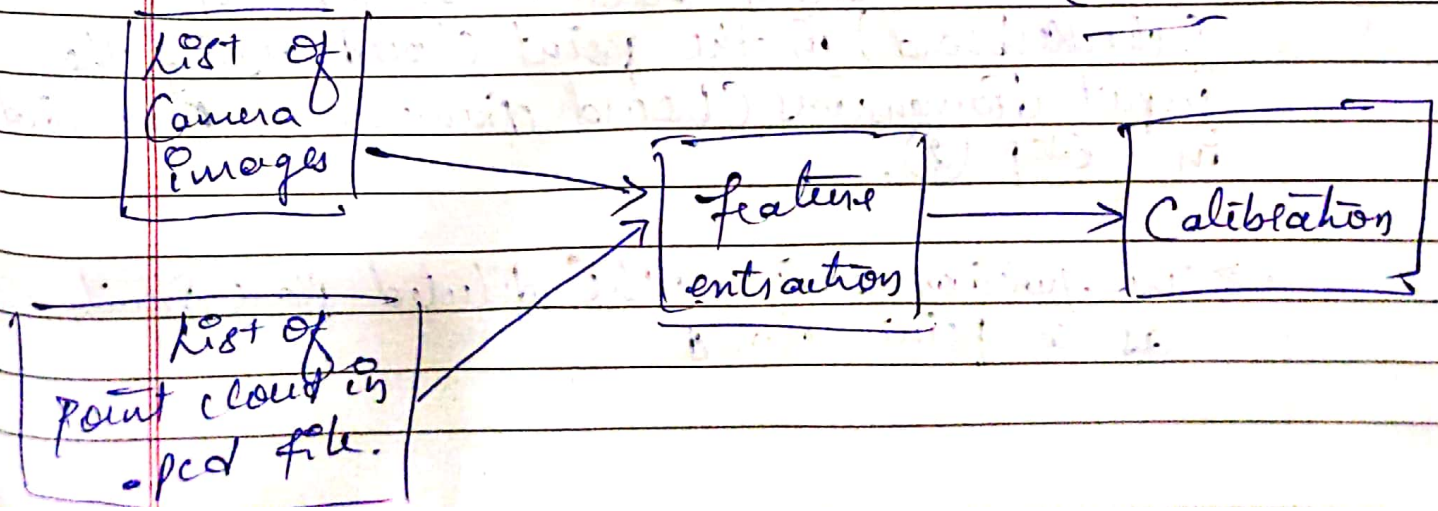
Lidar Camera Calibration

- ✓ Camera provide rich colour information & other features that can be used to extract different characteristics of detected objects.
- ✓ Lidar provides an accurate 3-D location & structure of the object.
- ✓ To enhance the object detection & classification pipeline, data from these 2 sensors can be fused to get more detailed & accurate information on the object.
- ✓ Lidar Camera calibration helps in estimating the transformation matrix between Lidar & Camera
- ✓ use the rigid transformation matrix to fuse Lidar & Camera data

Workflow for Lidar & Camera Calibration (LCC)



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Steps

(1). Load Data.

→ load image (checkerboard) path
Lidar point cloud path and Camera parameter file path.

(2). Checkerboard Corner Detection and Size (in mm)

→ Estimates corner points of checkerboard from an image in 3-D (world frame co-ordinates) with respect the camera's co-ord. system.

→ function used: estimateCheckerboardCorners3d

→ estimates corner points using camera intrinsic parameters & size of the checkerboard

(3). Checkerboard detection in Lidar

→ function used: detectRectangularPlanePoints function

→ Detects the checkerboard in the Lidar data

→ This function detects rectangular objects (checkerboard) in the point cloud using the input dimensions (board dimensions) calculated in step (2).

→ This function returns the detected plane points as a point cloud.

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④ Calibrating Lidar and Camera.

→ function used: estimateLidarCameraTransform.

→ To estimate the rigid transformation matrix between lidar and camera.

→ This function uses detected checkerboard corners from point clouds (step ③) and 3-D corners from checkerboard images (step ②)

→ Returns the transformation matrix as a rigid 3d object.

→ also returns translational, rotational & re-projection errors as a structure.

⑤ Project lidar point cloud on image.

→ function used: projectLidarPointsOnImage

→ Projects lidar point cloud on the an image.

→ Transforms lidar point cloud coord. to the camera coordinate frame.

→ This function uses rigid transformation (step ④) and camera intrinsic matrix to project point cloud on to an image.

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