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EC EN 631

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Task 1

Left Camera

The intrinsic parameters are given by the matrix:

$$\begin{bmatrix} 1{,}687.89 & 0 & 326.07 \\ 0 & 1{,}690.34 & 229.10 \\ 0 & 0 & 1 \end{bmatrix}$$

The distortion parameters are:

$$\begin{bmatrix} -0.48859 \\ -1.24679 \\ 0.003893 \\ 0.000785 \\ 30.5969 \end{bmatrix}$$

Right Camera

The intrinsic parameters are given by the matrix:

$$\begin{bmatrix} 1{,}693.80 & 0 & 322.87 \\ 0 & 1{,}697.08 & 201.99 \\ 0 & 0 & 1 \end{bmatrix}$$

The distortion parameters are:

$$\begin{bmatrix} -0.53356 \\ 5.23310 \\ 0.005254 \\ 0.003133 \\ -115.455 \end{bmatrix}$$

Task 2

Flea Cameras

The rotation matrix and vectors are given by:

$$\begin{bmatrix} 0.99998 & 0.00320 & -0.00453 \\ -0.00313 & 0.99986 & 0.01656 \\ 0.00458 & -0.01654 & 0.99985 \end{bmatrix} \text{ and } \begin{bmatrix} -0.01655 \\ -0.00456 \\ -0.00316 \end{bmatrix}$$

The transition vector is:

$$\begin{bmatrix} -20.38998 \\ -0.029863 \\ 0.614177 \end{bmatrix}$$

The Essential Matrix is:

$$\begin{bmatrix} -0.00178 & -0.61359 & -0.04003 \\ -0.70770 & -0.33542 & 20.3842 \\ 0.09359 & -20.0387 & -0.33782 \end{bmatrix}$$

The Fundamental Matrix is:

$$\begin{bmatrix} -0.000000038 & 0.000013214 & -0.001557598 \\ -0.00001522 & 0.000007205 & -0.73683948 \\ -0.00032931 & 0.73748453 & 1.000000 \end{bmatrix}$$

Practice Data

The rotation matrix and vectors are given by:

$$\begin{bmatrix} 0.99923 & -0.01095 & -0.03780 \\ 0.01158 & 0.99980 & 0.01656 \\ 0.03761 & -0.01698 & 0.99915 \end{bmatrix} \text{ and } \begin{bmatrix} -0.01678 \\ -0.03771 \\ 0.01127 \end{bmatrix}$$

The transition vector is:

$$\begin{bmatrix} -11.5814 \\ -0.37909 \\ -1.71160 \end{bmatrix}$$

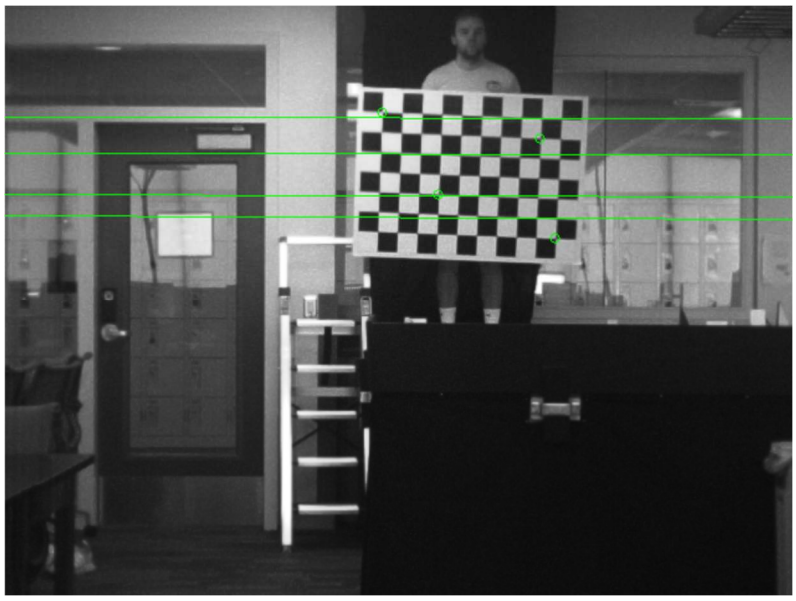
The Essential Matrix is:

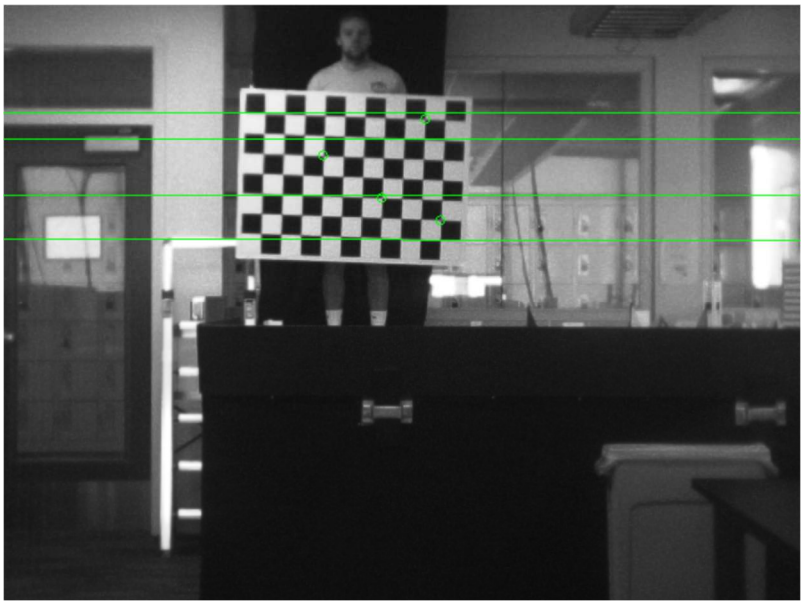
$$\begin{bmatrix} 0.005568 & 1.717691 & -0.35042 \\ -1.27472 & -0.177945 & 11.6362 \\ 0.24465 & -11.5832 & -0.20609 \end{bmatrix}$$

The Fundamental Matrix is:

$$\begin{bmatrix} 0.000000051 & 0.000015762 & -0.0076389 \\ -0.00001170 & -0.00000164 & -0.1272818 \\ -0.00518794 & -0.1269907 & 1.000000 \end{bmatrix}$$

Task 3



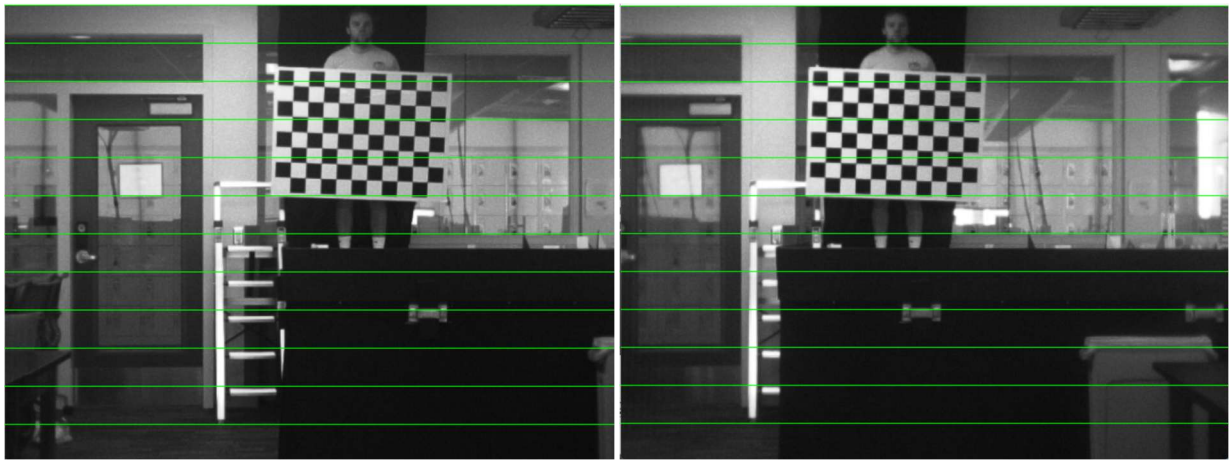


In the first image, the epipolar lines go through the points on the second (and vice versa for the second image)

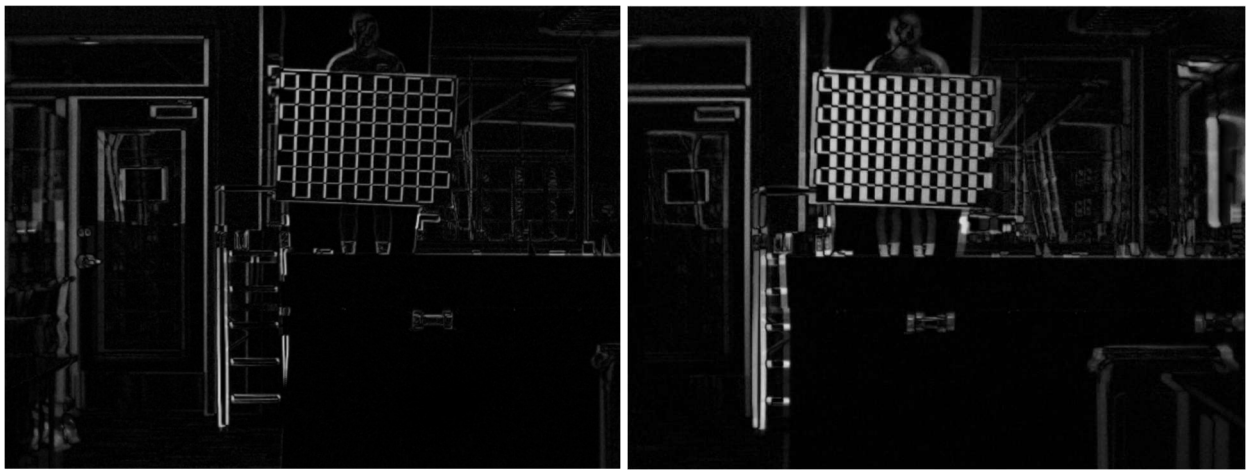
Task 4

Original Images

Rectified Images



Absolute Differences



The rectified rotation matrix and vectors (for left image) are given by:

$$\begin{bmatrix} 0.99939 & 0.00516 & -0.03461 \\ -0.00487 & 0.99995 & 0.00834 \\ 0.03465 & -0.00817 & 0.99937 \end{bmatrix} \text{ and } \begin{bmatrix} -0.00824 \\ -0.03464 \\ -0.00502 \end{bmatrix}$$

The rotation matrix and vectors just for the right image are given by:

$$\begin{bmatrix} 0.99955 & 0.001464 & -0.03011 \\ -0.00171 & 0.99996 & 0.00823 \\ 0.030095 & 0.00828 & 0.99951 \end{bmatrix} \text{ and } \begin{bmatrix} 0.00825 \\ -0.03011 \\ -0.00159 \end{bmatrix}$$