Affine transformation, rotation and shearing

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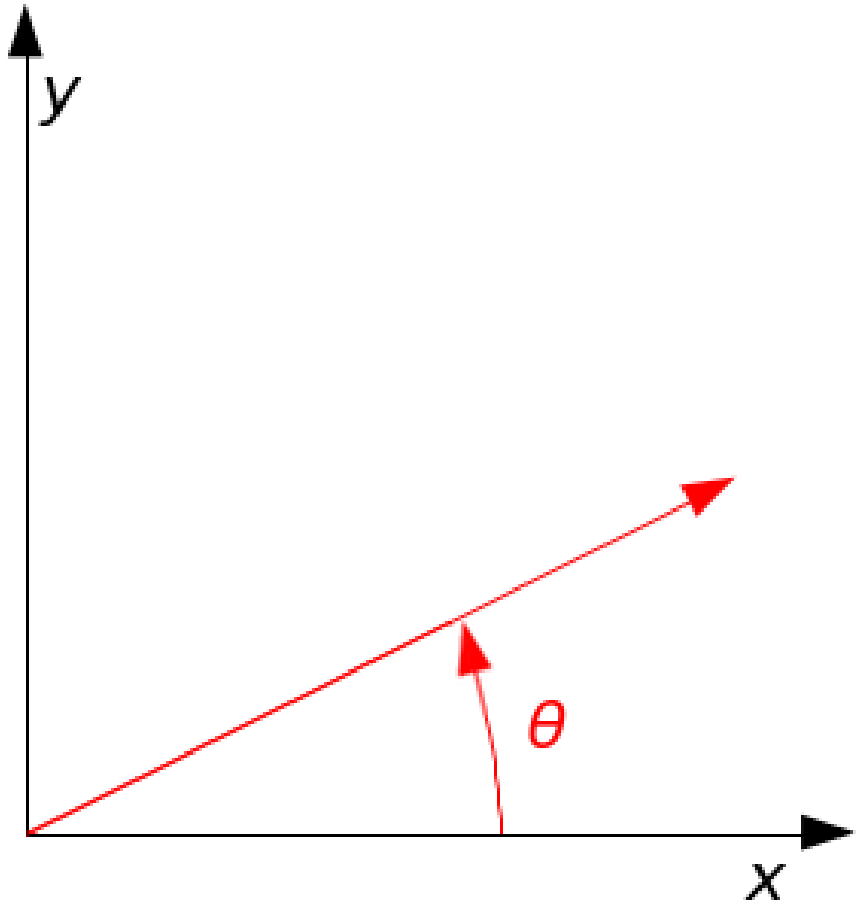
Principe of rotation



(source: wikipedia)

Rotation matrix

$$\begin{bmatrix} cos(\theta) & -sin(\theta) \\ sin(\theta) & cos(\theta) \end{bmatrix}$$

Shearing

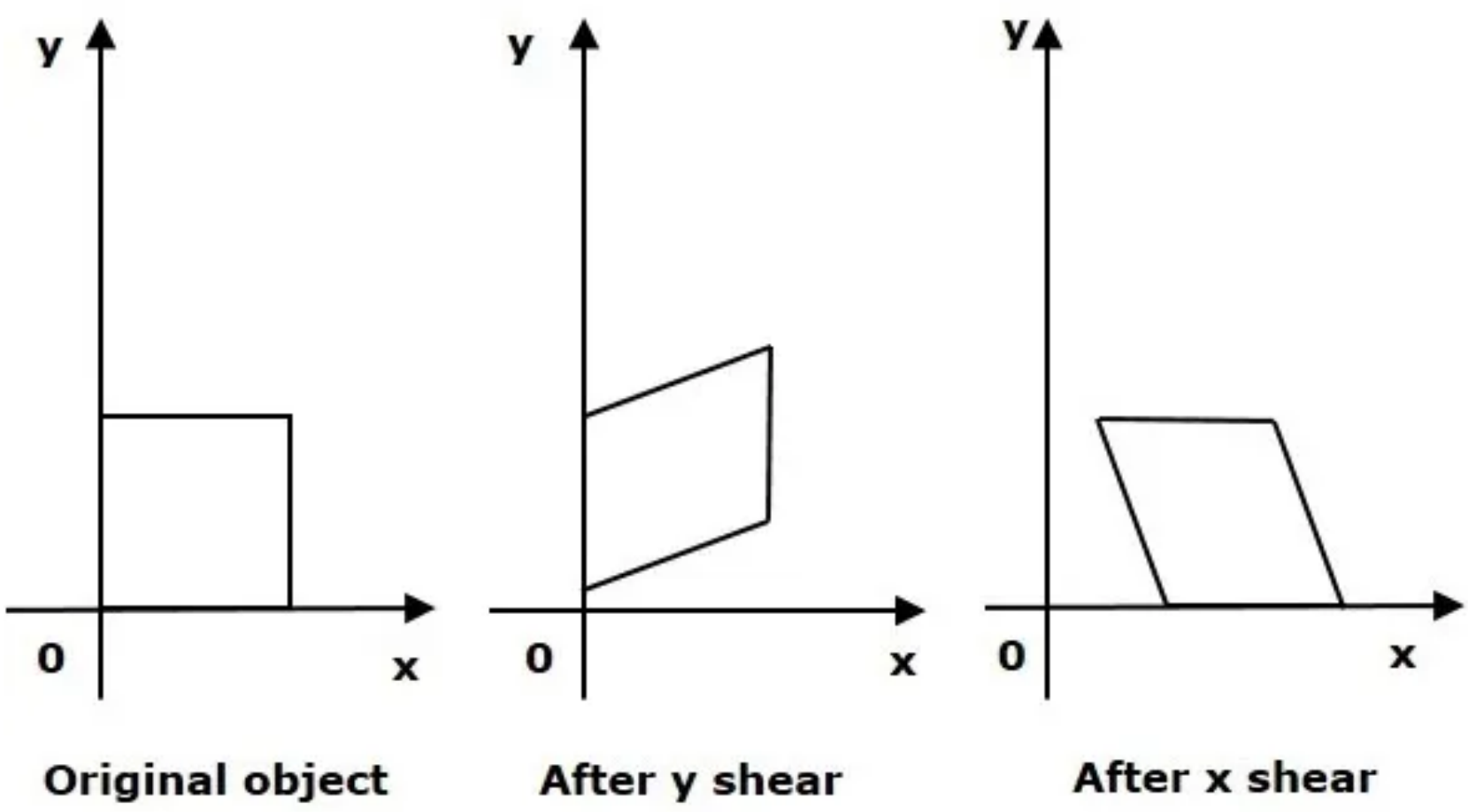


Figure 1: source: tutorialspoint.com

Shearing: matrix

x shearing:

$$\begin{aligned} x &= w + bz \\ y &= z \end{aligned}$$

$$\text{Matrix for shearing} = \begin{bmatrix} 1 & b \\ c & 1 \end{bmatrix}$$

Note

Interpolation is necessary because we are in a discrete space.

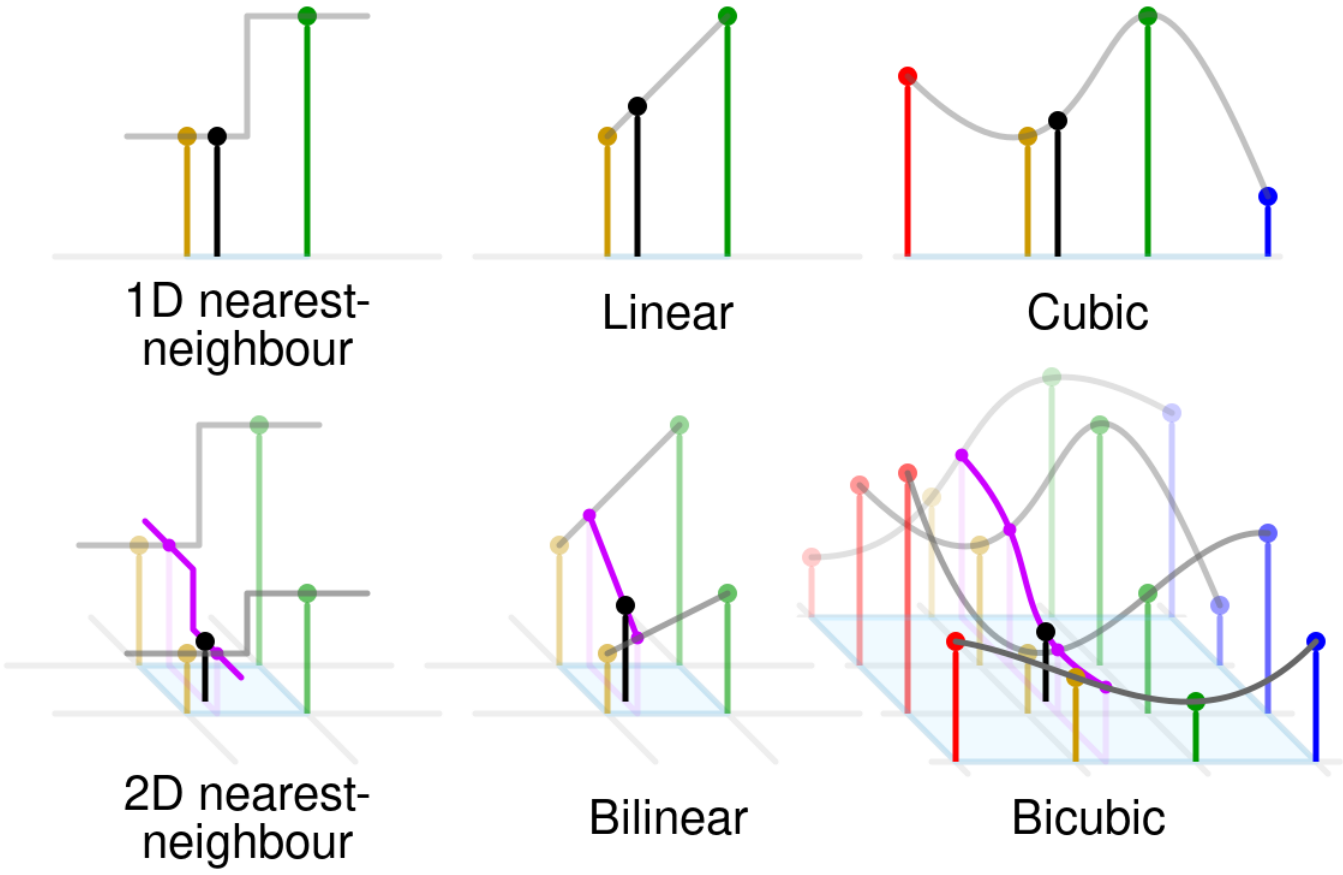


Figure 2: source: wikipedia