

Computer Vision, fall 2020

Exercise 4, return latest on Sunday 4.10.2020 at 23.59 via Moodle

Ex 4.1 Camera Calibration (3 points)

Calibrate your own camera using an open source calibration toolbox created for Matlab and found here:

http://www.vision.caltech.edu/bouguetj/calib_doc/index.html

1. Print the calibration template found via this link
http://www.vision.caltech.edu/bouguetj/calib_doc/htmls/own_calib.html
2. Take at least 10 images using your own camera, e.g. your smartphone camera
3. Follow the instructions for doing your own calibration
4. What are the calibration parameters for your camera? Define the intrinsic matrix K
5. Image GOPR1515_06102.jpg (found from Moodle) has been taken with a wide-angle lens camera (GoPro 3). File Calib_Results.mat found in Moodle contains its calibration parameters in a form easily read into Matlab and Calib_Results.m the data in text form. Form the matrix K for this camera and compare the parameters with the ones for your own camera. What can you say about the differences between the cameras?

Ex 4.2 Line detection and vanishing point computation. (3 points)

1. Detect edges in the images Corridor1.jpg and Corridor2.jpg using Matlab's Canny edge detector and find as many lines as possible among the edges by using the Hough line detector you developed at the previous exercise or use Matlab's Hough lines detection.
2. Compute vanishing points for lines in approximately vertical direction and direction orthogonal to the image plane (along the corridor). You are free to decide which kind of a computation algorithm to design, but justify your selection. How do you agree with the computed vanishing point locations? If you think they are in a wrong location despite sophisticated computation, what could be a problem?
3. Compute how much the camera has rotated between the two images using the equations provided in the lecture notes in Lecture 2. E.g.
<https://tutcris.tut.fi/portal/files/7748951/ruotsalainen.pdf> Chapter 4, gives you advice on the relationship between vanishing point locations and camera rotation if needed. What is the a priori assumption used in this setup, when you are able to use just one vanishing point? You'll need also the calibration files Calib_Results_GoPro.* for this task.

Ex 4.3. HowUStudy pilot (2 points + 2 extra for joining the discussion on 7.10.)

This course has been selected as a pilot for HowUStudy course feedback survey. Please log in to the system following the link <https://unihow.helsinki.fi/surveys/351> and fill the survey. Your answers

will be anonymous, so please take a screenshot from the login page and return that as a reply to this task.

During exercise class 5 (7.10. at 16.15-18) we'll have discussion based on your replies with pedagogical teachers joining the event. The purpose is to look at the results overall and your participation in the discussion would be very much appreciated, actually needed. The plan is to help me in improving the course and hopefully already being able to get some of the learnings in use for the last lectures and for planning the exam.

It is understandable that not everyone is able to join the event, but everyone joining and taking part in the discussion will get extra 2 points for the exercises.