

# CS 111: Digital Image Processing (Spring 2011)

## Programming Assignment - 1

Due – April 12 (Before class)

### Getting Started

- 1) In this assignment you will get familiar with reading and writing images using Java. You may download and use two simple Java classes, 'MyImageReader.java' and 'MyImageWriter.java' for this purpose. The links are given below:  
<http://www.ics.uci.edu/~umukherj/cs111/MyImageReader.java>  
<http://www.ics.uci.edu/~umukherj/cs111/MyImageWriter.java>
- 2) Download images from the course website to create your own image gallery. You will be using these images to test your code throughout this class.
- 3) Write a code to test if you can read and write files in jpg format.
- 4) If you want to use Java, look for Java applet for reading and writing images. We will mostly using JPG images.
- 5) It is important to have a good image viewer. A popular one is Irfanview – Google it and download. It is free.

### Setting Up for Convolution

Write a program that implements the function **Convolve( $I, F, iw, ih, fw, fh$ )** with the following specifications.

- a.  $I$  is a gray scale image. This is a two dimensional array of size  $iw$  by  $ih$ .
- b.  $F$  denotes a filter. This is a two dimensional array of floating point numbers of size  $fw$  by  $fh$ . Usually  $(fh, fw) \ll (ih, iw)$ .
- c. The output  $O(x, y)$  is an image of same size as  $I$ . The value of  $O$  at any pixel is generated by position  $F$  on  $I(x, y)$  such that the top right pixel of  $F$  coincides with  $I(x, y)$ , and then multiplying the values of  $I$  and  $F$  for all the pixels of  $I$  covered by  $F$ , and finally summing these values.
- d. Test your code on some of the images using the following two filters.

1/4	1/4
1/4	1/4

1/9	1/9	1/9
1/9	1/9	1/9
1/9	1/9	1/9

Note: Consider the pixels around the boundary of  $I$  to be of value 0.