SNS COLLEGE OF ENGINEERING

Kurumbapalayam(Po), Coimbatore – 641 107
Accredited by NAAC-UGC with 'A' Grade
Approved by AICTE, Recognized by UGC & Affiliated to Anna University, Chennai

Department of Information Technology

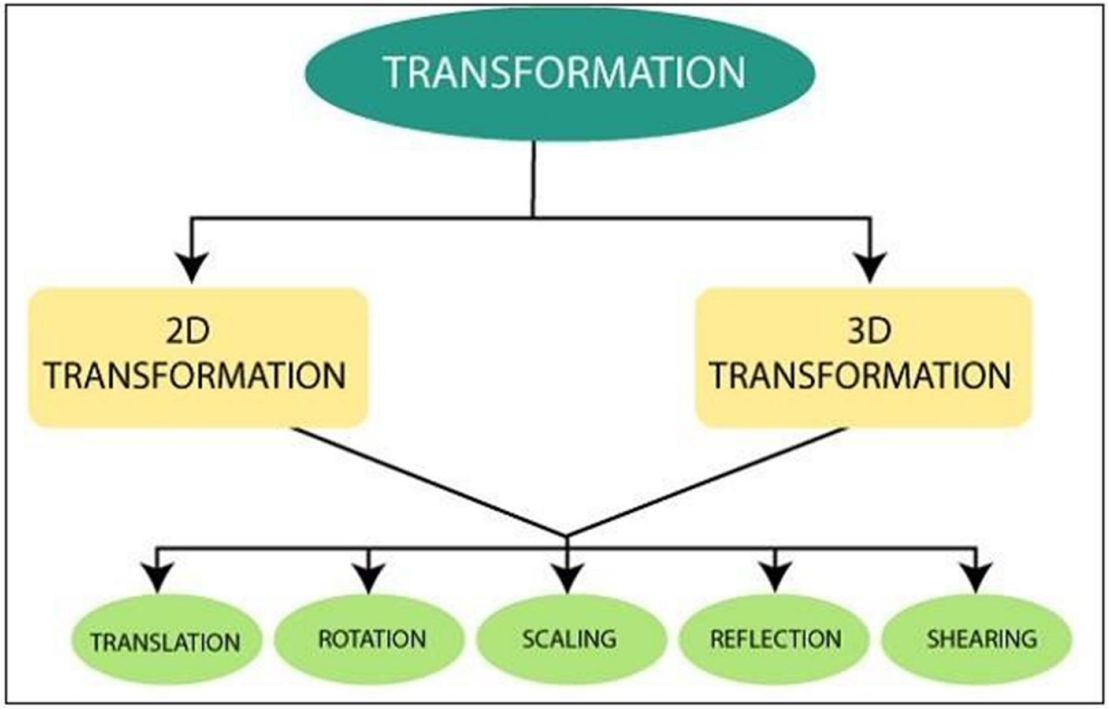
Computer Graphics

Unit 2 : MODELING AND TRANSFORMATIONS OF OBJECTS

Prepared By
R.Vaishnavi.,AP/IT
SNSCE.

Transformation

- In computer graphics, transformation refers to the process of changing the position, size, or orientation of an object.
- It is used to manipulate and animate objects in a virtual environment.



SCALING

Scaling is a process of modifying or altering the size of objects.

Scaling may be used to increase or reduce the size of object.

If scaling factor >1,then the object size is increased.

If scaling factor <1,then the object size is reduced.

This scaling is achieved by using the following scaling equations

Xnew = Xold x Sx

Ynew = Yold x Sy

Initial coordinates of the object O = (Xold,Yold)

Scaling factor for X-axis = Sx

Scaling factor for Y-axis = Sy

New coordinates of the object O after scaling = (Xnew,Ynew)

In Matrix form, the above scaling equations may be represented as-

$$\begin{bmatrix} X_{new} \\ Y_{new} \end{bmatrix} = \begin{bmatrix} S_x & 0 \\ 0 & S_y \end{bmatrix} x \begin{bmatrix} X_{old} \\ Y_{old} \end{bmatrix}$$

Scaling Matrix

Problem:

Given a square object with coordinate points A(0, 3), B(3, 3), C(3, 0), D(0, 0). Apply the scaling parameter 2 towards X axis and 3 towards Y axis and obtain the new coordinates of the object.

Solution

Old corner coordinates of the square = A (0, 3), B(3, 3), C(3, 0), D(0, 0)

Scaling factor along X axis = 2

Scaling factor along Y axis = 3

For Coordinates A(0, 3)

Let the new coordinates of corner A after scaling = (Xnew, Ynew).

Applying the scaling equations, we have,

Xnew = Xold x Sx = 0 x 2 = 0

Ynew = Yold x Sy = 3 x 3 = 9

Thus, New coordinates of corner A after scaling = (0, 9).

For Coordinates B(3, 3)

Let the new coordinates of corner B after scaling = (Xnew, Ynew).

Applying the scaling equations, we have,

Xnew = Xold x Sx = 3 x 2 = 6

Ynew = Yold x Sy = 3 x 3 = 9

Thus, New coordinates of corner B after scaling = (6, 9).

For Coordinates C(3, 0)

Let the new coordinates of corner C after scaling = (Xnew, Ynew).

Applying the scaling equations, we have,

Xnew = Xold x Sx = 3 x 2 = 6

Ynew = Yold x Sy = 0 x 3 = 0

Thus, New coordinates of corner C after scaling = (6, 0).

For Coordinates D(0, 0)

Let the new coordinates of corner D after scaling = (Xnew, Ynew).

Applying the scaling equations, we have,

Xnew = Xold x Sx = 0 x 2 = 0

Ynew = Yold x Sy = 0 x 3 = 0

Thus, New coordinates of corner D after scaling = (0, 0).

Thus, New coordinates of the square after scaling = A (0, 9), B(6, 9), C(6, 0), D(0, 0).