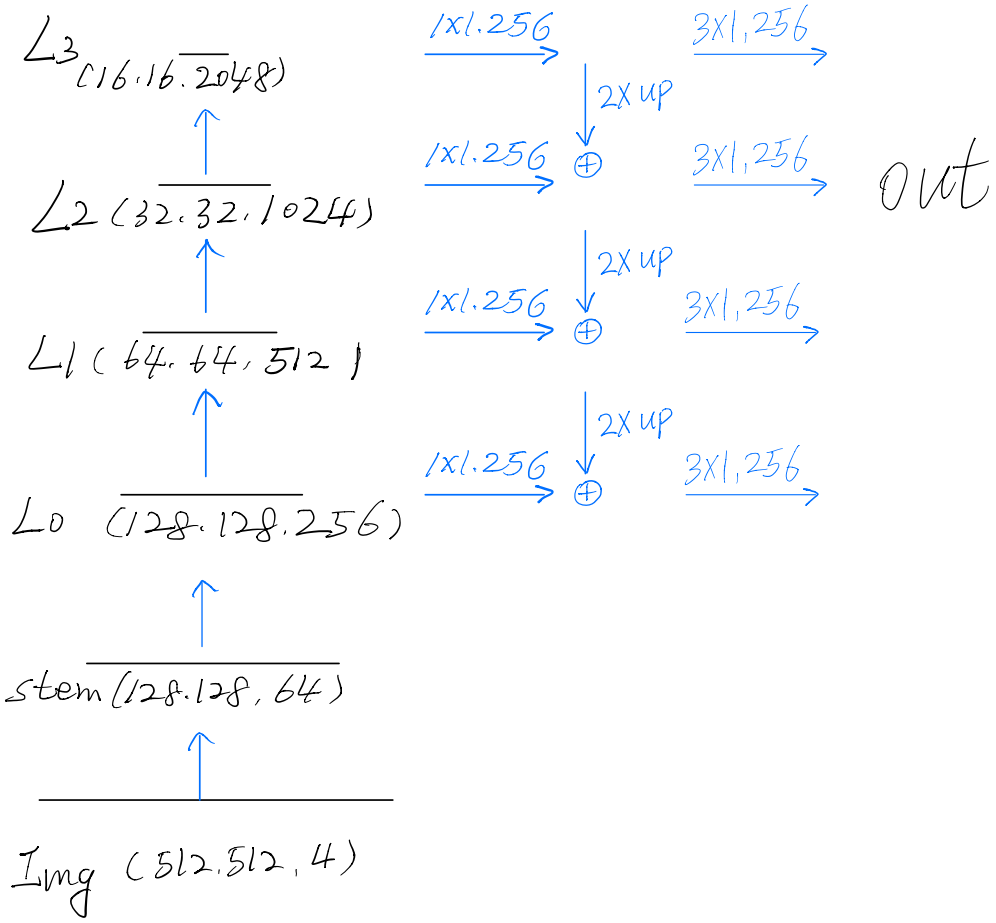
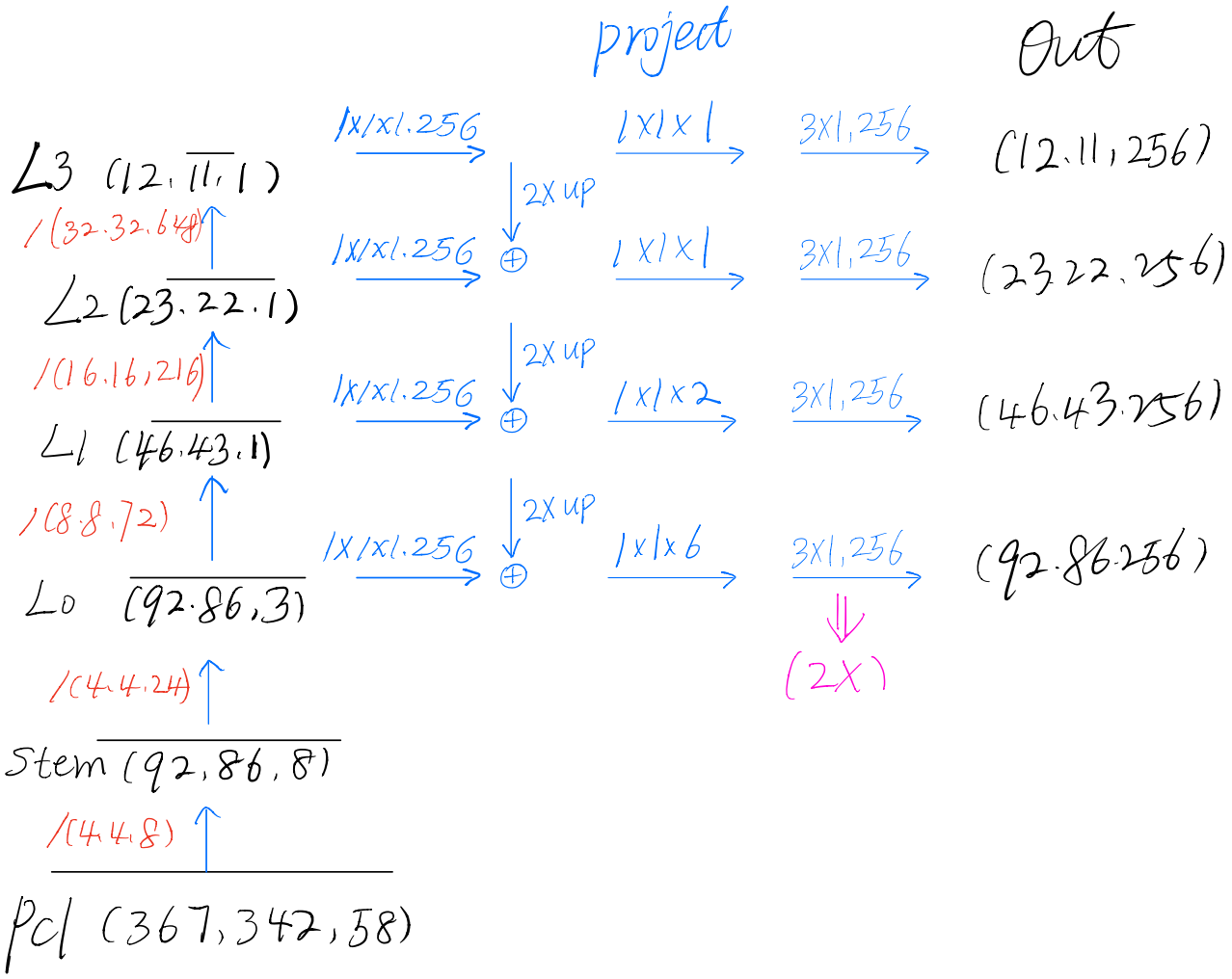
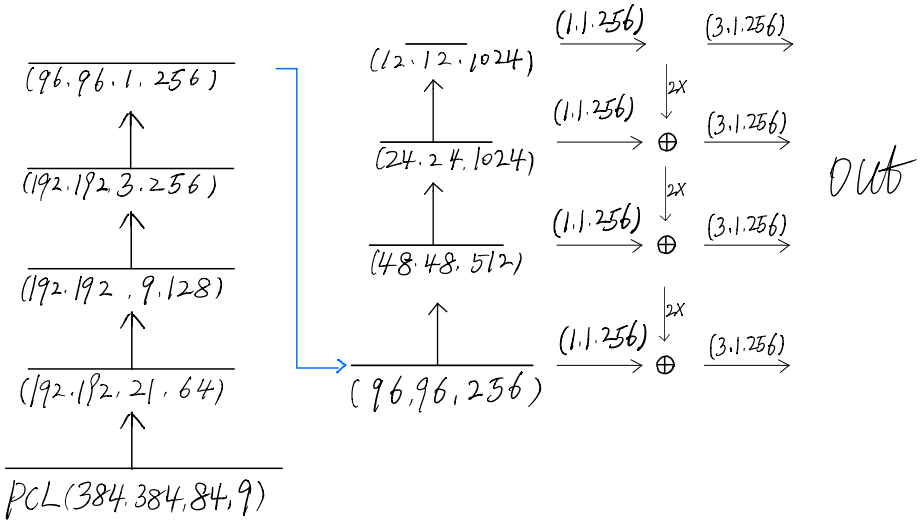
2d FPN


L3 (16, 16, 2048)
L2 (32, 32, 1024)
L1 (64, 64, 512)
L0 (128, 128, 256)
stem (128, 128, 64)
Img (512, 512, 4)
1x1, 256
3x1, 256
2x up
1x1, 256
3x1, 256
2x up
1x1, 256
3x1, 256
2x up
1x1, 256
3x1, 256
out

3D FPN ①: Project following FPN



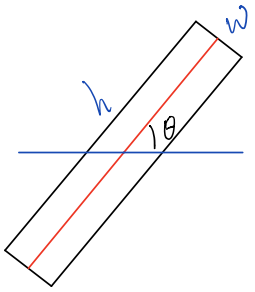
3D FPN ② : Project before FPN



$b = (x_c, y_c, h_{max}, w_{min}, \underbrace{\sin 2\theta}_{st}, \underbrace{\sin 4\theta}_{sf})$

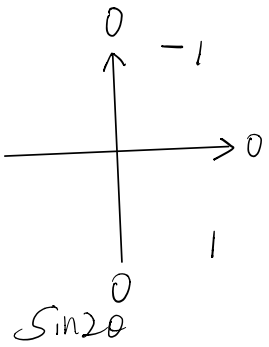
$h_{max} = \max(h, w)$

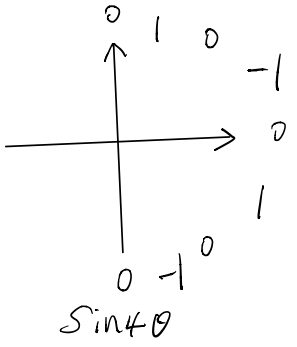
$w_{min} = \min(h, w)$



symmetric $\Rightarrow b(\theta) = b(\theta + \pi)$

$\theta \in [-\frac{\pi}{2}, \frac{\pi}{2})$ clock-wise for positive





$$\theta = \begin{cases} \frac{1}{2}\arcsin(st) & st * sf > 0 \\ \frac{\pi}{2} - \frac{1}{2}\arcsin(st) & st * sf < 0 \end{cases}$$

$\Downarrow$

$b = (x_c, y_c, h_{max}, w_{min}, \theta)$

For line: $w_{in} = 0$. $b = (x_c, y_c, length, \sin 2\theta, \sin 4\theta)$

For 3d box: $b = (x_c, y_c, h_{max}, w_{min}, \sin 2\theta, \sin 4\theta, z_{min}, z_{max})$