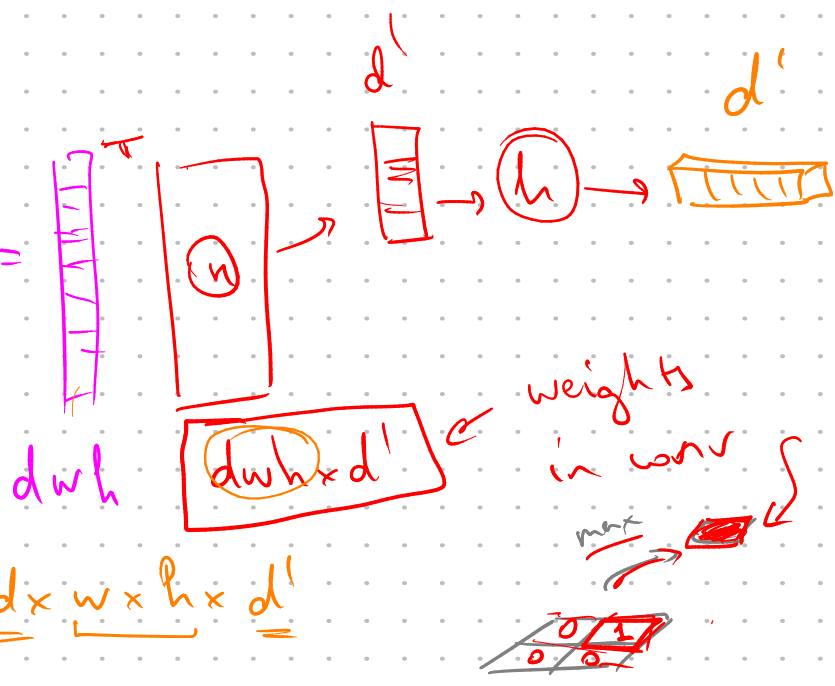
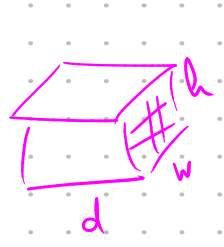
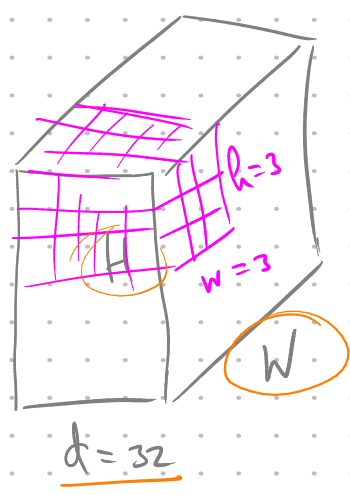


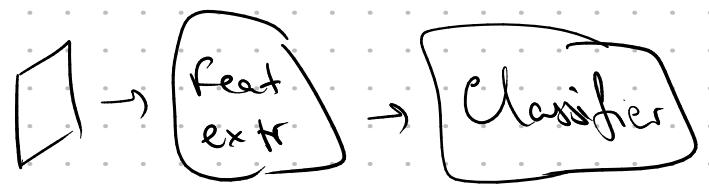
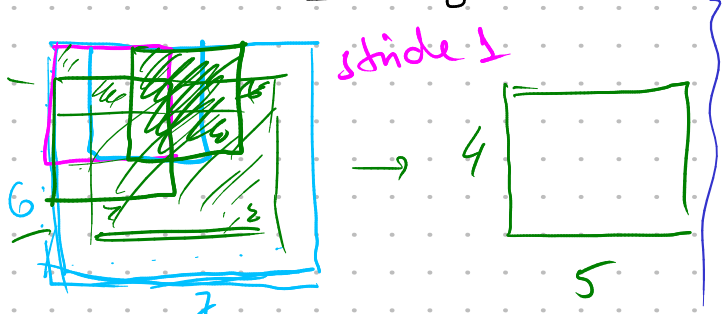
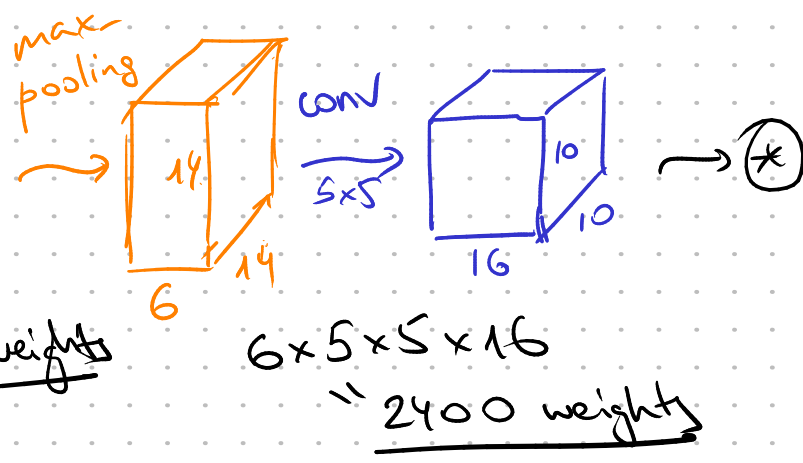
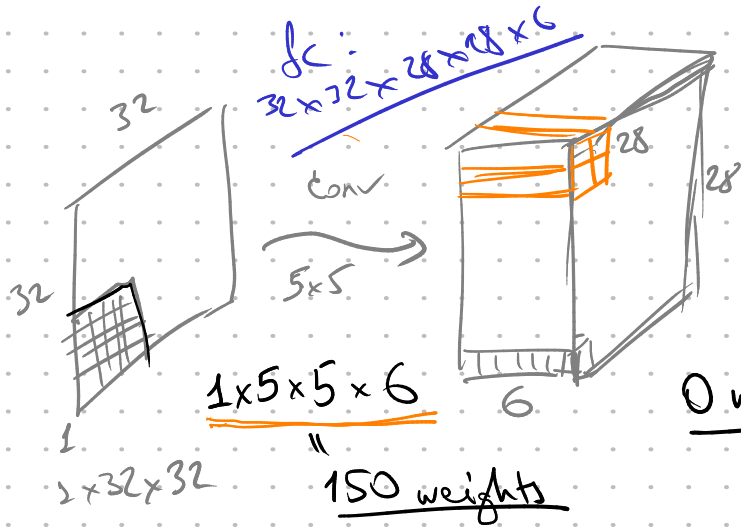
$$3 \cdot 10^6 \times 4 \cdot 10^6 = 12 \cdot 10^{12}$$

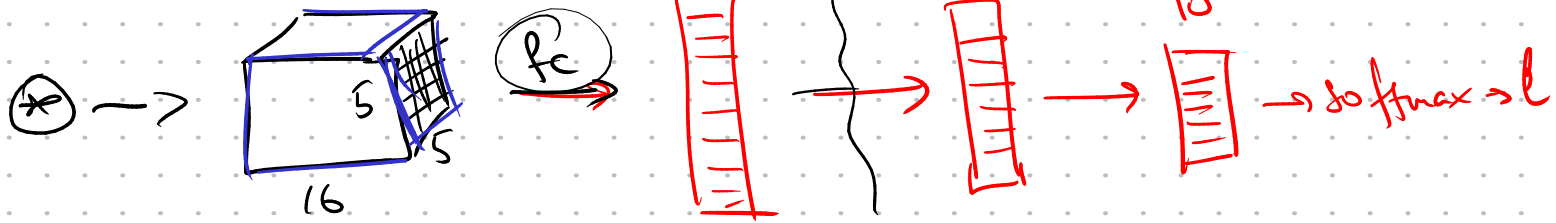
$$4 \times 3 \times 16 \times \frac{1}{4} \cdot 10^6$$

CNN $4 \times 3 \times 16$



2d conv: $d \times w \times h \times d'$

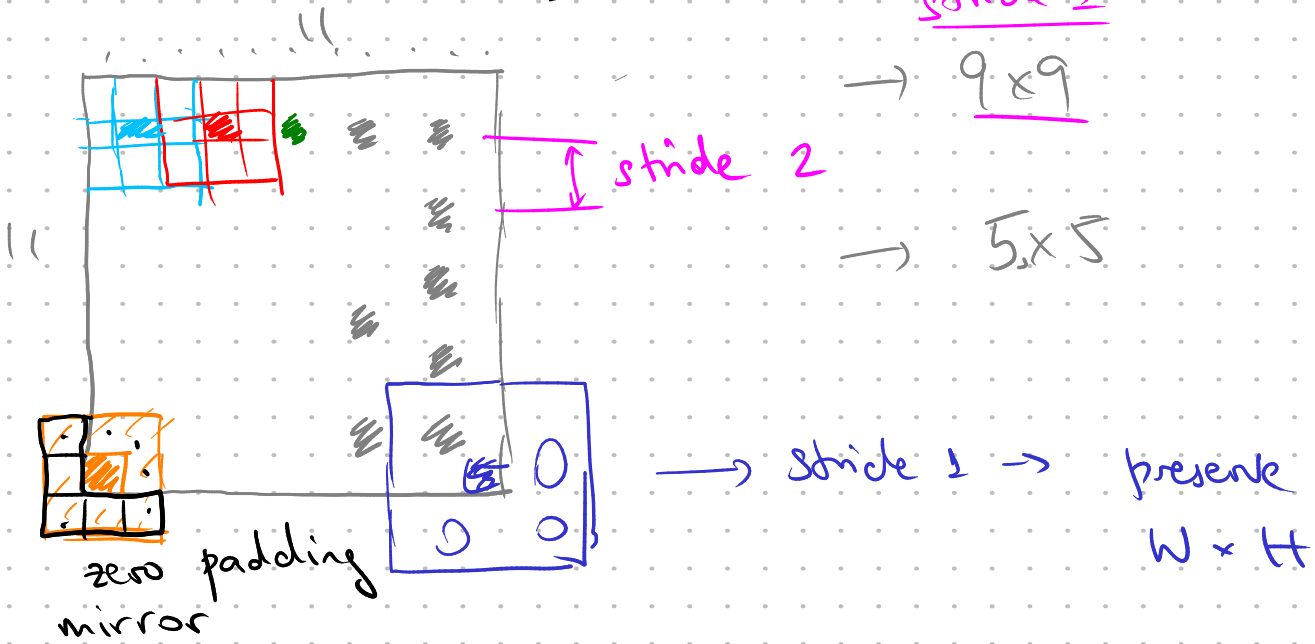




$$16 \times 5 \times 5 \times 120 = 400 \times 120 = 48000 \text{ weights}$$

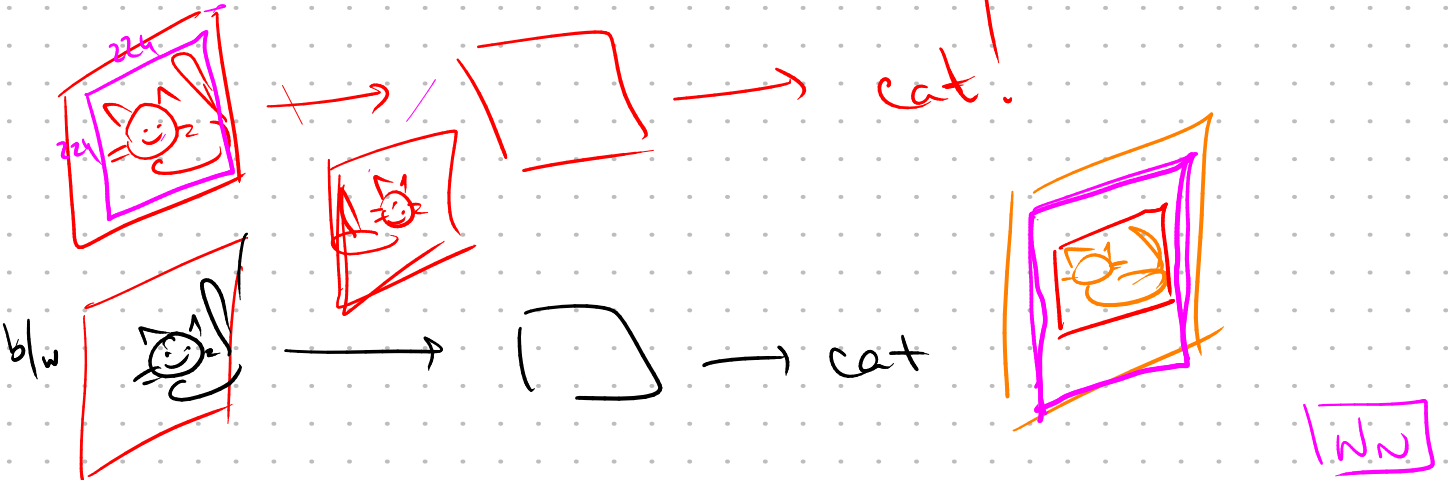
$$120 \times 84 \approx 840 \text{ weights}$$

$$\approx \underline{10k \text{ weights}}$$



Data Augmentation

$$(x, y) \xrightarrow{f} (f(x), y)$$



Adversarial examples

$$x, y \rightarrow [f] \rightarrow (f(x), y) \rightarrow [W, N]$$