

Assignment 03: Mask Convolution

1. Write a function in Matlab (or Java) as follows:

Detect edges

```
function edges(Image)
img =imread(Image);
figure, imshow(img);

robertx=[1 0; 0 -1];
roberty=[0 1;-1 0];
sobelx=[-1 0 1; -2 0 2; -1 0 1];
sobely=[-1 -2 -1;0 0 0; 1 2 1];
prewittx=[-1 0 -1; -1 0 1; -1 0 1];
prewitty=[-1 -1 -1;0 0 0; 1 1 1];

robert=abs(convolution(img,robertx))+abs(convolution(img,roberty));
sobel=abs(convolution(img,sobelx))+abs(convolution(img,sobely));
prewitt=abs(convolution(img,prewittx))+abs(convolution(img,prewitty));

figure, imshow(robert);
figure, imshow(prewitt);
figure, imshow(sobel);
```

Convolution operation

```
function Img2=convolution(Img, mask)

Img2=rgb2gray(Img);
Img3=double(Img2);
[a, b]=size(Img3);
[n,~]=size(mask);

for i=1:a-2
    for j=1:b-2
        conv=Img3(i:i+(n-1),j:j+(n-1))*mask;
        s=sum(sum(conv));
        Img2(i,j)=s;
    end
end
```

2. Test the function.

Read an image file, apply the edge detection filters (i.e., masks) to see whether it works well. Try at least 3 filters: Sobel, Robert, Prewitt.

Sobel:



Prewit:



Roboyto:

