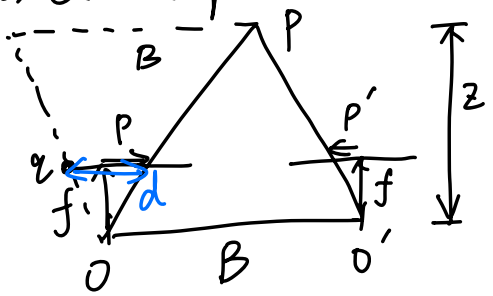
23-S2-Q4

(a) 不考 交比

(b) Q Topic 14-15 → Depth from Stereo



baseline B

focal length f

disparity d 视差

depth Z = ?

$$\frac{f}{d} = \frac{Z}{B}$$

$$\Rightarrow Z = \frac{f \cdot B}{d}$$

(i) δZ?

Solution $Z_{actual} = \frac{f \cdot B}{d+\delta d}$

$$\delta Z = \frac{f \cdot B}{d+\delta d} - \frac{f \cdot B}{d}$$

$$= -\frac{f\ B\ \delta d}{d(d+\delta d)}$$

Since δd is small to d

$$d+\delta d \approx d$$

$$\delta Z = -\frac{f \cdot B\ \delta d}{d^2}$$

$$Z = \frac{f \cdot B}{d} \Rightarrow f \cdot B = Z \cdot d$$

$$\Delta Z = -\frac{Z \cdot d \cdot \Delta d}{d^2}$$

$$= -\frac{Z \cdot \Delta d}{d}$$

Small errors in disparity measurement can lead to significant errors in depth estimation, especially for distant objects

(c) 不考 LLVM