3D Reconstruction

Lab Session 4

Computer Vision Lab Report (2019-2020)

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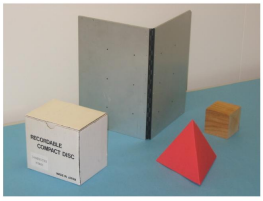
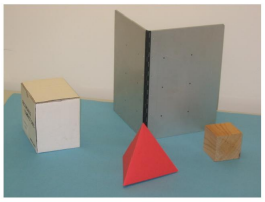
1 Description

The objective is to reconstruct a 3D scene, knowing the intrinsic and extrinsic parameters of each camera that the stereovision system used.

2 Task 1

1. We use the same images from stereo calibration as shown below-

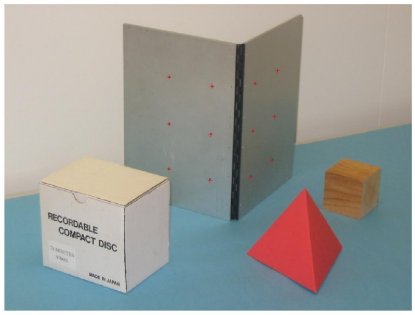




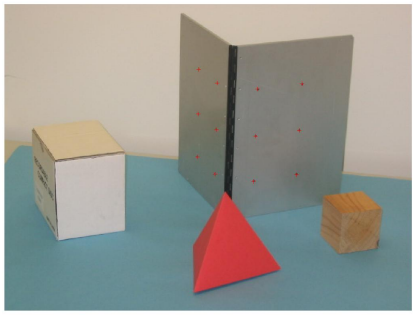
2. Projection matrix is calculated for both images using the calibTSAI() function.

3. These projection matrices are multiplied with given set of 3D points to generate the 2D points.

4. The reprojected points are shown below for left image-

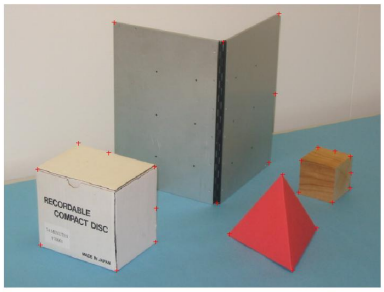


5. For the right image -

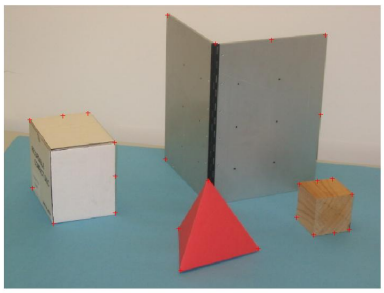


3 Task 2

1. We need to select points from the left and right images for the 3D reconstruction.
2. Select 8 points for both cubes, 6 points for the book and 4 points for the pyramid.
3. When selecting the points - Pyramid, cubes and the book should be selected in order.
4. The points selected for left image are shown as-



5. The points selected for right image are shown as -



6. The selected 2D points are transformed into 3D points using intrinsic camera calibration matrices.
7. Then, global rotation and translation matrix are calculated.
8. Triangulation is applied to all the 3D points before 3D projection.
9. The 3D reconstruction in real world coordinate system is as follows -