A53103338

Hw 1 — Computer Vision

(I)

$$\varphi = [2\ -3\ 0] + t[0\ 2\ 1]$$

$$= [2 \quad -3+2t \quad t]$$

Converting φ to Homogeneous coordinates

$$\varphi^H = [2 \quad -3+2t \quad t \quad 1]$$

Taking Projection of φ^H in image plane

$$\begin{bmatrix} u \\ v \\ w \end{bmatrix} = \begin{pmatrix} 1 & 0 & 0 & 0 \\ 0 & 1 & 0 & 0 \\ 0 & 0 & \frac{1}{f} & 0 \end{pmatrix} \begin{pmatrix} 2 \\ -3+2t \\ t \\ 1 \end{pmatrix}$$

$$\begin{bmatrix} u \\ v \\ w \end{bmatrix} = \begin{pmatrix} 2 \\ -3+2t \\ \frac{t}{f} \end{pmatrix}$$

Converting image Homogeneous Coordinates to Euclidean

$$(u', v') = \left(\frac{2f}{t}, \left(\frac{-3}{t} + 2 \right) f \right)$$

Endpoints

$t = -1$

$$(u_{-1}, v_{-1}) = (-2f, 5f)$$

$\lim t \to -\infty$

$$(u_{-\infty}, v_{-\infty}) = (0, 2f).$$