

```
clear; clc;
```

```
%% Load Letter R
width = 10;
height = 14;

ccnt=width*height;

fileID = fopen('letter_R.raw','r');
letter_R=fread(fileID,ccnt,'uint8=>uint8');

letter_R=reshape(letter_R,width,height);
letter_R = letter_R';
fclose(fileID);
imshow(letter_R)
```

A small, pixelated image of the letter 'R'.

```
imwrite(letter_R,'letter_R.jpg');
```

```
%% Load Text
width = 355;
height = 390;

ccnt=width*height;

fileID = fopen('text_image.raw','r');
text_image=fread(fileID,ccnt,'uint8=>uint8');

text_image=reshape(text_image,width,height);
text_image = text_image';
fclose(fileID);
imshow(text_image)
```



University
of Regina

UR Courses Login

Log in below using your U of R username and password

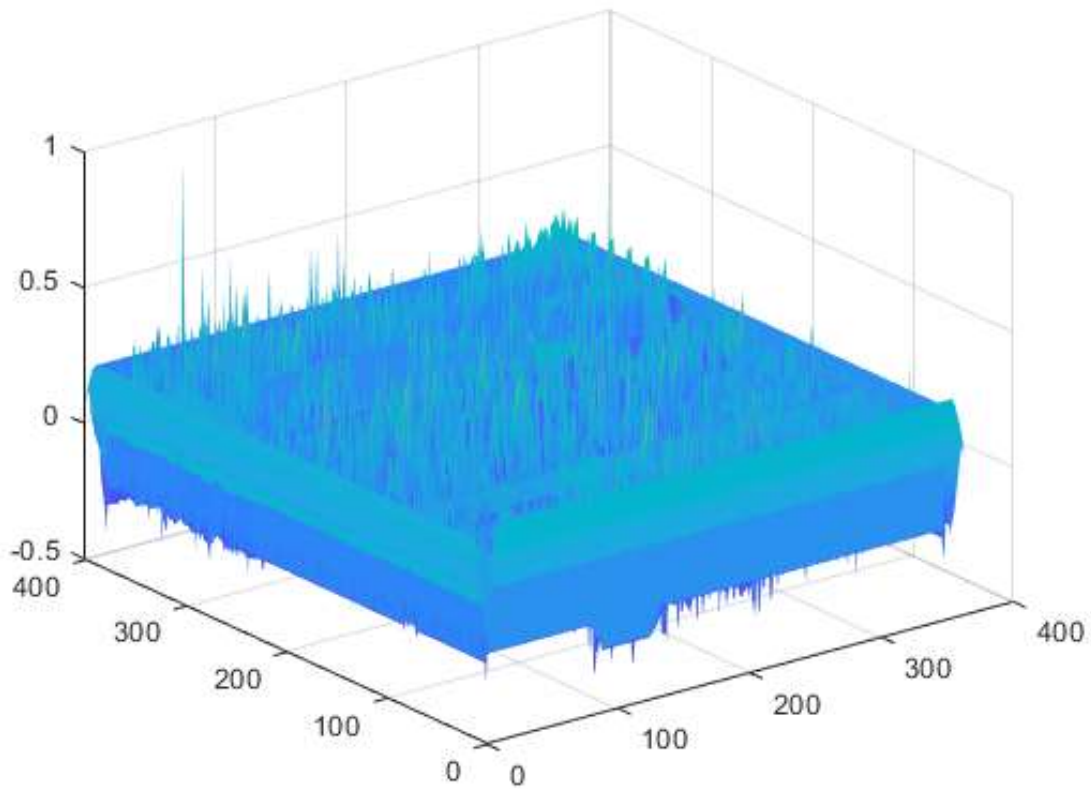
Cookies must be enabled in your browser [?](#)

☐ Remember username

```
imwrite(text_image, 'text_image.jpg');
```

```
% Match the template Question 1  
c = normxcorr2(letter_R, text_image);
```

```
figure,  
surf(c), shading flat
```



```
[yThresh, xThresh] = find(c>0.6);  
  
x =xThresh;  
y = yThresh;  
  
yoffset = y - size(letter_R,1);  
xoffset = x - size(letter_R,2);  
  
figure  
imshow(text_image)  
for m = 1:length(y)  
    imrect(gca, [xoffset(m)+1, yoffset(m)+1, size(letter_R,2), size(letter_R,1)]);  
    imtext(xoffset(m)+1, yoffset(m)+1,num2str(c(m)));  
end
```



University
of Regina

UR Courses Login

Log in below using your U of R username and password

Cookies must be enabled in your browser ?

☐ Remember username

```
%% Load Building
```

```
width = 560;
```

```
height = 420;
```

```
ccnt=width*height;
```

```
fileID = fopen('building.raw','r');
```

```
building=fread(fileID,ccnt,'uint8=>uint8');
```

```
building=reshape(building,width,height);
```

```
building = building';
```

```
fclose(fileID);
```

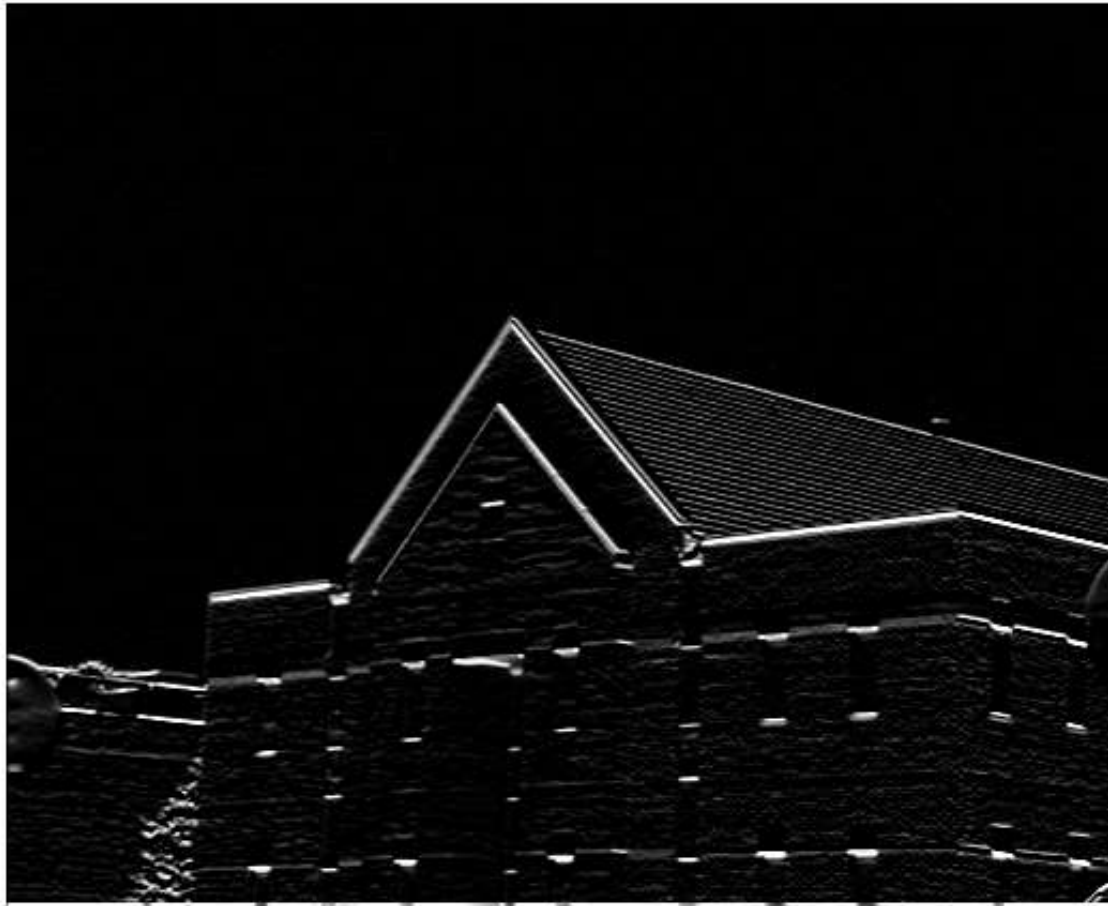
```
imshow(building)
```



```
imwrite(building, 'building.jpg');
```

```
% the result of applying Gx; Question 2
G_x = [-1, -2, -1;
        0, 0, 0;
        1, 2, 1];
isobel_x_Building = uint8(conv2(building, G_x));

imshow(isobel_x_Building)
```



```
%the result of applying Gy;  
G_y = [-1, 0, 1;  
       -2, 0, 2;  
       -1, 0, 1];  
  
isobel_y_Building = uint8(conv2(building, G_y));  
  
imshow(isobel_y_Building)
```

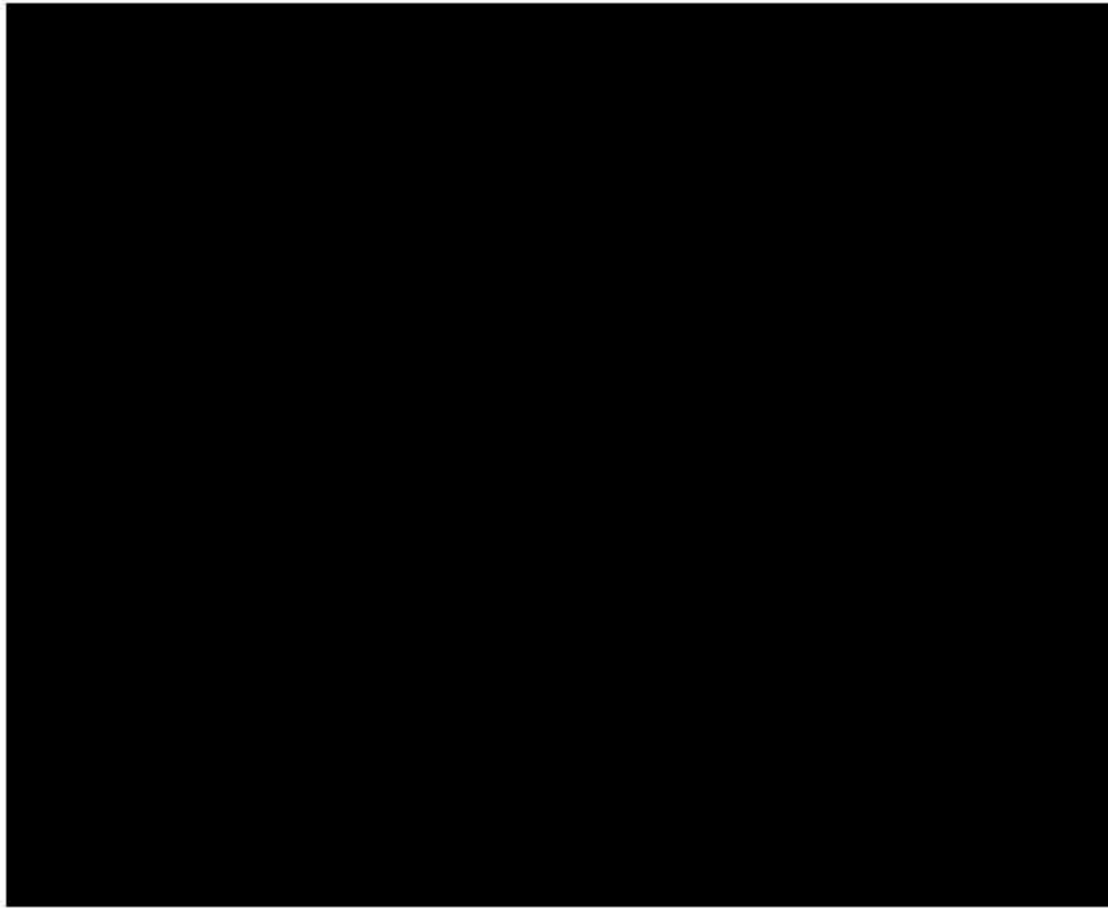


```
% the gradient  $\sqrt{G_x^2 + G_y^2}$ 
grad = sqrt(G_x.^2 + G_y.^2);
isobel_grad_Building = uint8(conv2(building, grad));

imshow(isobel_grad_Building)
```



```
T_E = 128;  
imshow(isobel_grad_Building==T_E)
```



```
% zero-crossing points map Question 3
L = [0 1 0;
      1 -4 1;
      0 1 0];
LaplaceBuilding = conv2(building,L);

imshow(LaplaceBuilding)
```



```
%% Load moon
width = 464;
height = 538;

ccnt=width*height;

fileID = fopen('moon.raw','r');
moon=fread(fileID,ccnt,'uint8=>uint8');

moon=reshape(moon,width,height);
moon = moon';
fclose(fileID);
imshow(moon)
```

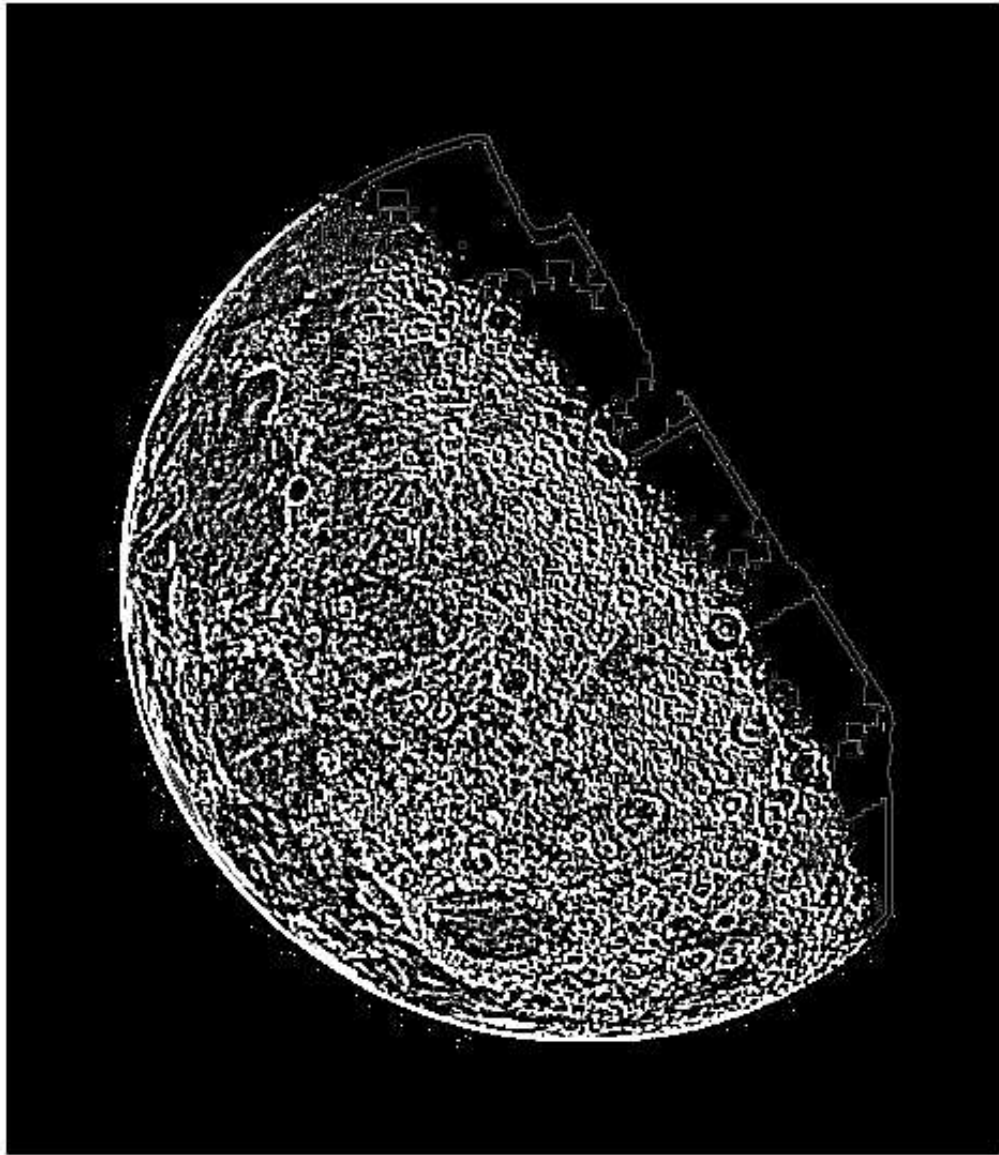


```
imwrite(moon, 'moon.jpg');
```

```
% 3 x 3 Laplacian sharpening filter. Question 4
```

```
laplacianKernel = [-1,-1,-1;-1,8,-1;-1,-1,-1]/8;  
laplacianMoon = conv2(moon, laplacianKernel, "same");% Display the image.
```

```
imshow(laplacianMoon);
```



```
sharpenedImageMoon = double(moon) + laplacianMoon;
```

```
imshow(sharpenedImageMoon);
```

