OS HW3

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Technique - bilinear interpolation

$$f(x,y)=z$$

four points $x_1 < x_2 \quad y_1 < y_2$

$$f(x_1,y_1)=z_1 \quad f(x_1,y_2)=z_2 \quad f(x_2,y_1)=z_3 \quad f(x_2,y_2)=z_4$$
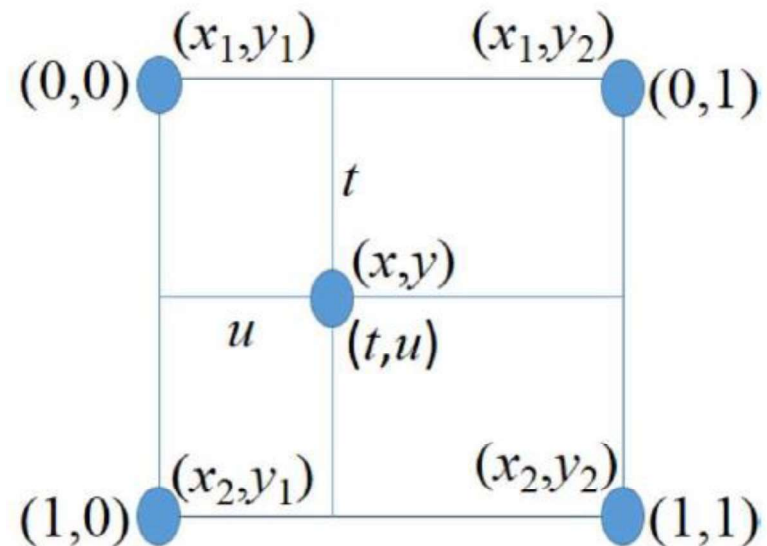
Using (t,u) to replace (x,y)

$$z=au+bt+cut+d$$

$$a=z_3-z_1$$

$$b=z_2-z_1$$

$$c=z_1-z_2-z_3+z_4$$

$$d=z_1$$

Technique - bilinear interpolation

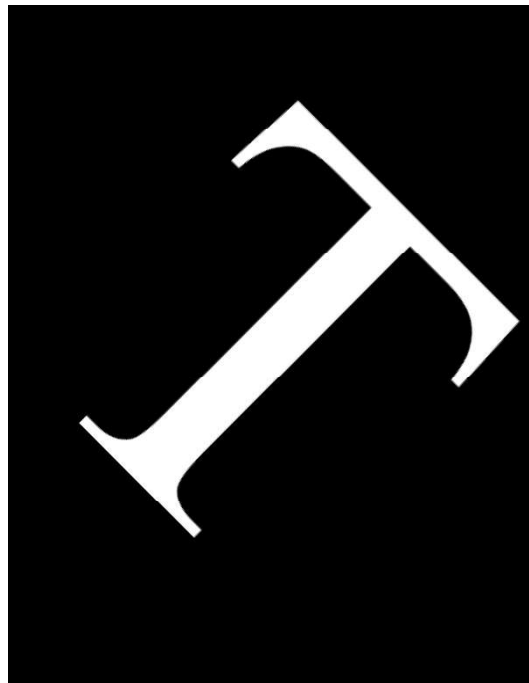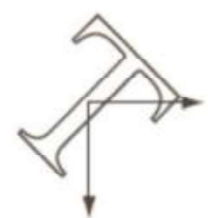- Ratio = 7

Technique - rotation

- Angle = 45°

Rotation $\begin{bmatrix} \cos\theta & \sin\theta & 0 \\ -\sin\theta & \cos\theta & 0 \\ 0 & 0 & 1 \end{bmatrix}$

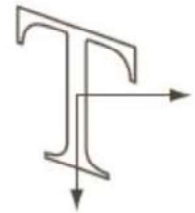$x = v\cos\theta - w\sin\theta$

$y = v\cos\theta + w\sin\theta$

Technique - shear

- Vertical = 0.45

Shear (vertical)

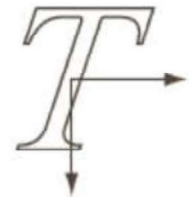$$\begin{bmatrix} 1 & 0 & 0 \\ s_v & 1 & 0 \\ 0 & 0 & 1 \end{bmatrix}$$

$$x = v + s_v w$$
$$y = w$$

Technique - shear

- Horizontal = 0.45

Shear (horizontal)

$$\begin{bmatrix} 1 & s_h & 0 \\ 0 & 1 & 0 \\ 0 & 0 & 1 \end{bmatrix}$$

$$x = v$$
$$y = s_h v + w$$

Goal

- Using pthread to speed up this program.(100 points)
- output1.bmp : bilinear interpolation
- output2.bmp : bilinear + rotation
- output3.bmp : bilinear + shear(v)
- output4.bmp : bilinear + shear(h)
- output5.bmp : bilinear + shear(v) + rotation + shear(h)