lect 40]

11/MR

Convolutional Neural Network

1. convolution
2. pooling
3. fully connected (ANN) layer.

Horiz filter edge detection

$$\begin{bmatrix} -1 & -1 & -1 \\ 0 & 0 & 0 \\ 1 & 1 & 1 \end{bmatrix} * \begin{bmatrix} 0 & 0 & 0 & 0 & \cdots & 0 \\ 0 & 0 & 0 & 0 & \cdots & 0 \\ 0 & 0 & \cdots & & & \\ 255 & 255 & 255 & 255 & \cdots & \\ 255 & 255 & \cdots & & & \\ 255 & 255 & \cdots & & & \end{bmatrix} = \begin{bmatrix} 0 & 0 & 0 & 0 \\ 255 & 255 & 255 & 255 \\ 255 & 255 & 255 & 255 \\ 0 & 0 & 0 & 0 \end{bmatrix}$$

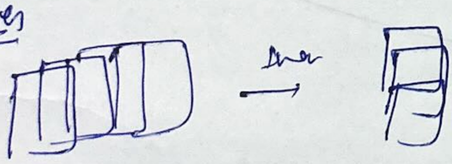
6×6

$$\begin{bmatrix} -1 & 0 & 1 \\ -1 & 0 & 1 \\ -1 & 0 & 1 \end{bmatrix}$$

vertical edge detector

lect 43] # padding

strides



strides = (1,1) → one bottom, one right

Image (n×n)
feature (f×f)
padding (p×p)
stride (s,s)

→ new image

$$\left[\frac{n+2p-f}{s}+1\right] \times \text{same}$$

rows ke liye itne rows ke values dalna

col ke liye itne col ke values dalna.

Back prop for sigmoid

x

$\sigma(x) = \frac{1}{1+e^{-x}}$

$\sigma'(x) = \frac{e^{x}}{(1+e^{x})^2} = \sigma(x)(1-\sigma(x))$

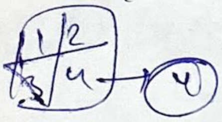
$loss = -(y\log\hat{y} + (1-y)\log(1-\hat{y}))$

lect 44] # pooling layer

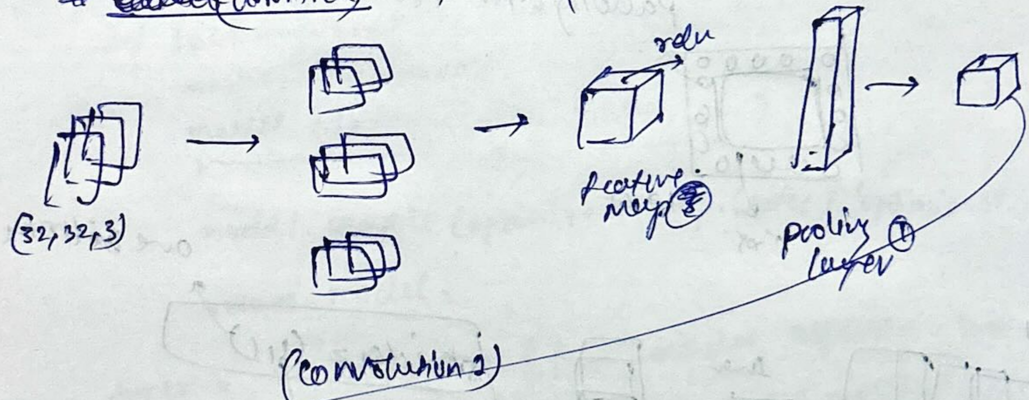
→ like drop out layer
→ keeps dominant feature

→ max/min/Avg/global (types of pooling)

- global max
- global avg



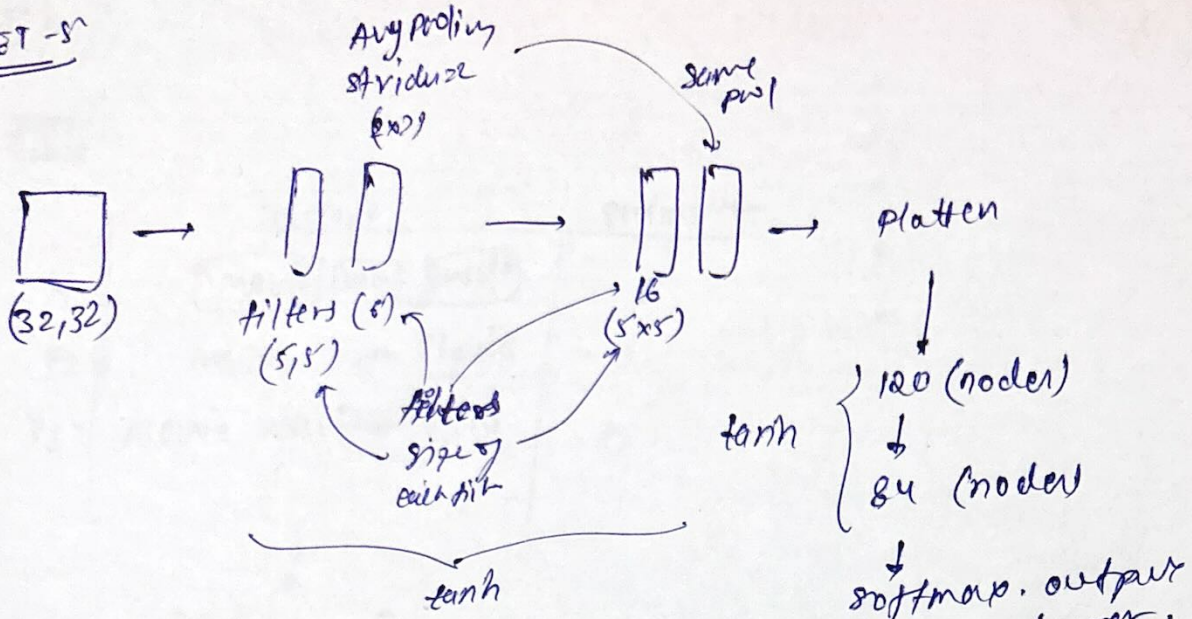
lect 45] # (CNN Arch) — general



(conv2) → pool ②

→ flatten (1D) → ANN → output layer.

LENET-5



lect 47] # Back propagation in CNN