NTUST course: Computer Vision and Applications (CI5336701, 2022 Spring)

Homework#4: Determine camera intrinsic parameter from single image

Date Due：2022. May. 23th, PM11:59。

Description：

1. Write a program for determining the camera position from ONE given image and a known structure. You may need to calculate the intrinsic and extrinsic parameters of the camera. No lens distortion on this image. (choose your tools, ex. C++/C, openCV, Matlab).

2. In this image, there is one cube with 50 mm in length, width and height. The world coordinate is on a corner and its *x*, *y* and *z* axes are on the edges as shown in the figure.
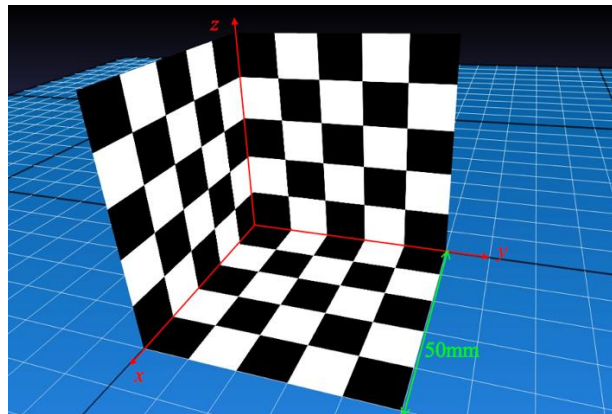
3. Please manually select 3 squares (rectangles, or known but non-degenerated shapes), then determine their homography from them (real-dimension to image domain). Based on Zhang's method (or IAC), please calculate the intrinsic parameter of the camera.

4. In this assignment, there is NO need to read this image or detect features in your program. You can use an image editor tool (ex. photoshop, XnView) for picking out the pixel coordinate then copy text into your program.

5. Deliverable: There are three types of data you should provide:

    1) Source code in C++/C or Matlab (or similar program with simple comment), being able to print out intrinsic parameter.

    2) (Optional) Execution file (.exe), if appliable.

    3) One page note for showing the points you select in this image.

    Please zip all your files, then upload to moodle2 (https://moodle2.ntust.edu.tw/) by due date.

6. Score evaluation:

    1. 100% for determining **K** correctly.

    2. Extra 25% bonus for calculating the camera position (relative to world coordinate).

Hint: Camera Position and Ground Truth (for your reference):

The following data are not used in your homework#4. These are ONLY for verifying your result. Please do NOT use any of these data in your program.

K matrix

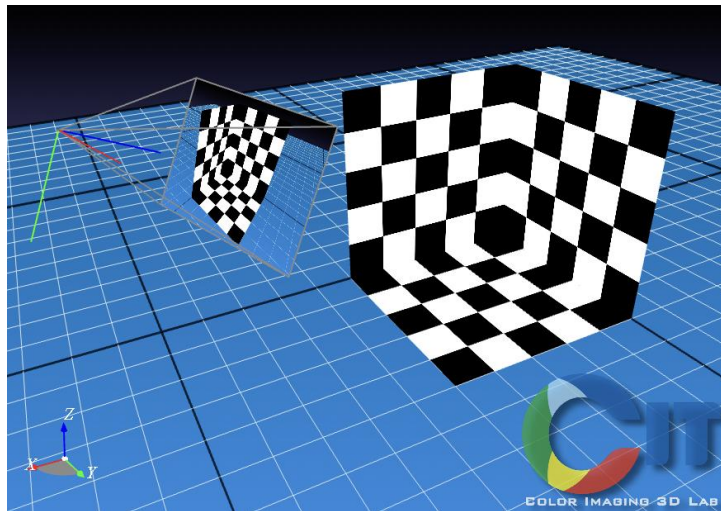892.613403 0.000000 518.500000

0.000000 892.613403 349.000000

0.000000 0.000000 1.000000

RT matrix

-0.346738 0.936377 -0.054507 -15.420745

0.447104 0.113917 -0.887199 4.205203

-0.824543 -0.331996 -0.458157 142.994766

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