

2) If we normalize the pixel vector x/w
and y/h $[0, 1]$ range

Then we can map the directly at $z=0$
normalized point

pixel $x \rightarrow x$ in range $[0, 1]$

pixel $y \rightarrow y$ in range $[0, 1]$

$z = 0$

result = $(x/w, y/h, z=0)$