



RAMA UNIVERSITY

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FACULTY OF ENGINEERING & TECHNOLOGY

BCS -504 Computer Graphics & Multimedia

Lecture-09

Mr. Dilip Kumar J Saini

Assistant Professor

Computer Science & Engineering

- **INTRODUCTION OF TRANSFORMATIONS**
- **TYPES OF TRANSFORMATIONS**
- **TRANSLATION**
- **MATRIX FOR TRANSLATION**



Introduction of Transformations

Computer Graphics provide the facility of viewing object from different angles. The architect can study building from different angles i.e.

1. Front Evaluation
2. Side elevation
3. Top plan



A Cartographer can change the size of charts and topographical maps. So if graphics images are coded as numbers, the numbers can be stored in memory. These numbers are modified by mathematical operations called as Transformation.

The purpose of using computers for drawing is to provide facility to user to view the object from different angles, enlarging or reducing the scale or shape of object called as Transformation.

Introduction of Transformations

Two essential aspects of transformation are given below:

1. Each transformation is a single entity. It can be denoted by a unique name or symbol.
2. It is possible to combine two transformations, after connecting a single transformation is obtained, e.g., A is a transformation for translation. The B transformation performs scaling. The combination of two is $C=AB$. So C is obtained by concatenation property.

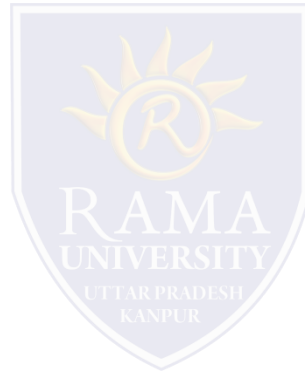


There are two complementary points of view for describing object transformation.

1. Geometric Transformation: The object itself is transformed relative to the coordinate system or background. The mathematical statement of this viewpoint is defined by geometric transformations applied to each point of the object.
2. Coordinate Transformation: The object is held stationary while the coordinate system is transformed relative to the object. This effect is attained through the application of coordinate transformations.

Types of Transformations

1. Translation
2. Scaling
3. Rotating
4. Reflection
5. Shearing



Translation

It is the straight line movement of an object from one position to another is called Translation. Here the object is positioned from one coordinate location to another.

Translation of point:

To translate a point from coordinate position (x, y) to another (x_1, y_1) , we add algebraically the translation distances T_x and T_y to original coordinate.

$$x_1 = x + T_x \quad y_1 = y + T_y$$

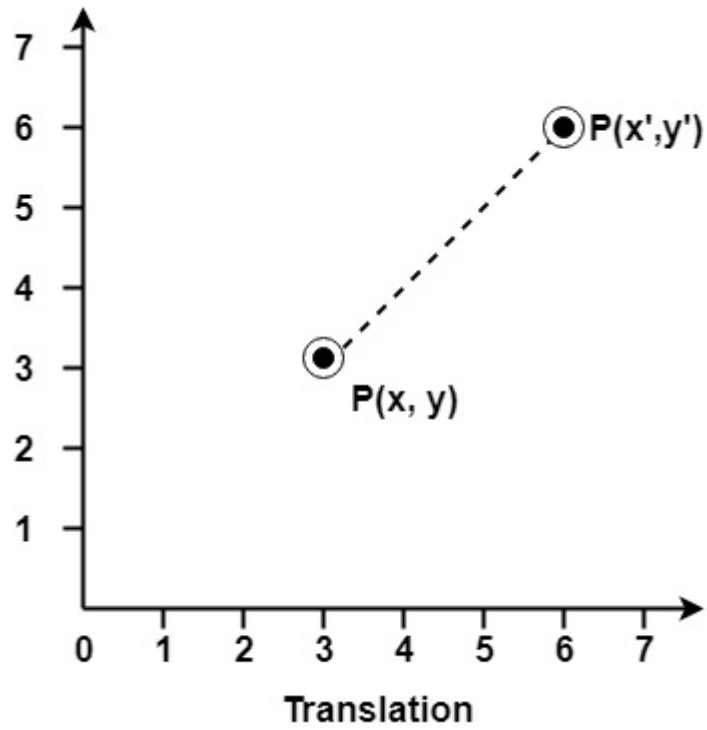
The translation pair (T_x, T_y) is called as shift vector.

Translation is a movement of objects without deformation. Every position or point is translated by the same amount. When the straight line is translated, then it will be drawn using endpoints.

For translating polygon, each vertex of the polygon is converted to a new position. Similarly, curved objects are translated. To change the position of the circle or ellipse its center coordinates are transformed, then the object is drawn using new coordinates.

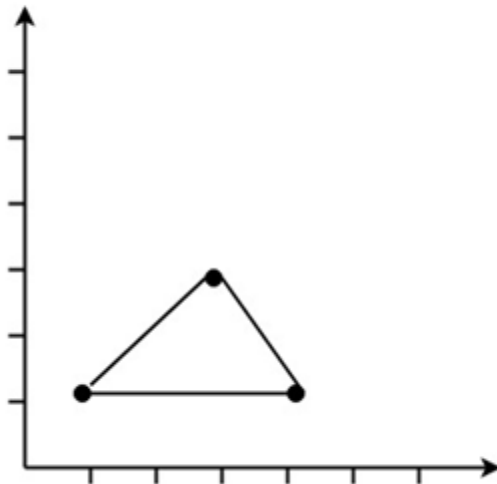
Let P is a point with coordinates (x, y) . It will be translated as (x^1, y^1) .

Translation

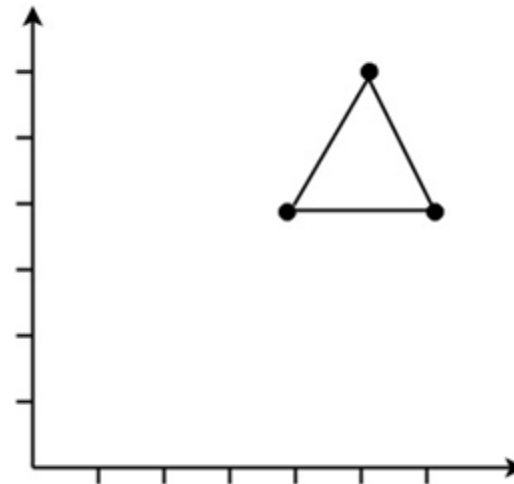


Translation

Translation of Polygon



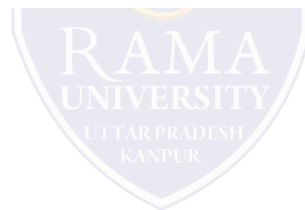
Original Position



Polygon after Translation

Matrix for Translation

$$\begin{vmatrix} 1 & 0 & 1 \\ 0 & 1 & 0 \\ t_x & t_y & 1 \end{vmatrix} \quad \text{Or} \quad \begin{vmatrix} 1 & 0 & t_x \\ 0 & 1 & t_y \\ 0 & 0 & 1 \end{vmatrix}$$



Multiple Choice Question

MUTIPLE CHOICE QUESTIONS:

Sr no	Question	Option A	Option B	OptionC	OptionD
1	CRT technique inside of coated with two phosphor layers that are	red	green	yellow	a & b
2	How CRT produces range of colors by combining the light emitted ?	same phosphors	different phosphors	phosphors tube	diode
3	A CRT monitors displays.....by using a combination of phosphors that emit different colored light.	color pictures	colorless pictures	Image	reflection
4	The capability of this system to store intensity values for pixel makes it well suited for the realistic display of scenes contain shadow and color pattern	no scan system	Random Scan System	Raster Scan System	none
5	Picture definition is stored as a set of line drawing instructions in a display file	Raster Scan System	Random Scan System	both	none

REFERENCES

- <http://www.engppt.com/search/label/Computer%20Graphics>

