

Fourth Year Mechatronics Department
CSE496-Elective Course (2): Digital Image Processing
Quiz #2, Time Allowed 30 minutes.
Spring 2015



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Student Name:

Student ID:

- 1- Write a MATLAB function that applies a mask of size $n \times n$ on an input image.
(Note: you are not allowed to use any ready-made MATLAB functions related to image filtering).
- 2- Use the function in (1) to write another function to find the gradient magnitude of an image using any suitable gradient operator.

Solution:

```
function output = imfilter2(im, fl)

[m, n ] = size(im);
[k, l ] = size(fl);
output = zeros(m,n);
for x = ceil(k/2):m-floor(k/2)
    for y = ceil(l/2):n-floor(l/2)
        sum = 0;
        for i = 1:k
            for j = 1:l
                sum = sum +im(x-ceil(k/2)+i, y - ceil(l/2)+j)*fl(i,j);
            end
        end
        output(x,y) = sum;
    end
end

function magnitude = gradientMagnitude(im)

gradYFilter = [-1 -1 -1;
               0  0  0;
               1  1  1];
gradXFilter = [-1  0  1;
               -1  0  1;
               -1  0  1];

gradX = imfilter2(im,gradXFilter);
gradY = imfilter2(im,gradYFilter);
magnitude = abs(gradX)+abs(gradY);

end
```