CE 503 Photogrammetry I - Homework 1

Assigned Monday, 30 August, due Wednesday, 8 September

Intensity	108	110	117	130	122	120
Column	20	21	22	23	24	25

1. In the above image row, interpolate an intensity at column location 22.15. by

   (a) Nearest neighbor

   (b) Linear interpolation

   (c) Cubic interpolation

Column

Row	73	74	75	76	77	78
14	80	75	52	80	85	80
15	70	50	90	120	115	100
16	45	60	75	150	130	125
17	50	70	85	120	100	95
18	53	70	90	110	90	90
19	50	75	100	105	88	85

2. In the image to the right, interpolate an intensity at (row,column) location (15.37, 75.78) by, (a) nearest neighbor, (b) bilinear, and (c) bicubic interpolation.

$$\begin{bmatrix} r \\ c \end{bmatrix}_{original} = \begin{bmatrix} \cos 30 & \sin 30 \\ -\sin 30 & \cos 30 \end{bmatrix} \begin{bmatrix} r'-125 \\ c'-100 \end{bmatrix}_{new} + \begin{bmatrix} 83 \\ 64 \end{bmatrix}$$

3. Retrieve the image from homework page. Read it into a matlab array. Initialize a new array with size (row,col) = (250,200), intensity = 255. Loop through all pixels of new image, transform via above equation, if within the input image (r:0-167, c:0-128) then interpolate an intensity and place in new image. If outside, do nothing. Hand in any matlab code you develop. Do by nearest neighbor, bilinear, and bicubic. (alloc. Image array: im=repmat(uint8(0),m,n))