NTUST course: Computer Vision and Applications (CI5336701, 2017 Spring)

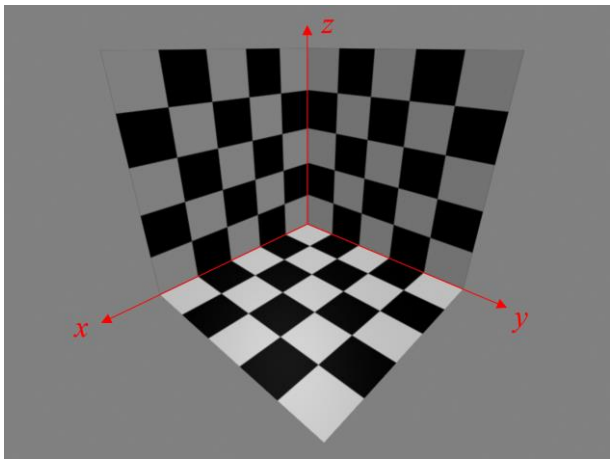
Homework#3：Determine Camera Position Relative to World Coordinate

Date Due：2017. Jun. 3rd, PM11:55。

Description：

1-1. Writing a program for determine 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).
給一張已知結構的照片，請撰寫程式計算相機內部參數與外部參數，不需修正鏡頭變形(使用您擅長的工具,C/C++, OpenCV, Matlab)

1-2. In this image, there is one cube with 50 cm 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.
照片中包含一個方盒(長寬高皆為 50cm)，並假設世界座標原點在其中一角如圖所示。



1-3. Please manually select 3 squares, as well as known shapes, (please show me in another figure), then determine their homography from a unit square. Based on Zhang's method (or IAC), please calculate the intrinsic parameter of the camera.
請手動選擇三個方形(請標示於另一張圖片)，利用 Zhang 的方法計算相機內部參數。

1-4. Finally, try to find out the camera position relative to World coordinate.
最後請相機相對於世界座標的 3D 位置計算出來。

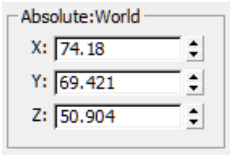
1-5. In this assignment, there is NO need to read this image or detect features in your program. Using an image tool (ex. photoshop) for picking out the pixel coordinate is recommended.
本作業不需透過程式讀取影像或偵測特徵，僅需影像軟體選取你所需的座標值即可。

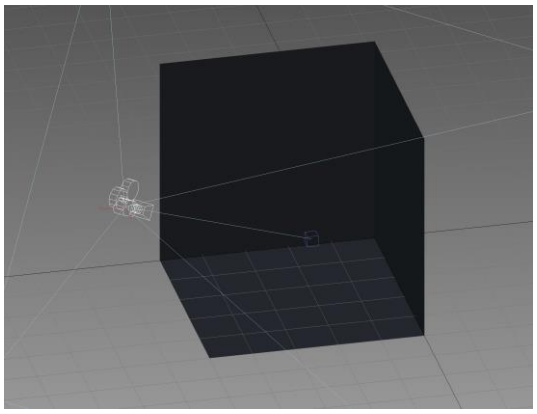
1-6. Deliverable: There are three types of data you should provide: 1) Source code in C++/C or Matlab, with simple comment. 2) Execution file (.exe). 3) One page description (including the figures of selected features, and result) saved in ppt, doc, or pdf file format. You do NOT need to write many sentences in the description file. Please zip all your files, then, upload on moodle

(http://moodle.ntust.edu.tw/) by due 6/03 PM11:55.

請繳交 3 種檔案 1)程式原始檔，並在內文加簡易註解，2)執行檔，該執行檔可執行老師提供的檔案，3)一頁簡易說明，包含圖示標示您選用的點及計算出來結果，不需寫成報告形式(以 ppt, doc 或 pdf 儲存)。請將所檔案壓縮，並在期限內(6/03 PM11:55)上傳到 Moodle。

Camera Position Ground Truth:





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