**Project #1 - Spatial Transformation**

**Due date: 2015/10/18**

In terms of digital image processing, a geometric transformation consists of two basic operations: (1) a spatial transformation of coordinates and (2) intensity interpolation that assigns intensity values to the spatially transformed pixels.

**Requirements**

(a) Write a computer program capable of spatial translating an image by three kinds of interpolation, i.e. nearest-neighbor, bilinear, and bicubic. The inputs to your program include the desired parameters of the most commonly used transformation, affine transform. Your program should support combinations of scaling, rotation, translation, and shear.

(b) Download Fig. 2.20(a) and Fig. 2.36(a) as test images. Use your program to spatially translate them. Verify your program by comparing your results with the figures in the textbook (Figure 2.24 and Figure 2.36).

(c) Test your program by your own sample images: one nature image and one pure text image. Explain the reasons for their differences.

(d) Upload your project results to E3 before the due time with one single zipped file named “IP\_Project1\_[StudentID].rar”. The file should include: (1) source code with proper comments, (2) your own sample images, and (3) project report.

(e) It is suggested that project reports be kept short, and be organized in a uniform manner to simplify grading. The following format achieves these objectives:

Page 1. Information of the project should be typed neatly in the top of page 1. Information including: project title, project number, course name, student's id, student's name, date due, date handed in.

Page 1 - 2. Technical discussion. One to two pages (max). This section should include the techniques used and the principal equations (if any) implemented. Some best practices or implementation issues are encouraged to present here.

Page 3 (or 4). Discussion of results. One to two pages (max). A discussion of results should include major findings in terms of the project objectives, and make clear reference to any images generated.

Appendix (optional). Some special designs of your partial program could be listed here. Standard routines and other material obtained from other sources should be acknowledged by name, but their listings should not be included. Do not list all your source code here.