Assignment Camera Calibration

CV

Topic : Camera Calibration Date of submission 02-04-2021

Ideal Perspective Projection

1. Distortion-free lens
2. All rays are straight lines and pass through the projection center. This point is the origin of the camera coordinate system
3. Focal point and principal point lie on the optical axis
4. The distance from the camera origin to the image plane is the constant

Clockwise rotation means to rotate in the negative direction.

Assume all questions are in **Ideal Perspective Projection.**

Note: ALL the camera constants are negative.

1. Find out camera coordinate and image coordinate of the point object with world coordinate (6,6,-5) . camera constant = -2.
camera coordinate and world coordinate are aligned (origins coincide and x, y, z axis of camera coordinate and world coordinate are parallel).

2. Find the world coordinate of the point which is imaged on point with image coordinate (12,12) .
Given camera constant = -3,
camera coordinate and world coordinate are aligned. (origins coincide and x, y, z axis of camera coordinate and world coordinate are parallel).

3. If point with world coordinate (12,12,-4) imaged at point with image coordinate at (6,6). What will be the image coordinate of the point with world coordinates (6,6,-5).

(camera coordinate and world coordinate are aligned (origins coincide and x, y, z axis of camera coordinate and world coordinate are parallel).

4. Find out camera coordinate and image coordinate of a point with world coordinate (8,8,-8) .

camera constant = -2,
axis of camera coordinate system is parallel to axis of world coordinate system but origin of camera coordinate system shifted to point with world coordinate (5,5,5) .

5. Find out image coordinate of point with world coordinate (8,8,-8) .
camera constant = -2,
origin of camera coordinate system coincide to origin of world coordinate system.
z-axis of camera coordinate system is parallel to z-axis of world coordinate system,
and pan =-45' (camera is rotated clockwise 45' around z-axis) .

6. Find out image coordinate of point with world coordinate (8,8,-8) .
camera constant = -2,
z-axis of camera coordinate system is parallel to z-axis of world coordinate system,
origin of camera coordinate system shifted to point with world coordinate (5,5,5),
and pan =-45' (camera is rotated clockwise 45' around z-axis) .

7. Find out a transform (projection) matrix (approximate) which maps an object point into an image plane.

Object point	maped_point in image plane
(9,9,9)	(4,4)
(9,7,9)	(4,2)
(7,9,9)	(2,4)
(7,7,9)	(2,2)
(9,9,11)	(2,2)
(9,7,11)	(2,1)