

Name : Kavalya Gupta
Division : A
PRN : 1032210925

Experiment ¹ - CV

Q1) What is affine transformation? What is difference between affine and perspective transformation?

Ans1) Affine transformation is a linear mapping method that preserves points straight lines and planes. It includes scaling, rotation, translation and skewing operations.

Affine transformation preserve parallel lines, ratios of distances between points on a straight line and the angle between lines.

	AFFine Transform	Perspective Trans.
Line	Preserves parallelism	Does not necessarily preserve parallelism
Perspective	straight lines and ratios.	straight lines and ratios.

Angle Preservation	Preserves angle between lines	Do not necessarily preserves angle between lines.
Matrix	Uses $2 \times 2 / 3 \times 3$ matrix for line mapping	Uses 3×3 matrix for projection and transformation
Distortion	Introduces steering shearing, scaling, rotation and transformation	Introduces perspective perspective distortion.
Applications	Used in graphics, image processing and vision	Used in 3D rendering augmented reality

(Q2)

Ans2)

(i) Translate eight by 3 units

$$(-3, 2) \Rightarrow (0, 2)$$

(ii) Scale in 'y' direction by 5 units

$$(0, 2) \Rightarrow (0, 10)$$

$$(-3, 2) \Rightarrow (-3, 10)$$

(iii) Rotate image about y axis by 45°

$$\begin{bmatrix} \cos\theta & -\sin\theta \\ -\sin\theta & \cos\theta \end{bmatrix} \Rightarrow \begin{bmatrix} 1/\sqrt{2} & -1/\sqrt{2} \\ -1/\sqrt{2} & 1/\sqrt{2} \end{bmatrix}$$

$$x_2 = \cos\theta (x_i) + \sin\theta (y_i) = \left(\frac{1}{\sqrt{2}}\right)(-3) + \left(\frac{1}{\sqrt{2}}\right)(2)$$

$$y_2 = -\sin\theta (x_i) + \cos\theta (y_i) = \left(-\frac{1}{\sqrt{2}}\right)(-3) + \left(\frac{1}{\sqrt{2}}\right)(2)$$

$$(x_2, y_2) = \left(-\frac{\sqrt{2}}{2}, \frac{5\sqrt{2}}{2}\right)$$

(iv) Shear in x direction by 30 units.

$$(-3 + 30(2), 20) = (57, 20)$$

(Q3) What is the need of geometric transformation?

Ans 3) These are essential in various fields like computer graphics, image processing, computer vision and robotics.

They allow for manipulation and deformation of shapes, images and objects in a controlled predictable means. Geometric transformation enable tasks such as resizing, rotation, translation, skewing and perspective correction in images and graphic.

T.Y. B.Tech. (ECE) Academic Year 2023-24 Semester: VI
Continuous Assessment Rubric

COURSE: Computer Vision (ECE4026B)

EVALUATOR: J. A. Lele

STUDENT:

EXPT NO.: 1

DATE:

DIMENSION	SCALE					SCORE (25)
	1	2	3	4	5	
Regularity and punctuality	Submitted without performance	Performed late and submitted later than scheduled date with permission	Performed on schedule; submitted two weeks late	Performed on schedule; submitted one week late	Performed and submitted as per schedule	3
Overall Understanding of experiment	Neither shows any understanding of the experiment nor can relate it to theory.	Objectives are not clear.	Can only state the objective but shows poor understanding	Understands objective but cannot place it in context of a theory topic	Understands objective and can relate it to an appropriate theory topic	5
Understanding the Procedure	Cannot follow the procedure	Follows the procedure half heartedly	Follows right procedure but cannot analyze data	Follows right procedure but can analyze data and interpret it without justification	Follows right procedure, can analyze data and interpret it with justification	4
Experiment Skills	Does not participate in experiment	Performs the experiment only with the help from supervisor/others and is confused.	Performs the experiment with some supervisory help but not keeping record.	Performs experiment on own without supervisory help, keeping record partially	Performs experiment on his/her own without supervisory help; records all readings properly. Keeps the setup clean.	5
Ethics	Copies the results from others	Completes the result analysis with help from others but forgets to acknowledge the help.	Completes the result analysis with help from others and acknowledges the help.	Produces his own result analysis but tries to manipulate	Produces his own result analysis faithfully and owns up the results without any manipulation	5

Total

Teacher's signature with date:

Student's signature with date:

22

W
1
2
3
4
6