
COMPUTER VISION – LAB 2

Computer Vision 2019 - P. Zanuttigh, U. Michieli, S. Ghidoni, K. Koide, M. Terreran

Topic: Camera calibration

Goal: Calibrate your own camera

Data acquisition:

1. Get a camera (it could be a smartphone, a digital camera, a webcam etc.)
2. Get the checkerboard from the instructor. It has 12 square intersections for each row and 8 for each column, with a square edge size of 2 cm.
3. Place the checkerboard on the desk and do not move it anymore (it should be as flat as possible).
4. Acquire several images (around 20) of the checkerboard with different camera positions. The checkerboard should appear in as much positions, scales and orientations as possible.
5. Copy the images on your computer using your preferred approach (cloud / email / usb)

If you do not have a camera you can use the images provided by the instructor (on elearning or on [\\nas2\datilab\ENI\lab2](#)). The checkerboards in the “Huawei” and “D3300” folders have 12x8 intersections and 2cm squares, while the “IAS_LAB” one has 6x5 intersections and 10cm squares.

Write a program that:

1. Loads the checkerboard images.
2. Detects the checkerboard intersections in each image. The OpenCV function you need is `cv::findChessboardCorners()` (*optional*: consider to use the `cv::cornerSubPix()` function to refine the corner detections)
3. Calibrates the camera by using the intersections found. The OpenCV function doing this task is `cv::calibrateCamera()`
4. Computes the mean reprojection error.
5. Choosing among the input images, prints the names of the image for which the calibration performs best and the image for which it performs worst according to the reprojection error.
6. (*Optional*) Undistorts and rectifies a new image acquired with the same camera (if you used the provided images try with the IAS_LAB set that has a higher distortion). You should firstly compute the maps to be applied to the image by using `cv::initUndistortRectifyMap()` and then use the `cv::remap()` function. Compare the undistorted image with the original image.