UVIC - EURECAT
CURS 2019-2020

MASTER'S DEGREE IN ROBOTICS PERCEPTION SYSTEMS

UNIT 2: GEOMETRY IN COMPUTER VISION

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1 Exercise 1

1.1 Intrinsic camera calibration

Calibrate the intrinsics parameters of your webcam.

Start by forking: [usb_cam_calibration]. and then follow the Readme. Deliver a screenshot and the resulting matrix values in a pdf file.

1.2 Result:

Here is the forked and uploaded repository: [usb_cam_calibration_forked].

We are calibrating a [640x480] camera.

$$P = K * T_w^c \tag{1}$$

With class calibration libraries, we obtain the image 1. The resulting matrix values are the following ones:

$$Camera\_matrix[K] = \begin{bmatrix} 583.23 & 0 & 326.80 \\ 0 & 583.19 & 215.86 \\ 0 & 0 & 1 \end{bmatrix}$$

We use the distortion model named plumb_bob. Its coefficients are the following ones[D]: [k1,k2,t1,t2,k3] = [-0.337,0.1023, 0.00385,0.0015,0];

$$Rectification\_matrix[R] = \begin{bmatrix} 1 & 0 & 0 \\ 0 & 1 & 0 \\ 0 & 0 & 1 \end{bmatrix}$$

$$Projection\_matrix[P] = \begin{bmatrix} 516.258 & 0 & 330.075 & 0 \\ 0 & 547.133 & 214.011 & \\ 0 & 0 & 1 & 0 \end{bmatrix}$$

At image 2 we can see that the calibrated one (/usb_cam/image_rect_color) it's straighter than the other one (/usb_cam/image_raw) and it has a better resolution.

2 Exercise 2

2.1 Exercise 2.2.

Write a program that provides the direction vector of a ball seen by the camera (in the camera reference frame).

Start by forking [ros_img_processor]. Deliver it by indicating a github repository link. Do not forget to document at Readme file.

2.2 Result

Here is the forked repository: [ros_img_processor_forked].
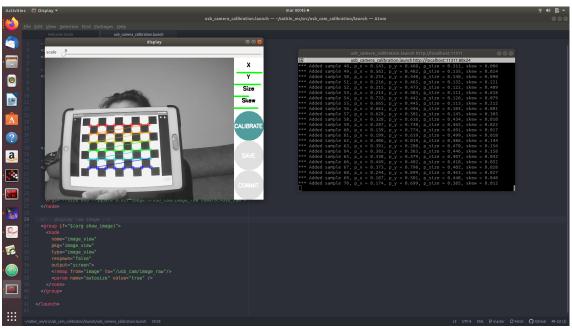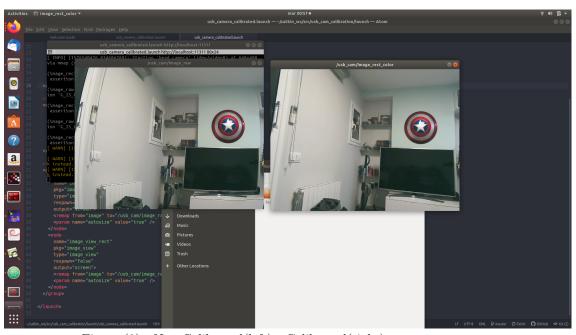
Figure (1)   Obtaining calibration parameters

Figure (2)   Non-Calibrated(left) - Calibrated(right)