

1) $640 \times 480 \times 3 = 921600$

$$\begin{pmatrix} 921600 \\ 512 \end{pmatrix}$$

512.

2). при этом "не зависимо".

3). нет инвариантности
по сдвигу.

$$x \in \mathbb{R}^3$$

$$\Theta_i \in \mathbb{R}^3 \times \mathbb{R}^3$$



$$h_i = \underbrace{\Theta}_S x \quad \text{,, } S_L$$

$$\begin{pmatrix} 0 & 1 & 0 \\ 0 & 0 & 1 \\ 1 & 0 & 0 \end{pmatrix} \begin{pmatrix} x_0 \\ x_1 \\ x_2 \end{pmatrix} = (x_1, x_2, x_0)^T$$

$$S_L; S_R$$

$$\Theta(Sx) = S(\Theta x)$$

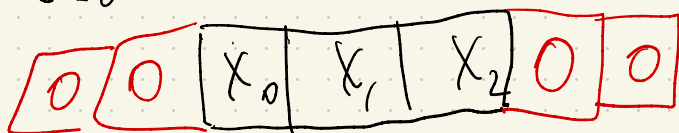
$$\Theta S = S \Theta$$

угаруулар.

$$\Theta = \begin{pmatrix} \kappa_0 & \kappa_1 & \kappa_2 \\ \kappa_2 & \kappa_0 & \kappa_1 \\ \kappa_1 & \kappa_2 & \kappa_0 \end{pmatrix}$$

$$(\Theta X)_i = \sum_{j=0}^2 K_{(j-i) \bmod 3} \cdot X_j = \Theta * X$$

$$h_0^2 (\Theta X)_0 = \sum_{j=0}^2 K_j X_j$$



$$0: K_0 K_1 K_2$$

$$1: K_2 K_0 K_1$$

$$\Theta = \begin{pmatrix} K_0 & K_1 & K_2 \\ K_2 & K_0 & K_1 \\ K_1 & K_2 & K_0 \end{pmatrix}$$

$$\frac{\Theta^T * X}{\sqrt{\sigma(\Theta) \sigma(X)}}$$

$$X = \begin{bmatrix} 1 & 0 & 1 \end{bmatrix}$$

$$\Theta_0 = \begin{bmatrix} 0.9 & 0 & 0.8 \end{bmatrix}$$

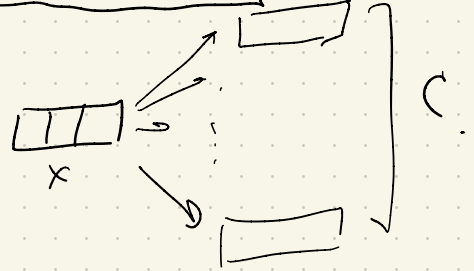
$$\Theta_1 = \begin{bmatrix} 1 & 0 & 0 \end{bmatrix}$$

$$\Theta_2 = \begin{bmatrix} 1 & 0 & 0 & 0 \end{bmatrix}$$

$$x \in \mathbb{R}^n$$

$$\Theta = \kappa \begin{bmatrix} \phantom{\rule{1cm}{1cm}} \end{bmatrix}$$

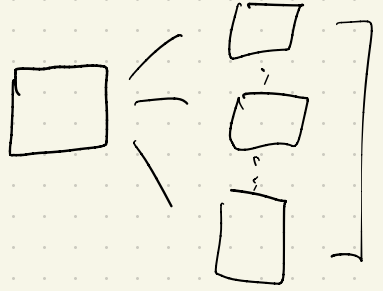
C



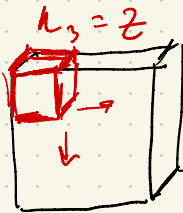
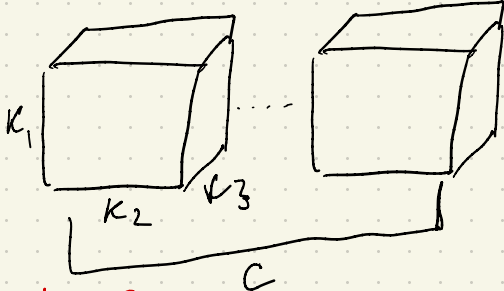
$$x \in \mathbb{R}^n \times \mathbb{R}^m$$

$$\Theta = \kappa \begin{bmatrix} \phantom{\rule{1cm}{1cm}} \end{bmatrix}$$

κ_2

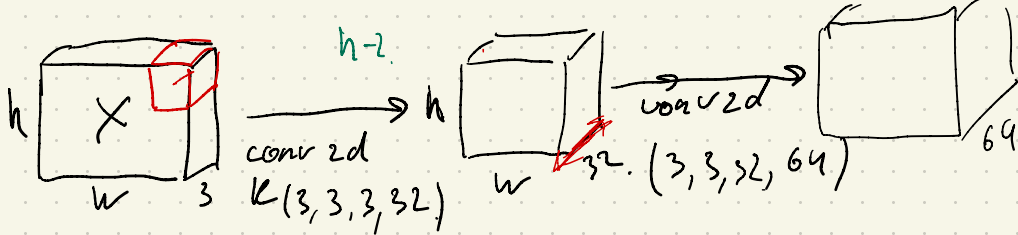


$$x \in \mathbb{R}^n \times \mathbb{R}^m \times \mathbb{R}^z$$



conv 2D

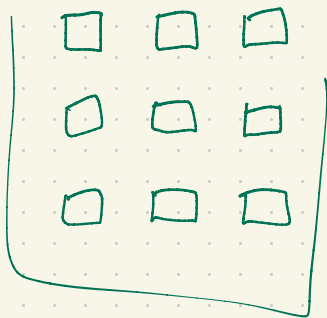
Depth wise - conv.



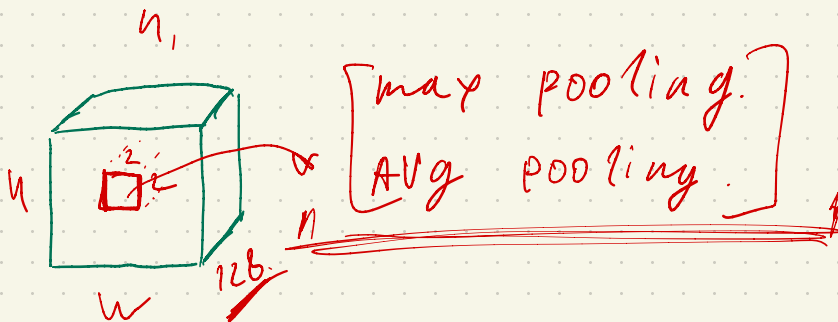
$w-2$

$K(5, 5, 3, 32)$ $w-4$

$$w_1 = w - K_w + 1$$



$$K = \begin{pmatrix} k_{11} & k_{12} & \dots & k_{1n} \\ \vdots & \vdots & \ddots & \vdots \\ k_{n1} & \dots & \dots & k_{nn} \end{pmatrix}$$



- 1) Padding
- 2) Stride

$$w, h = x$$

$$K_w, K_h, K$$

$$w', h'$$

$$w' = \lfloor (w - k_w + 2p + 1) / s \rfloor \text{ ecm pad.}$$

$$w' = \lfloor (w - k_w + 1) / s \rfloor \text{ ecm hem. pad.}$$

$$w = 8. \quad k_w = 3 \quad p = 0. \quad s = 1$$

$$\lfloor w - k_3 + 1 \rfloor = 6. \quad p = 1$$

$$\lfloor 8 - 3 + 2 + 1 \rfloor = 8. \quad p = \lfloor k_w / 2 \rfloor$$

$$s = 2.$$

$$(8 - 3 + 2 + 1) / 2 = 4.$$

$$\begin{array}{l} \boxed{n} \\ m \left(\begin{array}{c} \\ z \end{array} \right) = \oplus \\ \boxed{m \cdot z = n.} \end{array} \quad \left. \begin{array}{l} k = \underline{m} \end{array} \right\}$$