Homework 3 for **Kun**

Introduce to image process

All codes are attached on the last page.

Histogram Equalization

a.

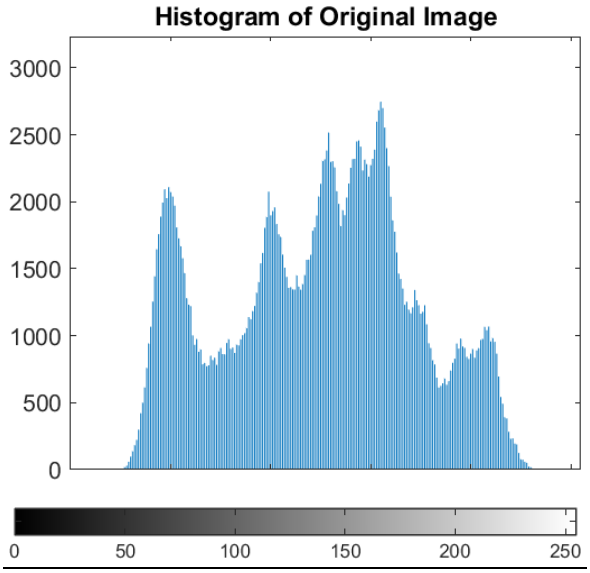
```
% Histogram Equalization
% a
I = im2uint8(rgb2gray(imread("amazon.png")));
imshow(I), title("Original Image");
```

Res:

b.

```
% b
imhist(I), title("Histogram of Original Image");
```

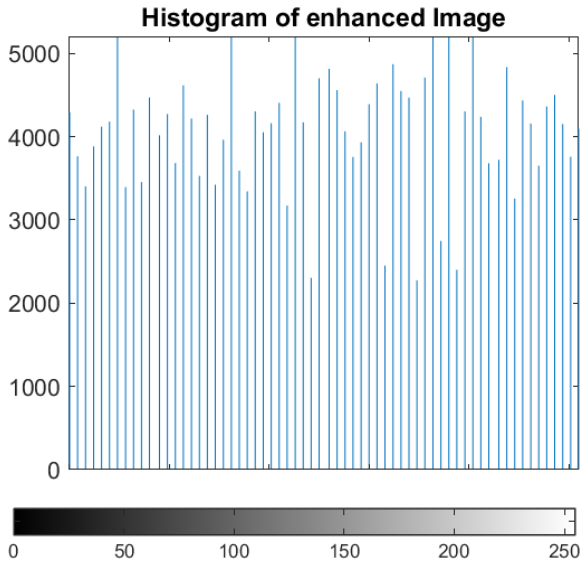
Res:



c.

```
% c
img_he = histeq(I);
imhist(img_he), title("Histogram of enhanced Image");
imshow(img_he), title("Enhanced Image");
```

Res:



Enhanced Image

d.

The most significant target(background) has been moved to the medium position.

481 Students.

```
% local enhancement approach
ROI = [100,300,100,300];
loc_he = I;
loc_he(ROI(1):ROI(2),ROI(3):ROI(4)) = histeq(I(ROI(1):ROI(2),ROI(3):ROI(4)));
imshow(loc_he), title("Local Enhanced Image");
```

Res:

Local Enhanced Image

Filtering

a.

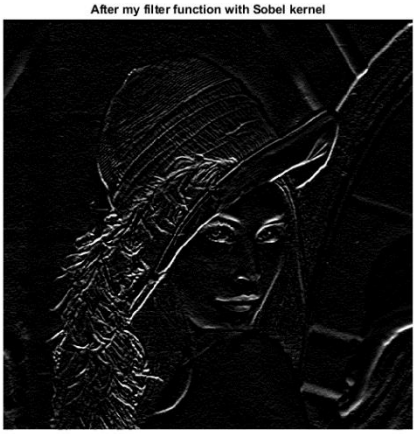
```
% Filtering
% a
h = fspecial('sobel');
aft_my_fil = myFilter(I,h);
imshow(aft_my_fil), title("After my filter function with Sobel kernel");
```

```
function res = myFilter(I,h)
    % We can add zero padding to original image
    [img_h,img_w] = size(I);
    hsize = size(h);
    padsize = [((hsize(1)-1)/2),((hsize(2)-1)/2)];
    padded_img = zeros(img_h+padsize(1)*2,img_w+padsize(2)*2);
    padded_img(padsize(1)+1:img_h+padsize(1), ...
        padsize(2)+1:img_w+padsize(2)) = I;
    [padded_h,padded_w] = size(padded_img);
    for i=1:img_h
        for j=1:img_w
            copy(i+padsize(1),j+padsize(2)) = sum(sum( ...
                padded_img(i:i+hsize(1)-1,j:j+hsize(2)-1).*h));
        end
    end
    res = uint8(copy(1+padsize(1):padded_h-padsize(1), ...
        1+padsize(2):padded_w-padsize(2)));
end
```

We can add zero padding to original image

Res:

After my filter function with Sobel kernel



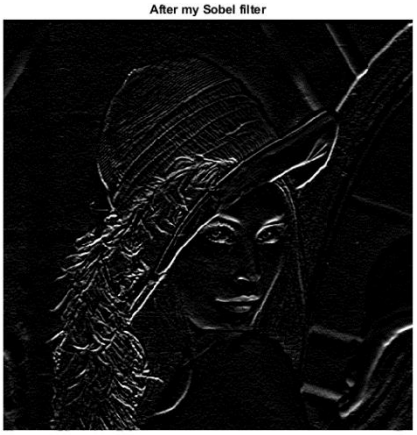
b.

```
% b
% Prewitt filter
aft_pre = imfilter(I,fspecial('prewitt'));
imshow(aft_pre), title("After build in prewitt filter");
aft_pre_my = myFilter(I,fspecial('prewitt'));
imshow(aft_pre_my), title("After my prewitt filter");
% Sobel filter
aft_sob = imfilter(I,fspecial('sobel'));
imshow(aft_sob), title("After build in Sobel filter");
aft_sob_my = myFilter(I,fspecial('sobel'));
imshow(aft_sob_my), title("After my Sobel filter");
% Point filter
point_f = [1 1 1;1 -8 1;1 1 1];
aft_poi = imfilter(I,point_f);
imshow(aft_poi), title("After build in Point filter");
aft_poi_my = myFilter(I,point_f);
imshow(aft_poi_my), title("After my Point filter");
% Blurring filter
aft_blu = imfilter(I,fspecial('gaussian',5,1));
imshow(aft_blu), title("After build in Blurring filter");
aft_blu_my = myFilter(I,fspecial('gaussian',5,1));
imshow(aft_blu_my), title("After my Blurring filter");
```

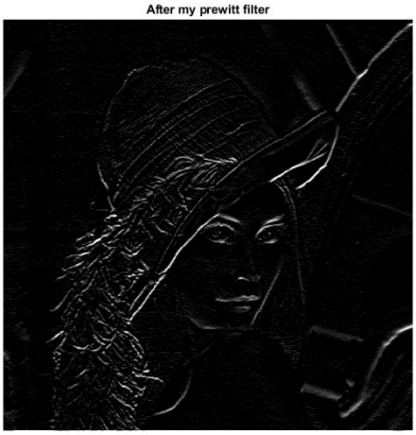
Res:

After build in prewitt filter

After my Sobel filter



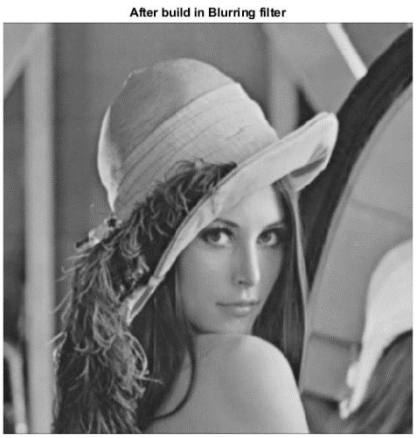
After my prewitt filter



After build in Point filter

After build in Sobel filter

After my Point filter

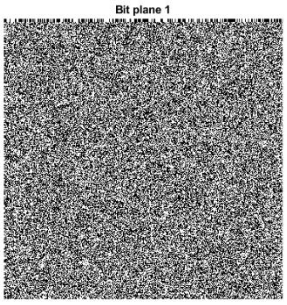


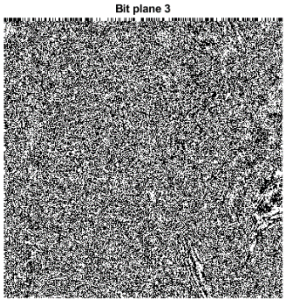
Those are almost same

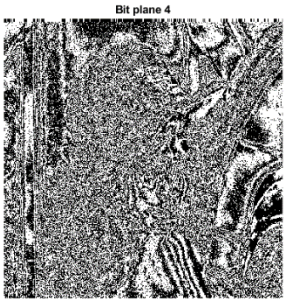
Bit Plane Splicing

```
% Bit Plane Splicing
I = im2uint8(rgb2gray(imread("lena_std.tif")));
for i=1:8
    B=logical(bitget(I,i));
    imshow(B);title("Bit plane "+i);
    drawnow;
    pause(0.5);
end
```

Res:







Bit plane 6

Bit plane 8

Bit plane 7

```
% Histogram Equalization
% a
I = im2uint8(rgb2gray(imread("lena_std.tif")));
imshow(I), title("Original Image");


% b
imhist(I), title("Histogram of Original Image");


% c
img_he = histeq(I);
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imshow(img_he), title("Enhanced Image");


% local enhancement approach
ROI = [100,300,100,300];
loc_he = I;
loc_he(ROI(1):ROI(2),ROI(3):ROI(4)) = histeq(I(ROI(1):ROI(2),ROI(3):ROI(4)));
imshow(loc_he), title("Local Enhanced Image");


% Filtering
% a
h = fspecial('sobel');
aft_my_fil = myFilter(I,h);
imshow(aft_my_fil), title("After my filter function with Sobel kernel");


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% Blurring filter
```

```
aft_blu = imfilter(I,fspecial('gaussian',5,1));
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```

```
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    padded_img = zeros(img_h+padsize(1)*2,img_w+padsize(2)*2);
    padded_img(padsize(1)+1:img_h+padsize(1), ...
        padsize(2)+1:img_w+padsize(2)) = I;
    [padded_h,padded_w] = size(padded_img);
    for i=1:img_h
        for j=1:img_w
            copy(i+padsize(1),j+padsize(2)) = sum(sum( ...
                padded_img(i:i+hsize(1)-1,j:j+hsize(2)-1).*h));
        end
    end
    res = uint8(copy(1+padsize(1):padded_h-padsize(1), ...
        1+padsize(2):padded_w-padsize(2)));
end
```