

NTUST course: Computer Vision and Applications (CI5336701, 2021 Spring)

Final Project : Reconstruct 3D from stereoscopic side-by-side images

Date Due : 2021. Jun. 21<sup>th</sup>, PM11:55 (3 weeks)

Description :

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1. Write a program for reconstructing 3D points from stereoscopic images, then, output a 3D XYZ file. (choose your tools, ex. C++/C, python, openCV, orMatlab).
2. The intrinsic and extrinsic parameters of both images are given in CalibrationData.txt. In this project, you need to write a program for importing side-by-side image sequences, and analyzing images to create a 3D .xyz file. A fundamental matrix is also given for assisting you to find the corresponding features in left and right images. Once corresponding features are determined, please calculate their 3D, then store them as a .xyz. Please reject all outliers by verifying their re-projection error.
3. In each frame, you need to split it into left and right images. Try to pick out the brightest pixel in each row in Left and find out its corresponding point in Right, as well as inverse direction, under epipolar geometry. Finally calculate 3D by “direct triangulation” as mentioned in lecture. X Y Z in each line of a text file with .xyz extension (can be recognized by Meshlab).
4. Please write a short report (upto 3 pages, A4), and use Meshlab software or other 3D viewer to verify your result.
5. Deliverable: There are three types of data you should provide: 1) Source code (and execution file .exe, if any) in C++/C, python, Matlab, with simple comments. 2) Output 3D file in Your\_ID.xyz, 3) report document (3 pages). Please zip all your files, then, upload on Moodle (<http://moodle.ntust.edu.tw/>) by due 6/21 PM11:55.

Hint:

1. Please refer to course slides.
2. One frame side-by-side image (resolution will be 1280x800 for Left and Right views)



3. The 3D model is roughly 140 mm in height, and scanning scenario is also shown in figures.
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