Exercise for Computer Vision WS22/23
19.01.2023
Submission on 26.01.2023

1. **Epipolar Geometry:** Using the image pair apt1.jpg and apt2.jpg and the corresponding points listed in apt corresp.txt, compute and print the Fundamental Matrix using the normalized corresponding points method. *(5 points)*

2. Visualize the corresponding points and the resulting epipolar lines. *(3 points)*

3. **Disparity Map:** Given the image pair aloeX.jpg, implement an efficient custom function to compute and display the disparity map. You may use the matchTemplate() of OpenCV. **Hint**: The given image pair is rectified.*(6 points)*

4. **Image Rectification**: Perform image rectification on the image pair from apt series and show the result. If needed, you may use the fundamental matrix:

$$\mathbf{F} = \begin{bmatrix} -1.78999 \times 10^{-7} & 5.70878 \times 10^{-6} & -0.00260653 \\ -5.71422 \times 10^{-6} & 1.63569 \times 10^{-7} & -0.0068799 \\ 0.00253316 & 0.00674493 & 0.191989 \end{bmatrix} \tag{1}$$

which satisfies

$$x_r F x_l = 0 \tag{2}$$

where x_l and x_r are the corresponding points from left and right images respectively. It is sufficient to compute result using the projective and similarity transforms as described in **C. Loop, Z. Zhang, Computing rectifying homographies for stereo vision**, Technical Report MSR- TR-99-21, MSR Redmond.*(6 points)*