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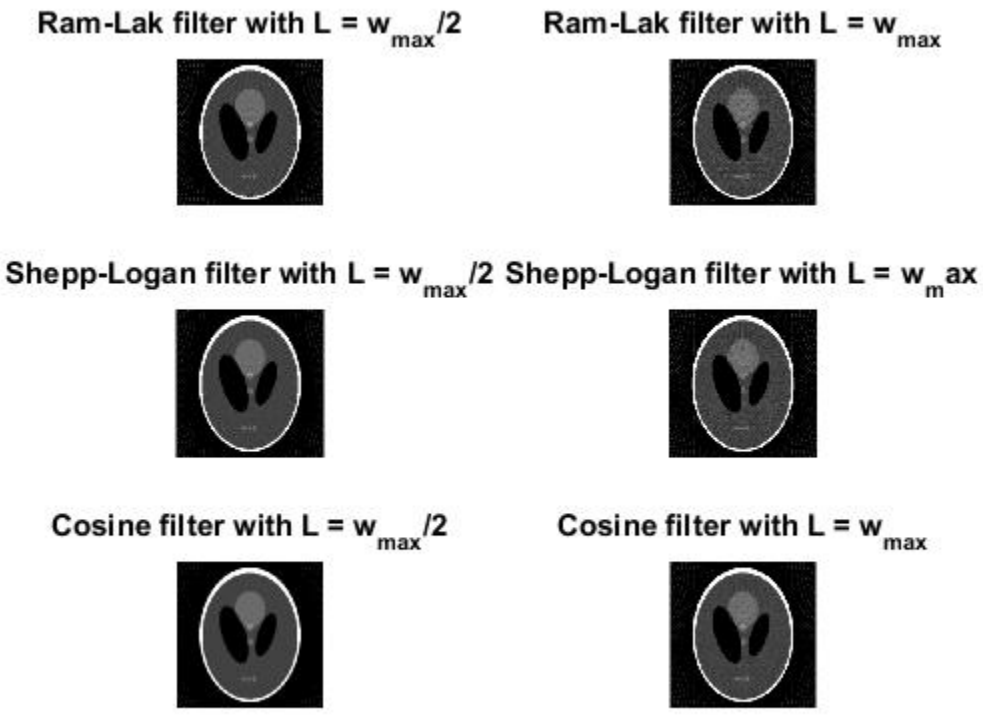
PART 1

```
%Initialization
image=phantom(256);
theta=0:3:177;
radon_trans=radon(image,theta);
[M,N]=size(image);
w_max=pi*(M-1)/M;

%Back projection
filtered_image=myFilter(radon_trans,1,w_max/2);
back_projected_ram_lak_a=0.5*iradon(filtered_image,theta,'linear','none',1,256);

filtered_image=myFilter(radon_trans,1,w_max);
back_projected_ram_lak_b=0.5*iradon(filtered_image,theta,'linear','none',1,256);

filtered_image=myFilter(radon_trans,2,w_max/2);
back_projected_shepp_logan_a=0.5*iradon(filtered_image,theta,'linear','none',1,256

filtered_image=myFilter(radon_trans,2,w_max);
back_projected_shepp_logan_b=0.5*iradon(filtered_image,theta,'linear','none',1,256

filtered_image=myFilter(radon_trans,3,w_max/2);
back_projected_cosine_a=0.5*iradon(filtered_image,theta,'linear','none',1,256);

filtered_image=myFilter(radon_trans,3,w_max);
back_projected_cosine_b=0.5*iradon(filtered_image,theta,'linear','none',1,256);

%Plots
figure;
subplot(3,2,1)
imshow(back_projected_ram_lak_a); title('Ram-Lak filter with L =
 w_{max}/2');
subplot(3,2,2)
imshow(back_projected_ram_lak_b); title('Ram-Lak filter with L =
 w_{max}');
subplot(3,2,3)
imshow(back_projected_shepp_logan_a); title('Shepp-Logan filter with L
 = w_{max}/2');
subplot(3,2,4)
imshow(back_projected_shepp_logan_b); title('Shepp-Logan filter with L
 = {w_max}');
subplot(3,2,5)
imshow(back_projected_cosine_a); title('Cosine filter with L =
 w_{max}/2');
```

```
subplot(3,2,6)
imshow(back_projected_cosine_b); title('Cosine filter with L =
 w_{max}');
```

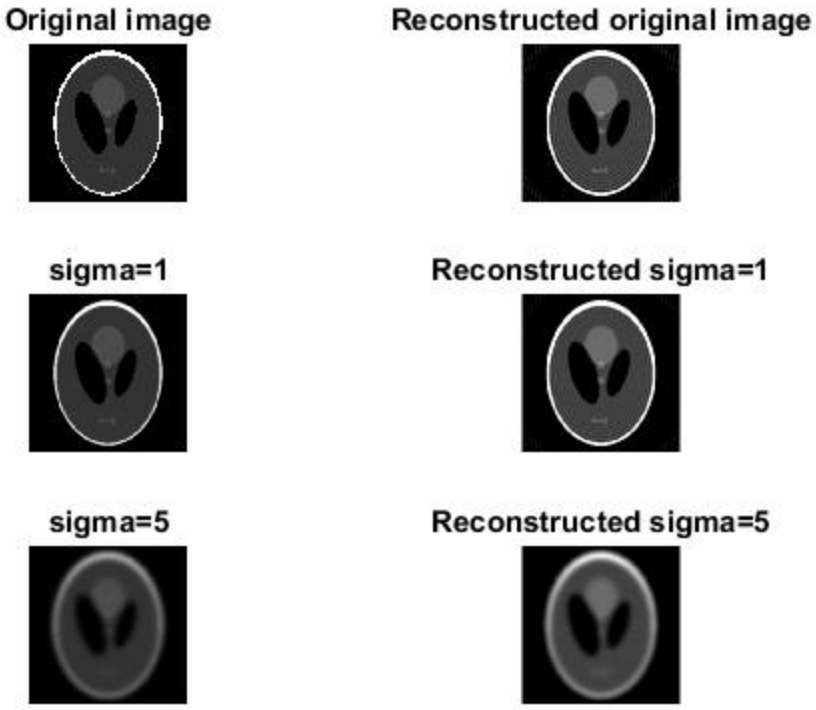


PART 2

```
%Gaussian blurring of the image
S0=image;
mask = fspecial('gaussian', 11, 1);
S1 = conv2 (image, mask, 'same');
mask = fspecial('gaussian', 51, 5);
S5 = conv2 (image, mask, 'same');

%Back projection via inverse radon function
filtered_image=myFilter(radon(S0,theta),1,1);
R0=0.5*iradon(filtered_image,theta,'linear','none',1,256);

filtered_image=myFilter(radon(S1,theta),1,1);
R1=0.5*iradon(filtered_image,theta,'linear','none',1,256);

filtered_image=myFilter(radon(S5,theta),1,1);
R5=0.5*iradon(filtered_image,theta,'linear','none',1,256);

%Plots
figure;
subplot(3,2,1);imshow(S0);title('Original image');
```

```
subplot(3,2,2);imshow(R0);title('Reconstructed original image');
subplot(3,2,3);imshow(S1);title('sigma=1');
subplot(3,2,4);imshow(R1);title('Reconstructed sigma=1');
subplot(3,2,5);imshow(S5);title('sigma=5');
subplot(3,2,6);imshow(R5);title('Reconstructed sigma=5');

%RRMSE values
disp('The RRMSE values are:');

disp(RRMSE(S0,R0));
disp(RRMSE(S1,R1));
disp(RRMSE(S5,R5));

disp('The RRMSE value is highest for the original image and lowest for
 the');
disp('blurred image. This is because the blurred image is the
 smoothest');
disp('and the iradon method is known to not cause any further
 blurring.');
```

```
The RRMSE values are:
    0.5617

    0.4944

    0.4372

The RRMSE value is highest for the original image and lowest for the
blurred image. This is because the blurred image is the smoothest
and the iradon method is known to not cause any further blurring.
```

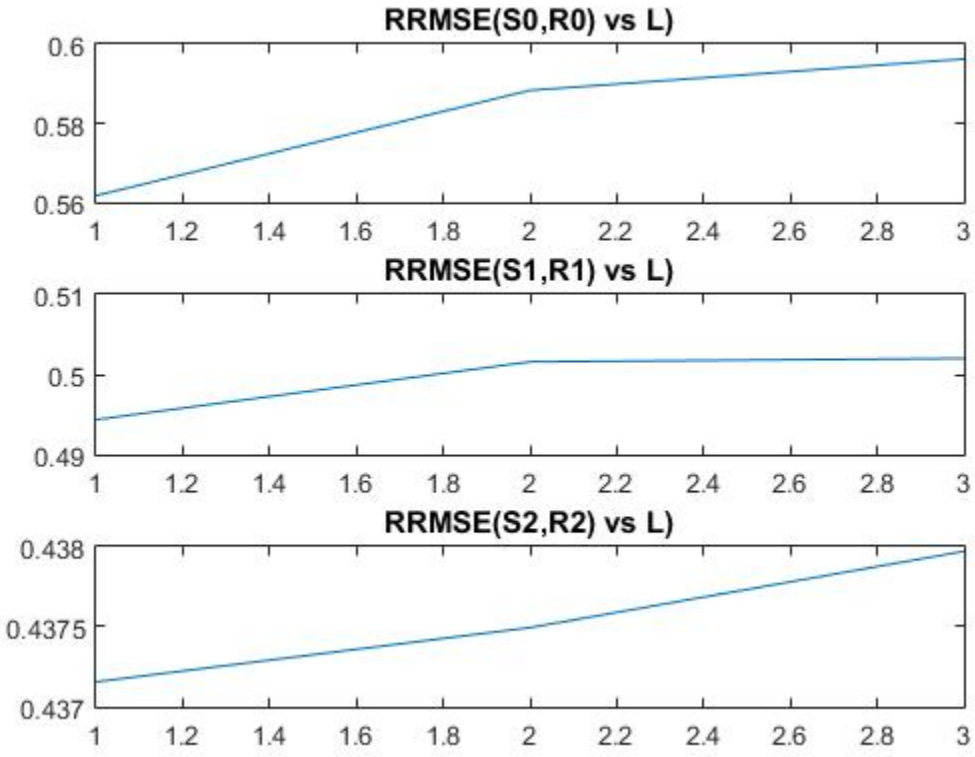


PART 3

```
vec1=[]; vec2=[];vec3=[];
for L=1:w_max
    filtered_image=myFilter(radon(S0,theta),1,L);
    R0_loop=0.5*iradon(filtered_image,theta,'linear','none',1,256);
    filtered_image=myFilter(radon(S1,theta),1,L);
    R1_loop=0.5*iradon(filtered_image,theta,'linear','none',1,256);

    filtered_image=myFilter(radon(S5,theta),1,L);
    R5_loop=0.5*iradon(filtered_image,theta,'linear','none',1,256);
    vec1=[vec1 RRMSE(S0,R0_loop)];
    vec2=[vec2 RRMSE(S1,R1_loop)];
    vec3=[vec3 RRMSE(S5,R5_loop)];
end

figure;
subplot(3,1,1); plot(1:w_max,vec1); title('RRMSE(S0,R0) vs L)');
subplot(3,1,2); plot(1:w_max,vec2); title('RRMSE(S1,R1) vs L)');
subplot(3,1,3); plot(1:w_max,vec3); title('RRMSE(S2,R2) vs L)');

disp('RRMSE seems to increase with L. As L increases, our
 constraint');
disp('on the frequency is further relaxes, due to which noise is
 highly amplified');
```

```
disp('for higher frequencies. Hence RRMSE increases with L.');
```

```
RRMSE seems to increase with L. As L increases, our constraint
on the frequency is further relaxes, due to which noise is highly
 amplified
for higher frequencies. Hence RRMSE increases with L.
```



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