Robotic Vision

ASSIGNMENT #3.

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A1. $^{c}_{c'}t = [4, -1, 3]^T$

$^{c}_{c'}R = R_{y, -\pi/2}$

$\therefore\ ^{c'}_{c}t = [-4, 1, 3]^T$

$^{c'}_{c}R = R_{y, \pi/2}$

f_skew( )

$$\begin{bmatrix} t_x \\ t_y \\ t_z \end{bmatrix} \quad \begin{bmatrix} 0 & -t_z & t_y \\ t_z & 0 & t_x \\ -t_y & t_x & 0 \end{bmatrix}$$

$$^{c}_{c'}R = \begin{bmatrix} \cos\beta & 0 & \sin\beta \\ 0 & 1 & 0 \\ -\sin\beta & 0 & \cos\beta \end{bmatrix}$$

$$\therefore\ ^{c'}_{c}R^T = \begin{bmatrix} 0 & 0 & 1 \\ 0 & 1 & 0 \\ -1 & 0 & 0 \end{bmatrix} \quad \& \quad [^{c'}_{c}t]_x = \begin{bmatrix} 0 & 3 & 1 \\ -3 & 0 & 4 \\ -1 & -4 & 0 \end{bmatrix}$$

$$\text{Given } K = \begin{bmatrix} 100 & 0 & 250 \\ 0 & 100 & 250 \\ 0 & 0 & 1 \end{bmatrix}$$

Now we know $E = [^{c'}_{c}t]_x \, ^{c'}_{c}R$

$$\therefore E = \begin{bmatrix} 0 & 3 & 1 \\ -3 & 0 & 4 \\ -1 & 4 & 0 \end{bmatrix} \begin{bmatrix} 0 & 0 & 1 \\ 0 & 1 & 0 \\ -1 & 0 & 0 \end{bmatrix} = \begin{bmatrix} -1 & 3 & 0 \\ 4 & 0 & -3 \\ 0 & 4 & -1 \end{bmatrix}$$

2. To find co-ordinates in pixels for epipoles e & e' corresponding to $\{c\}$ & $\{c'\}$, the condition is

$$E \cdot p_e = 0 \ \& \ E^T \cdot p_e' = 0 \ \& \ e = K \cdot P_e \ \& \ e' = K \cdot P_e'$$

$\therefore$ P_e = null(E),
P_e = P_e / P_e(3);
e = K * P_e;

$\therefore$ using the above lines of code in matlab, we find

$e = [125, 225]^T$

& $e' = [333.33, 216.67]^T$;