# Homework1

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3-D Reconstruction

a) (1pts) Using a digital camera and take a stereo image of a single object. Take two pictures from slightly different camera positions. Ideally, the object takes up a large portion of the frame. Manually identify and label visually 𝑛 (𝑛≫8) corresponding points in both pictures. You will need to identify the image coordinates of these points as well.

b) (3pts) Assume world coordinate system is centered at 1st camera pinhole with Z along viewing direction. Use 8-point algorithm to estimate the essential matrix using some of the above corresponding points. Recover rotation matrix and translation matrix. (Show your calculation step)

c) (2pts) Print a checkerboard image. Take a few images of the checkerboard and then use them to calibrate your camera. Show your camera parameters in the report.

d) (4pts) Reconstruct the 3-D locations of points and display the 3-D point cloud.

Answer:

文本

描述已自动生成图形用户界面, 文本, 应用程序, 电子邮件

描述已自动生成

图片包含 室内, 游戏, 片, 行李箱

描述已自动生成

图片包含 游戏机

描述已自动生成

|  |  |  |
| --- | --- | --- |
|  | X | Y |
| 1 | 1450.50000000000 | 742.500000000000 |
| 2 | 1966.50000000000 | 750.500000000000 |
| 3 | 2438.50000000000 | 770.500000000000 |
| 4 | 2886.50000000000 | 774.500000000000 |
| 5 | 1466.50000000000 | 1270.50000000000 |
| 6 | 1986.50000000000 | 1258.50000000000 |
| 7 | 2458.50000000000 | 1250.50000000000 |
| 8 | 2910.50000000000 | 1238.50000000000 |
| 9 | 1490.50000000000 | 1786.50000000000 |
| 10 | 2018.50000000000 | 1750.50000000000 |
| 11 | 2494.50000000000 | 1738.50000000000 |
| 12 | 2958.50000000000 | 1718.50000000000 |
| 13 | 1502.50000000000 | 2330.50000000000 |
| 14 | 2022.50000000000 | 2282.50000000000 |
| 15 | 2530.50000000000 | 2246.50000000000 |
| 16 | 2982.50000000000 | 2206.50000000000 |

图片包含 室内, 物体, 片, 行李箱

描述已自动生成

图片包含 游戏机

描述已自动生成

|  |  |  |
| --- | --- | --- |
|  | X | Y |
| 1 | 1086.50000000000 | 746.500000000000 |
| 2 | 1534.50000000000 | 758.500000000000 |
| 3 | 2006.50000000000 | 766.500000000000 |
| 4 | 2514.50000000000 | 786.500000000000 |
| 5 | 1062.50000000000 | 1218.50000000000 |
| 6 | 1502.50000000000 | 1250.50000000000 |
| 7 | 1974.50000000000 | 1274.50000000000 |
| 8 | 2474.50000000000 | 1310.50000000000 |
| 9 | 1038.50000000000 | 1694.50000000000 |
| 10 | 1474.50000000000 | 1730.50000000000 |
| 11 | 1946.50000000000 | 1770.50000000000 |
| 12 | 2434.50000000000 | 1814.50000000000 |
| 13 | 1010.50000000000 | 2150.50000000000 |
| 14 | 1442.50000000000 | 2202.50000000000 |
| 15 | 1906.50000000000 | 2254.50000000000 |
| 16 | 2402.50000000000 | 2326.50000000000 |