16-720 Computer Vision: Homework 4

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Q1.1

As learnt in class, one of the property of the Fundemental Matrix is $p^T F = 0$. When subsituting p with the normalized pointsm, we will get.

$$\begin{pmatrix} 0 & 0 & 1 \end{pmatrix} \begin{pmatrix} F_{11} & F_{12} & F_{13} \\ F_{21} & F_{22} & F_{23} \\ F_{31} & F_{32} & F_{33} \end{pmatrix} \begin{pmatrix} 0 \\ 0 \\ 1 \end{pmatrix} = 0$$

If we multiple the first point and the matrix, we will get

$$\begin{pmatrix} F_{31} & F_{32} & F_{33} \end{pmatrix} \begin{pmatrix} 0 \\ 0 \\ 1 \end{pmatrix} = 0$$

If we multiple the two vectors we will get, $F_{33} \times 1 = 0$. That means that F_{33} has to be equal to zero.

2.1

The F matrix is as following

$$\begin{pmatrix} 0.0000 & 0.0000 & -0.0022 \\ 0.0000 & 0.0000 & 0.0000 \\ 0.0021 & 0.0000 & 0.0111 \end{pmatrix}$$

2.2

$$\begin{pmatrix} 0.0000 & -0.0000 & 0.0017 \\ 0.0000 & -0.0000 & -0.0001 \\ -0.0018 & 0.0001 & 0.0091 \end{pmatrix}$$

2.3

$$\begin{pmatrix} 0.0147 & 0.6268 & 3.3536 \\ 0.2482 & -0.0089 & -0.0045 \\ -3.3422 & 0.1085 & 0.0017 \end{pmatrix}$$