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Assignment-01

Camera Calibration: Calculating Intrinsic and Extrinsic Parameters

- Introduction: Calibration refers to ascertaining a camera's internal configurations (intrinsic parameters) and the camera's position and orientation relative to the world (extrinsic parameters). These parameters aid in removing lens distortion and unparalleled projection of 3-dimensional artifacts onto the two-dimensional imagery plane.
- Preparing the Calibration Pattern: The next thing that you will need to do is capture several pictures of the checkerboard pattern from different orientations. The corners of the checkerboard capture known three-dimensional coordinates which forms the basis for calculating the camera parameters. Here I took a reference image from open source available online.
- Detecting the Corners: The corners of the checkerboard are recognized in two-dimensional images using an algorithm. These points are linked to 3D world coordinates, which are positions of the corners of checkerboard in real-world space.
- Intrinsic Parameters: Intrinsic parameters refer to the adjustable features of the camera:

    Focal Length: Value of zoom.

    Optical Center: Geometric center of camera.

    Distortion Coefficients: To eliminate lens distortion.

- All these parameters are retrieved and calculated from the identified corners of the checkerboard.
- Extrinsic Parameters: Extrinsic parameters define the location and angle of the camera in the picture. This is done by projecting the checkerboard 3D coordinates onto the picture plane.
- Estimation Process: Having established the correspondences for two and three-dimensional points, the intrinsic and extrinsic parameters are calculated.

- Conclusion: Camera calibration is essential for tasks like 3D reconstruction and object tracking, as it improves the accuracy of how the camera captures the world.