DIP Homework #2

There are three problems for this assignment:

Problem 1: You have the options to choose one (**only one is required**) from the following problems:

(1) **image scaling (or resizing) by a <u>non-integer</u> factor**

Use **framed_airplane.bmp** as the test image.   Scale up or down the central part of the given image.   Utilize the <u>bilinear interpolation</u> technique when needed.

(2) **rotation**

Use **framed_lena_color_256.bmp** as the test image.   Rotate the central part of the given image.   Utilize the <u>bilinear interpolation</u> technique when needed.
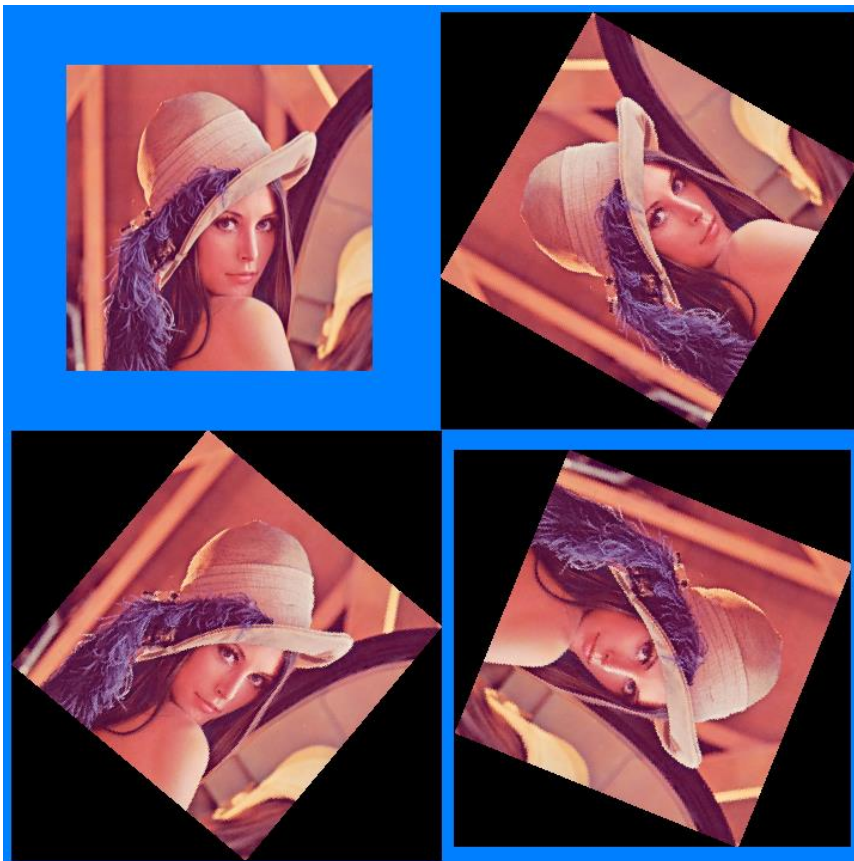
Note: The image shown here is <u>NOT</u> the same as the test image.

(3) **nonlinear image warping**

Use **building2.bmp** as the test image.   Consider the warping of <u>mapping an image onto a hemisphere</u> which is described in detail in the class handout.
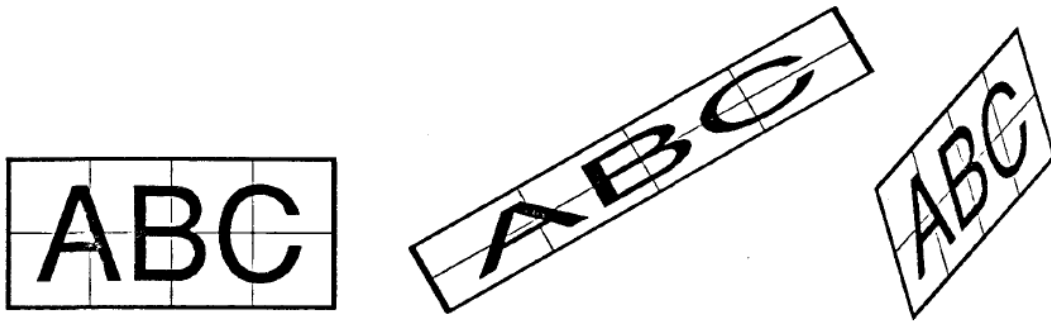
(4) **affine transformation**

Figure 2.4: *Affine warps of image at left.*

Use **framed_airplane.bmp** as the test image.

Problem 2: Same as Problem 1 above, you have the options to choose one (**only one is required**) from the following problems:

    (1) **Canny edge detector (preferred)**

        ◆ Carry out all the four steps of Canny edge detector, i.e., Gaussian LPF, gradient calculation, non-maximum suppression, and hysteresis thresholding.

        ◆ Show the resultant image of each step.

        ◆ Compare the performance of different combinations of σ, T_L, and T_H.

        ◆ test images: **house.bmp, cameraman.bmp**.

variance = 0.5   variance = 1.5
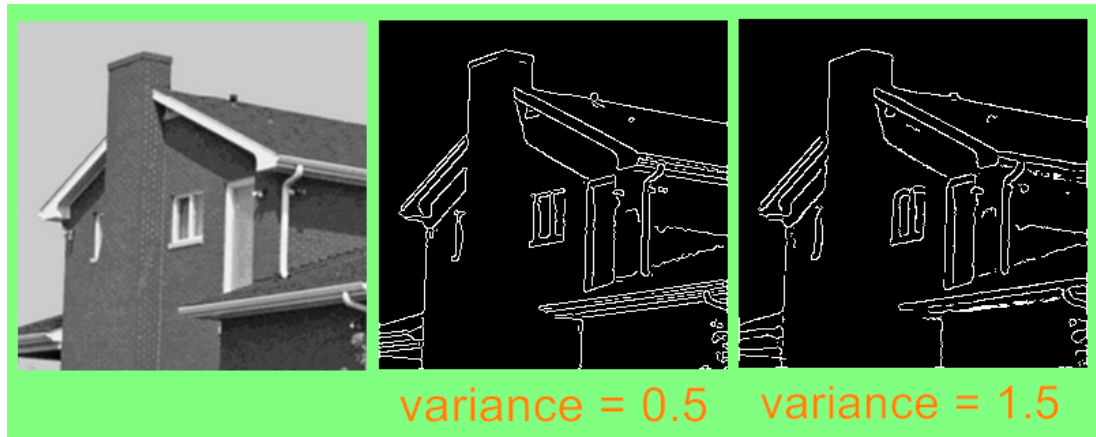
(2) **basic edge detection**

◆ Use Sobel masks for calculating gradient.

◆ test images: **house.bmp, cameraman.bmp**.

Problem 3: Same as Problem 1 above, you have the options to choose one (**just one is needed**) from the following problems:
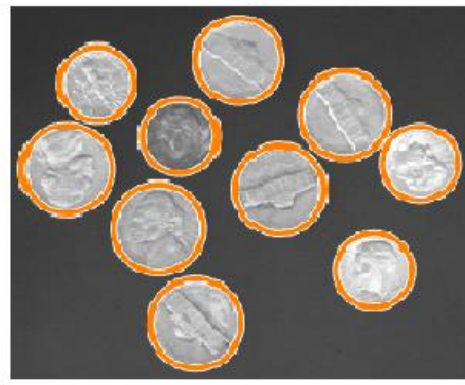
(1) **Hough transform for line detection**

◆ Locate some highest peaks in the $s - \theta$ plot, and draw the corresponding lines on the original input image.
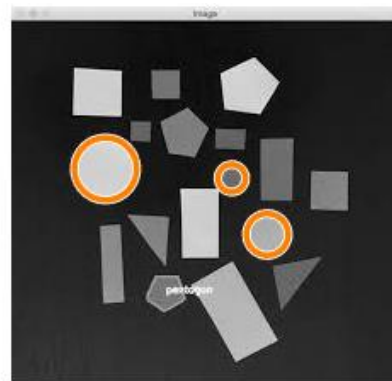
◆ test images: **house.bmp, cameraman.bmp**.

◆ Examples:
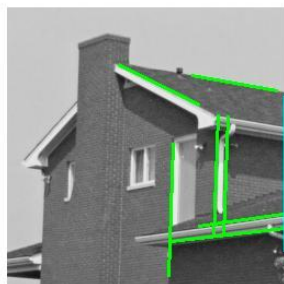
(2) **Hough transform for circle detection**

◆ Locate the centers of circles first, and then find their radii.

◆ test images: **coins.bmp**.

Hough Transform for Circle Detection

Hough Transform for Circle Detection