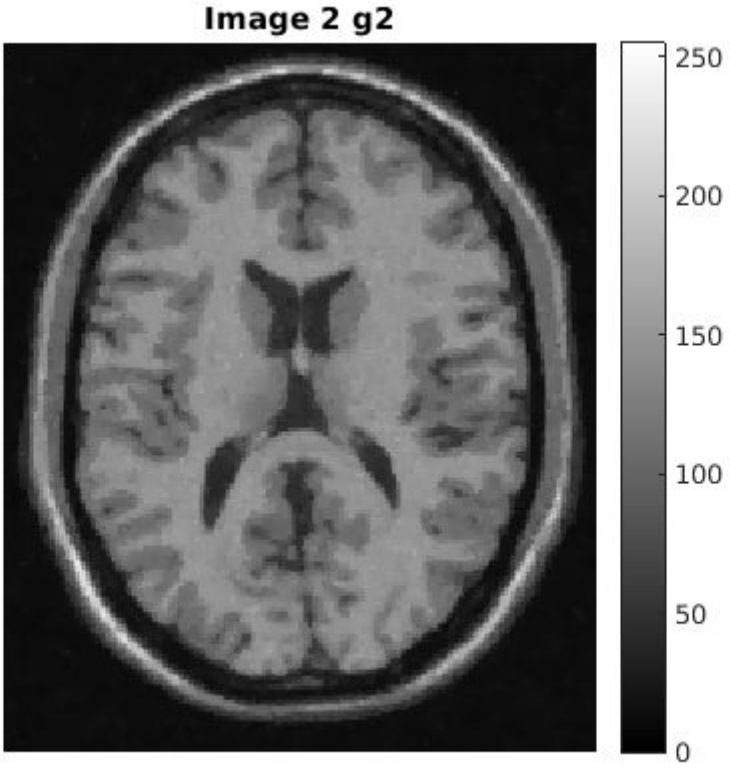


Image 2 g2
250
200
150
100
50
0

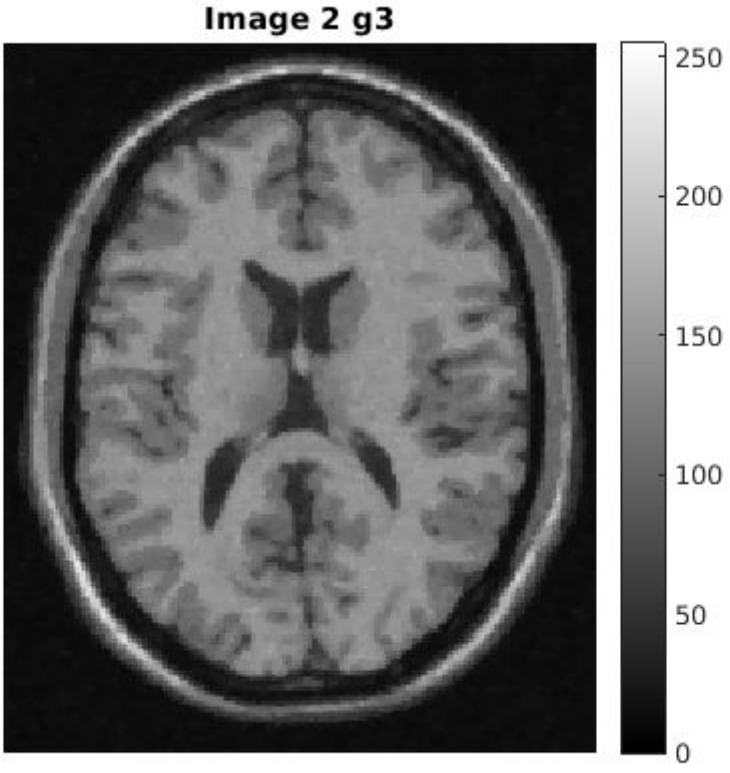


Image 2 g3
250
200
150
100
50
0

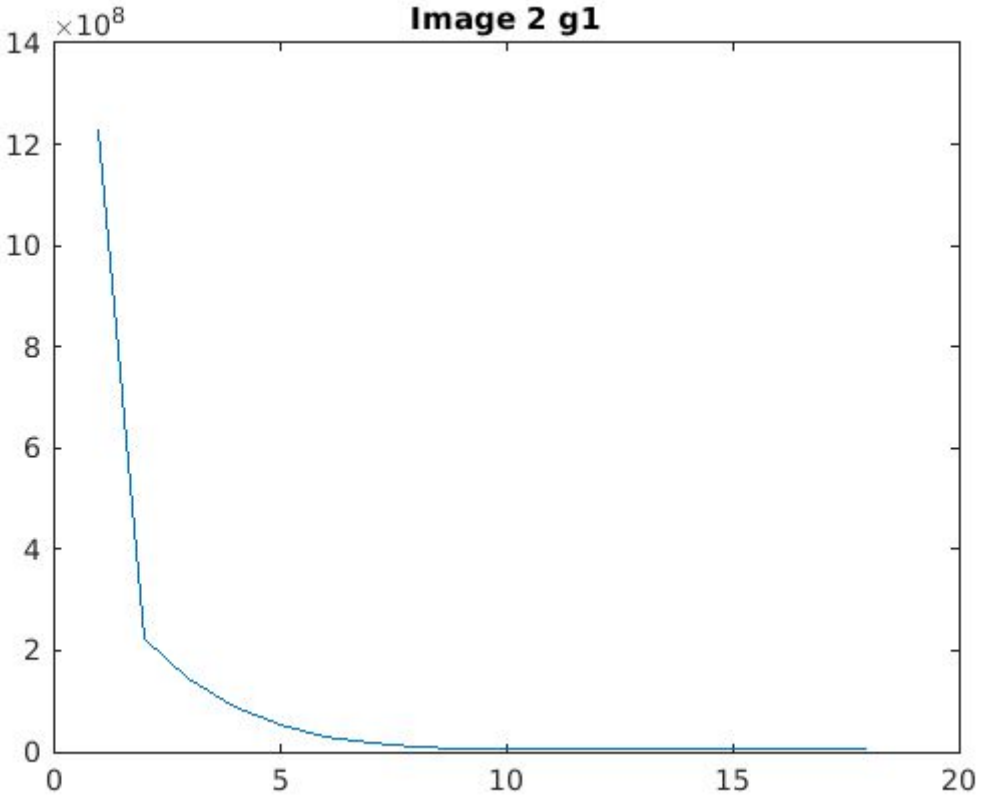


Image 2 g1
×10^8
14
12
10
8
6
4
2
0
0
5
10
15
20

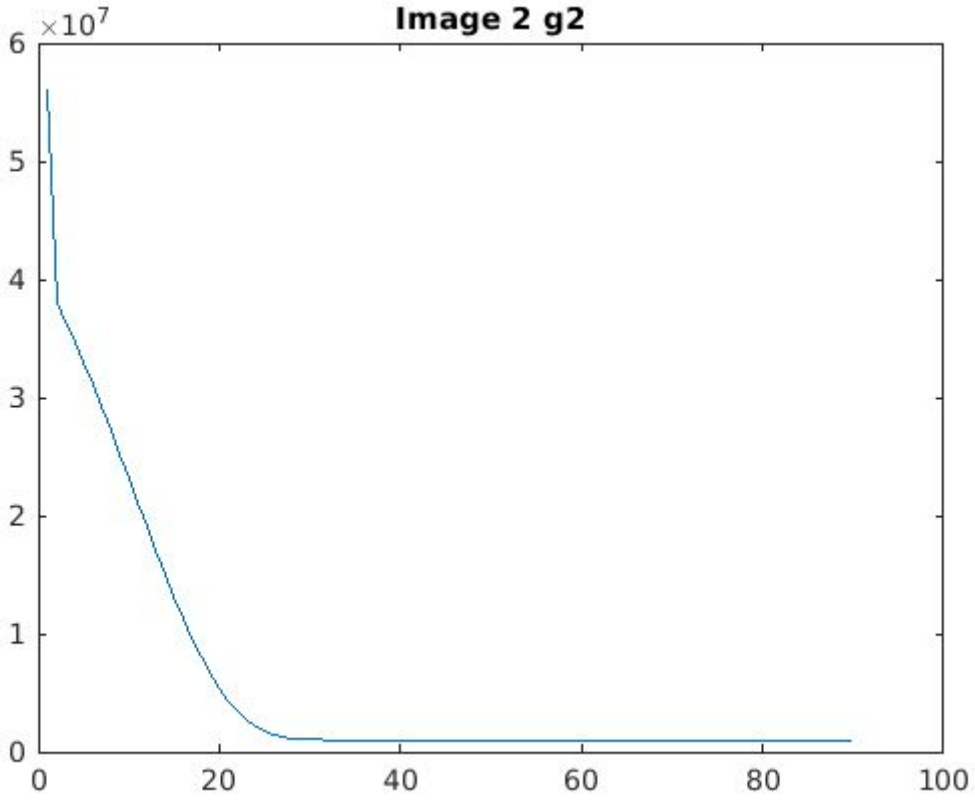


Image 2 g2
×10^7
6
5
4
3
2
1
0
0
20
40
60
80
100

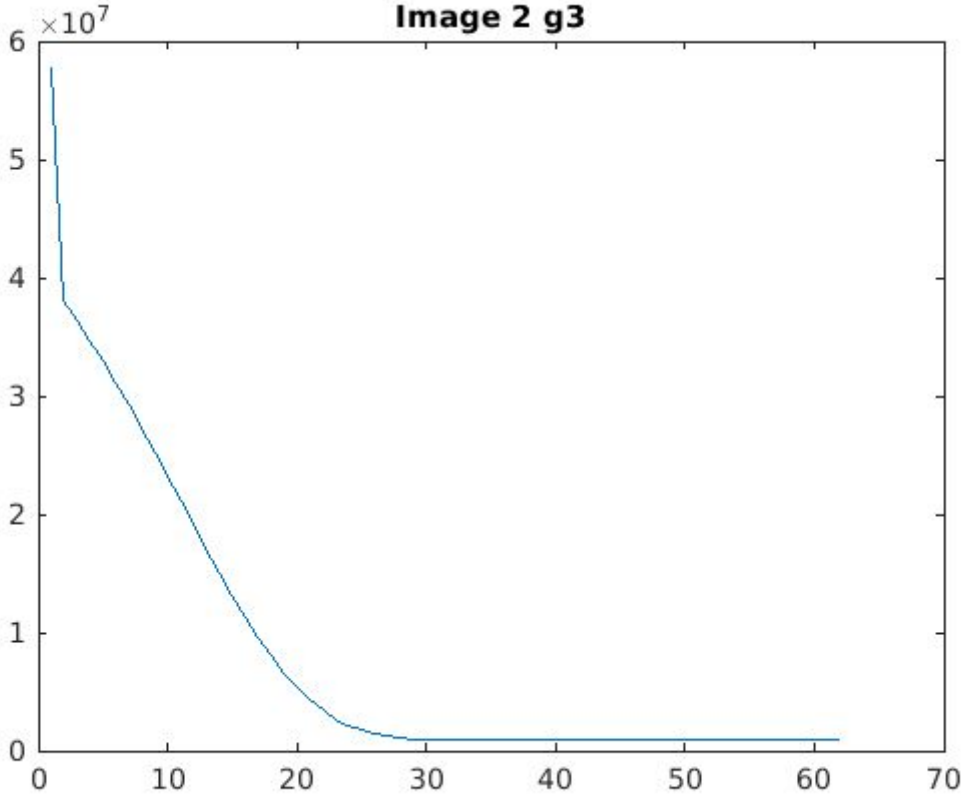
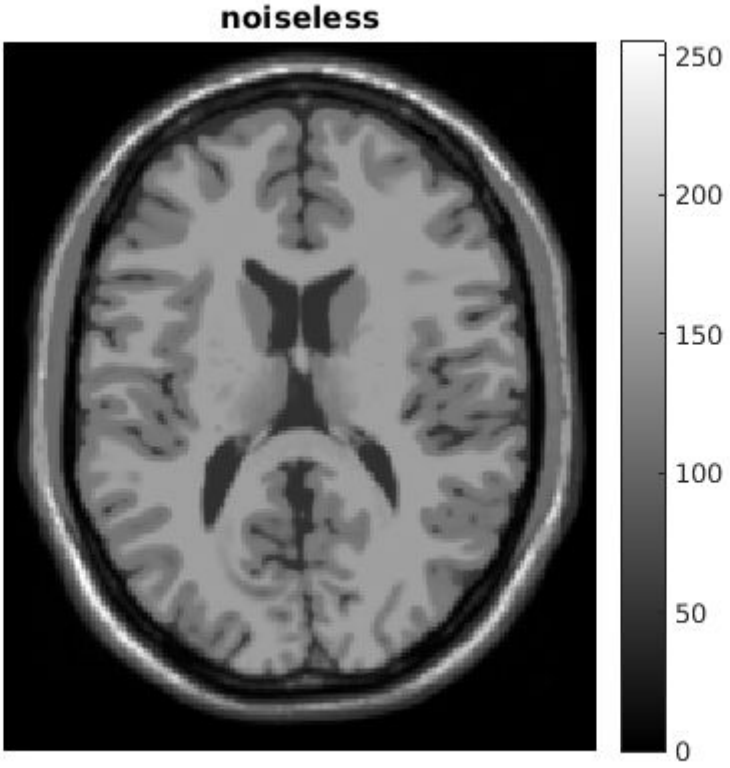


Image 2 g3
×10^7
6
5
4
3
2
1
0
0
10
20
30
40
50
60
70

Noise Level high Image



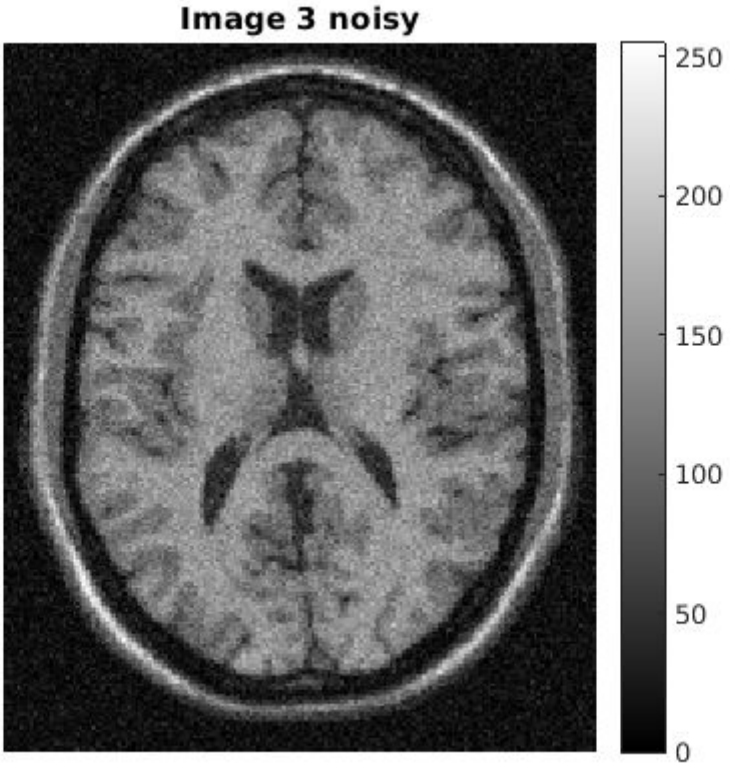


Image 3 noisy
250
200
150
100
50
0

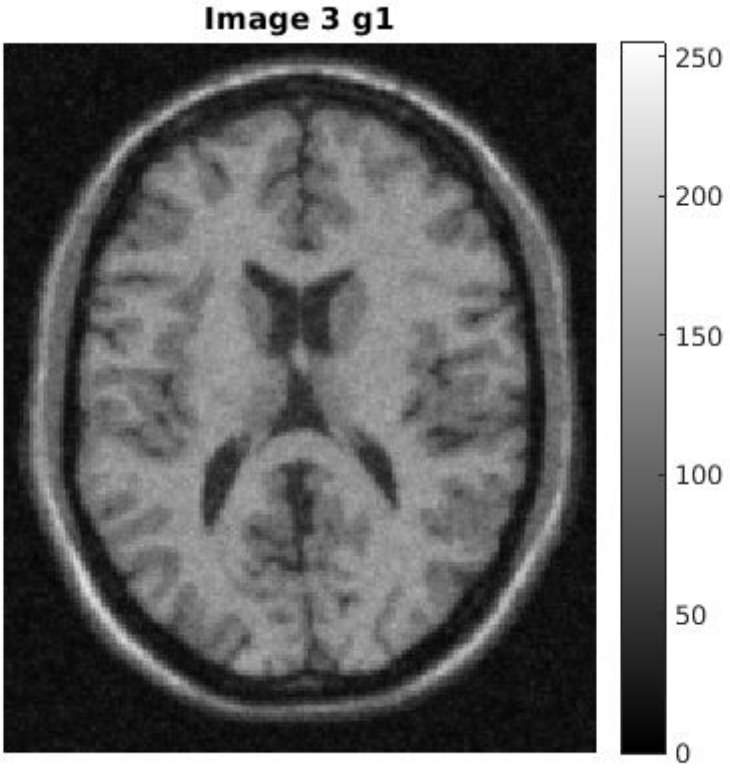


Image 3 g1
250
200
150
100
50
0

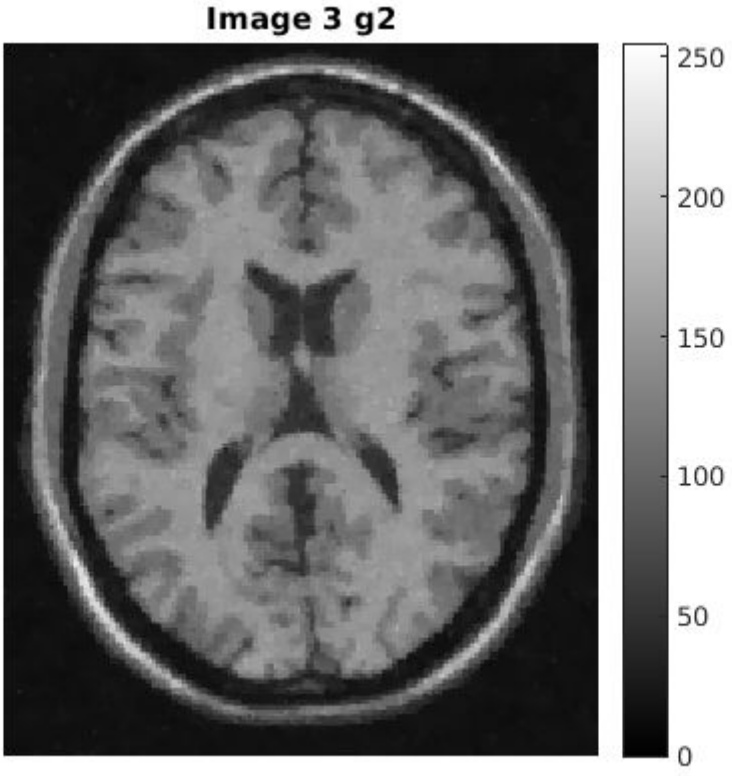


Image 3 g2
250
200
150
100
50
0

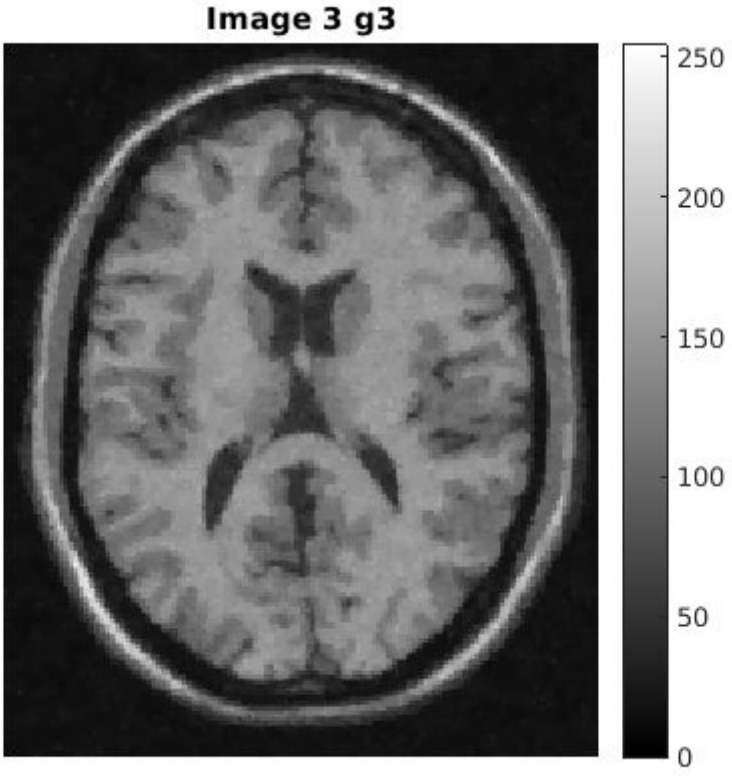


Image 3 g3
250
200
150
100
50
0

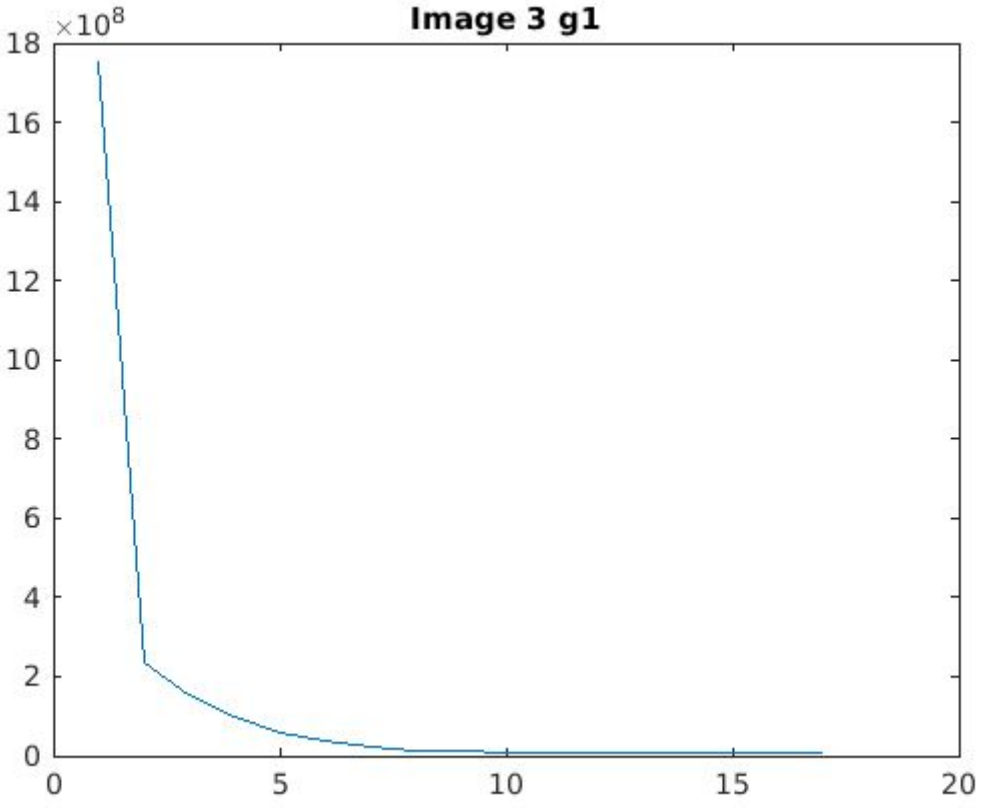


Image 3 g1
×10^8
18
16
14
12
10
8
6
4
2
0
0
5
10
15
20

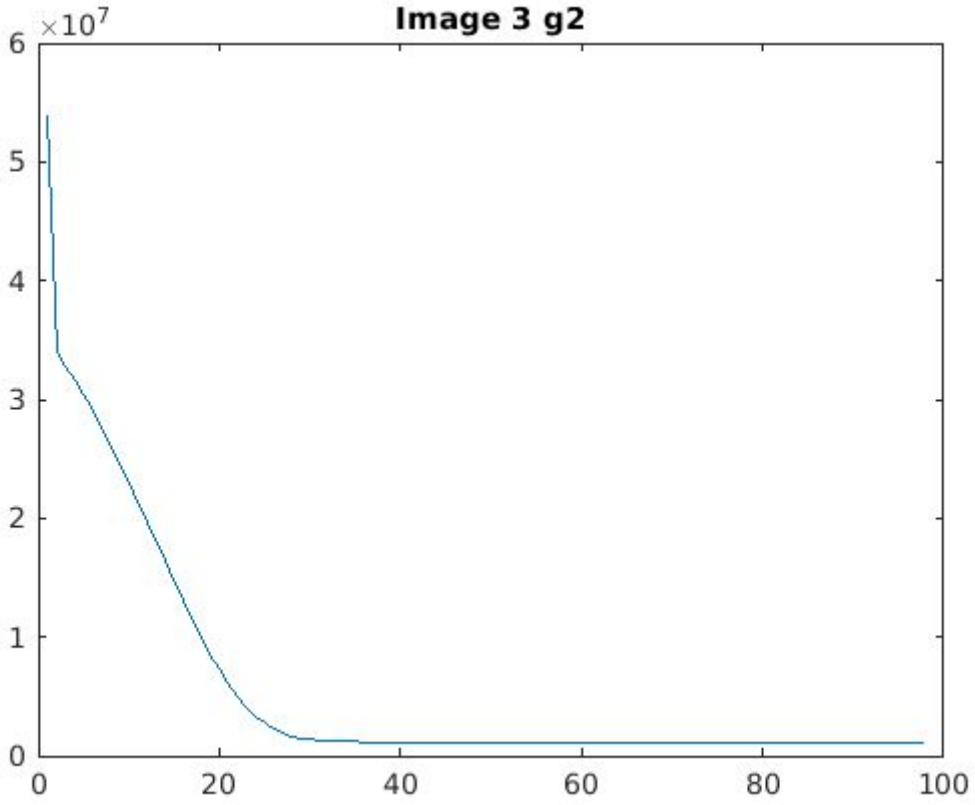


Image 3 g2
×10^7
6
5
4
3
2
1
0
0
20
40
60
80
100

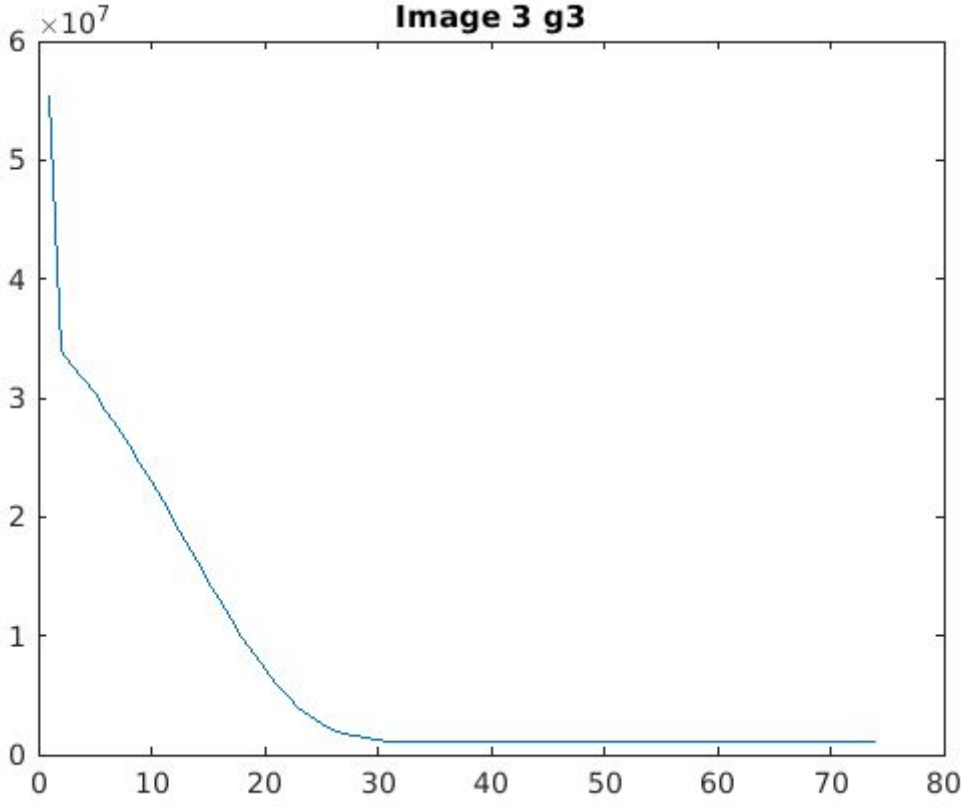


Image 3 g3
×10^7
6
5
4
3
2
1
0
0
10
20
30
40
50
60
70
80

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