Photogrammetric Computer Vision
Exercise 04

Group 18(G_18):

Name:	Student ID:
Tan Zhen	404576
Hu Weiwen	405422
Palaniappan Mohan	400124
Subhashini Krishnakumar	404563

Part 1: Theory

1. **A human operator marked interesting points within a 3D scene. Two of those points are projected to x1 = (1,0,1)T and x2 = (2,1,1)T within the first view. What can you say about the position of those points within the second view, if the Fundamental matrix F of this system is given by**

$$F = \begin{bmatrix} 1 & -1 & 0 \\ 0 & 1 & 0 \\ 1 & -1 & 0 \end{bmatrix}$$

Answer:

With the given information ,we can calculate the Epipolar lines of the two points in the second view.

$$l1' = F \cdot x1 = \begin{bmatrix} 0 \\ 1 \\ 1 \end{bmatrix}$$

$$l2' = F \cdot x2 = \begin{bmatrix} 1 \\ 1 \\ 1 \end{bmatrix}$$

So points within the second view $x1', x2'$ are on their corresponding epipolar lines $l1', l2'$.

2. **Using this information, derive the exact position of the epipole e2 within the second view.**

Answer:

Since the epipolar lines join in the epipole, so the position of the epipole $\mathbf{e}_2$ within the second view can be calculated:

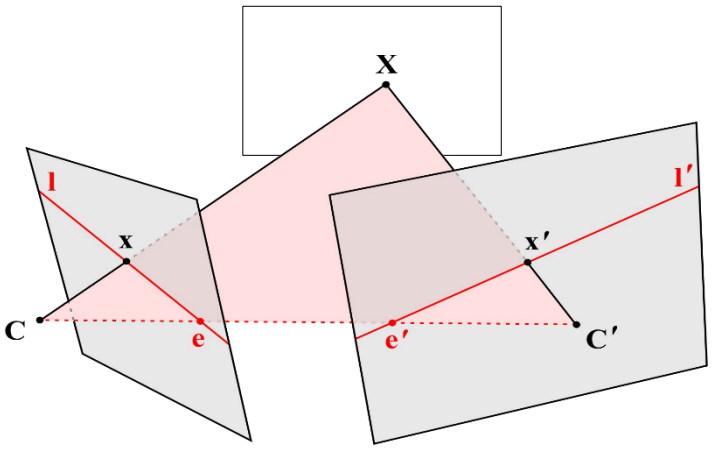
$$\mathrm{e2} = l1' \times l2' = \begin{bmatrix} 0 \\ 1 \\ -1 \end{bmatrix}$$

3. **How does the position of the epipole change, if the stereo-system is changed from a convergent to a stereo-normal view?**

Answer:

The epipoles are the intersections of baseline and image planes.

In the convergent view , the position of the epipoles is like the figure below



When it changes to the stereo normal view like below, the baseline is parallel to the image planes ,so the epipoles are ideal points at infinity.