SNS COLLEGE OF ENGINEERING

Kurumbapalayam (Po), Coimbatore – 641 107

An Autonomous Institution

Accredited by NBA – AICTE and Accredited by NAAC – UGC with 'A' Grade
Approved by AICTE, New Delhi & Affiliated to Anna University, Chennai

DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING

COURSE NAME : 19EC513 – IMAGE PROCESSING AND COMPUTER VISION

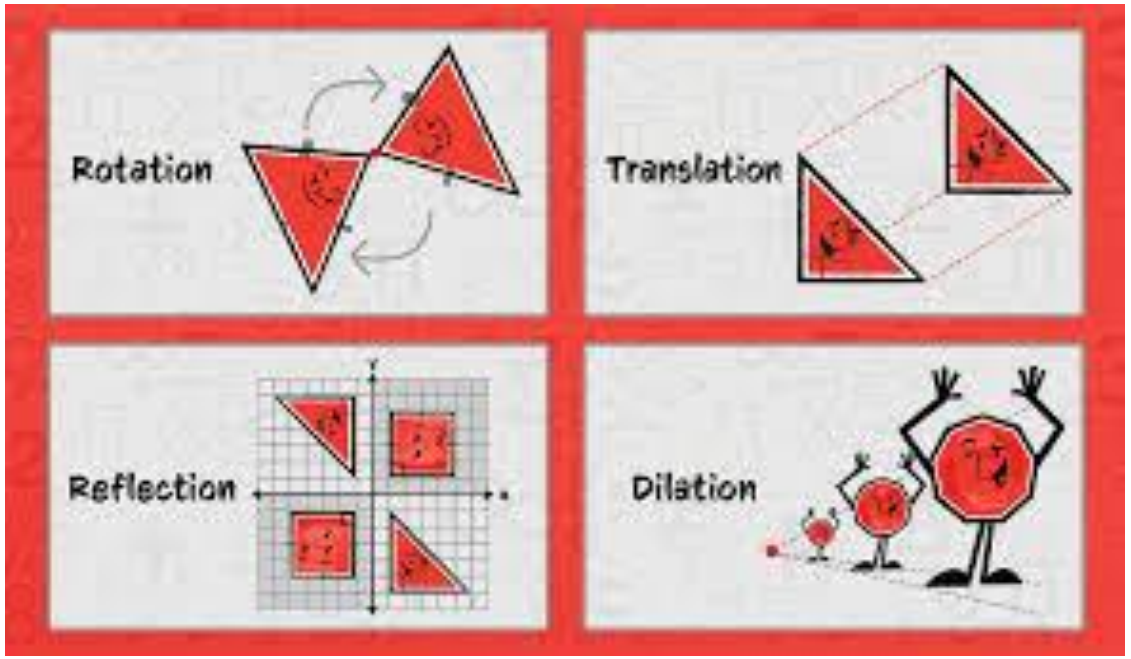
III YEAR / V SEMESTER

Unit V- Computer vision

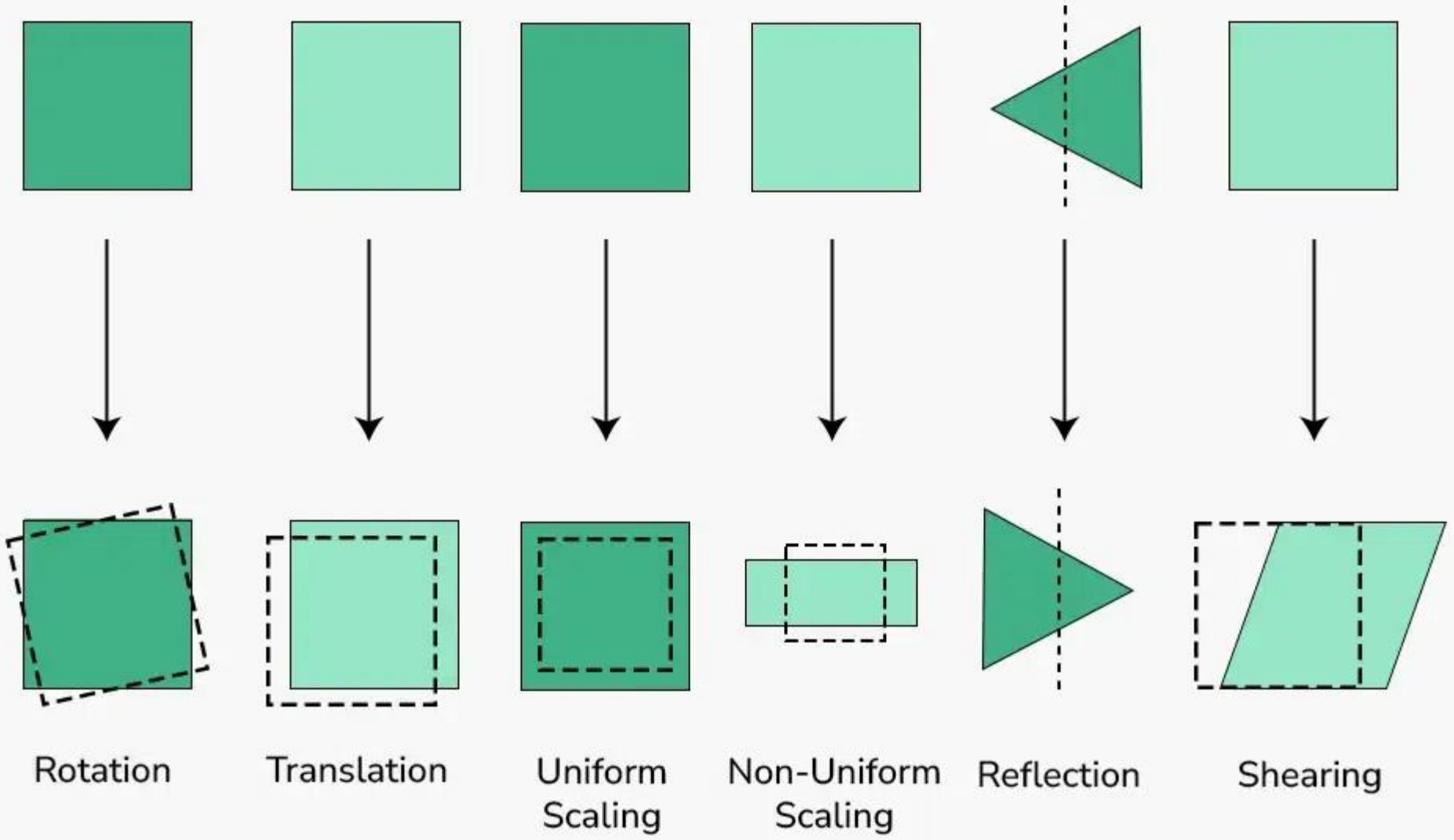
Topic : Geometric Transformation

INTRODUCTION

Geometric transformations are fundamental techniques in computer vision and image processing that alter the spatial arrangement of pixels in an image. These transformations modify the image's geometry—its shape, size, orientation, or position—without changing the color or intensity of the pixels. They're crucial for tasks like image alignment, feature extraction, object recognition, and image stitching



Geometric Transformation in Image Processing



Translation

•Shifts the image in the x or y direction by a specified amount, moving all pixels without altering the image's shape or size.
•Used for panning or aligning images in a scene.

Scaling

Changes the size of the image, either enlarging or shrinking it.
Achieved by multiplying pixel coordinates by scaling factors along the x and y axes.
Often used for resizing images or normalizing object sizes.

Rotation

•Rotates the image around a specified point (often the center).

•Defined by an angle of rotation, positive for counterclockwise and negative for clockwise.

•Commonly used for aligning images that might be captured at different orientations.

4. Shearing

Distorts the image by shifting rows or columns.

Creates a "skewed" appearance, where shapes appear slanted.

Useful in certain augmentations or for creating artistic effects.

Applications in Computer Vision

- **Image Registration**: Aligning images from different sensors or times.
- **Object Detection and Recognition**: Normalizing object orientation and size.
- **Augmentation**: Applying transformations to create new training samples.
- **Scene Reconstruction**: Using perspective changes to interpret 3D structures.

THANK YOU !!!