神经网络第十章

2022年7月22日 星期五 15:00

Computer Vision

apply:
图片检测 / 分类

neural style transfer ...

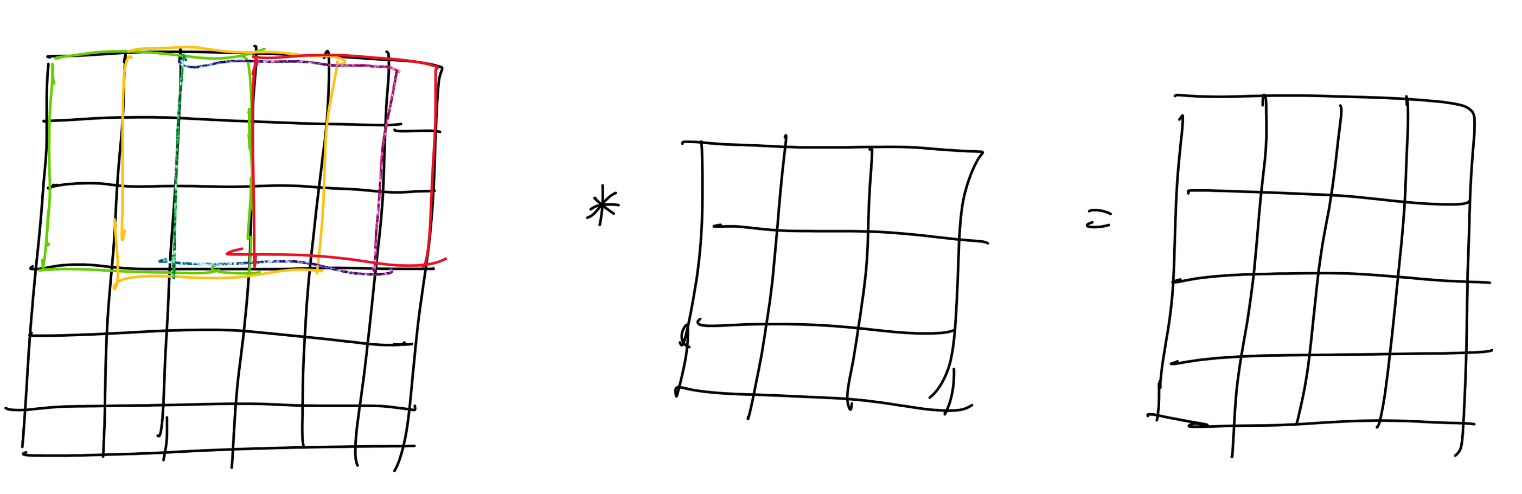
64 × 64 × 3

Edge Detection Example

卷积神经网络的应用、

"∗" : 卷积符号 (和乘一样)

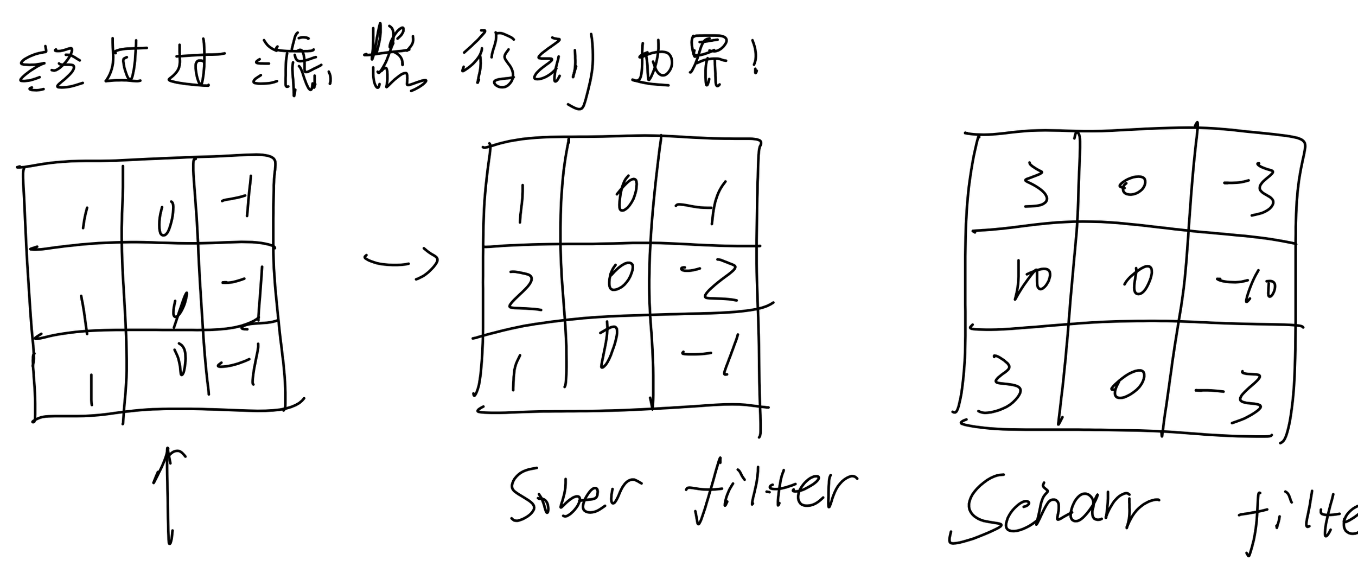
6 × 6 ∗ 3 × 3 = 4 × 4



More Edge detection

正负，亮暗分界线

经过过滤器得到边界!



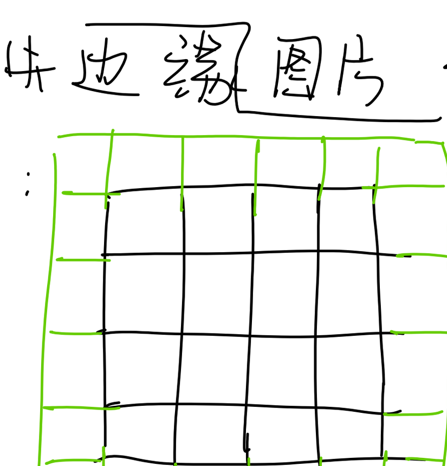
Sober filter Scharr filter

Padding (填充)

n×n (图) f×f (filter) ⟶ $(n-f+1)\times(n-f+1)$

会丢失边缘图片的信息

填充:



p=1

也可 p=2

Valid and Same convolutions

↓ no padding ↳ $p=\frac{f-1}{2}$

$n+2p-f+1=n$ ↗

Strided Convolutions

带步长的卷积

stride=2，将方框移动2个

(7×7) ∗ (3×3) $\xrightarrow{stride=2}$ 3×3

filter

当不为整数时，采用向下取整的方式

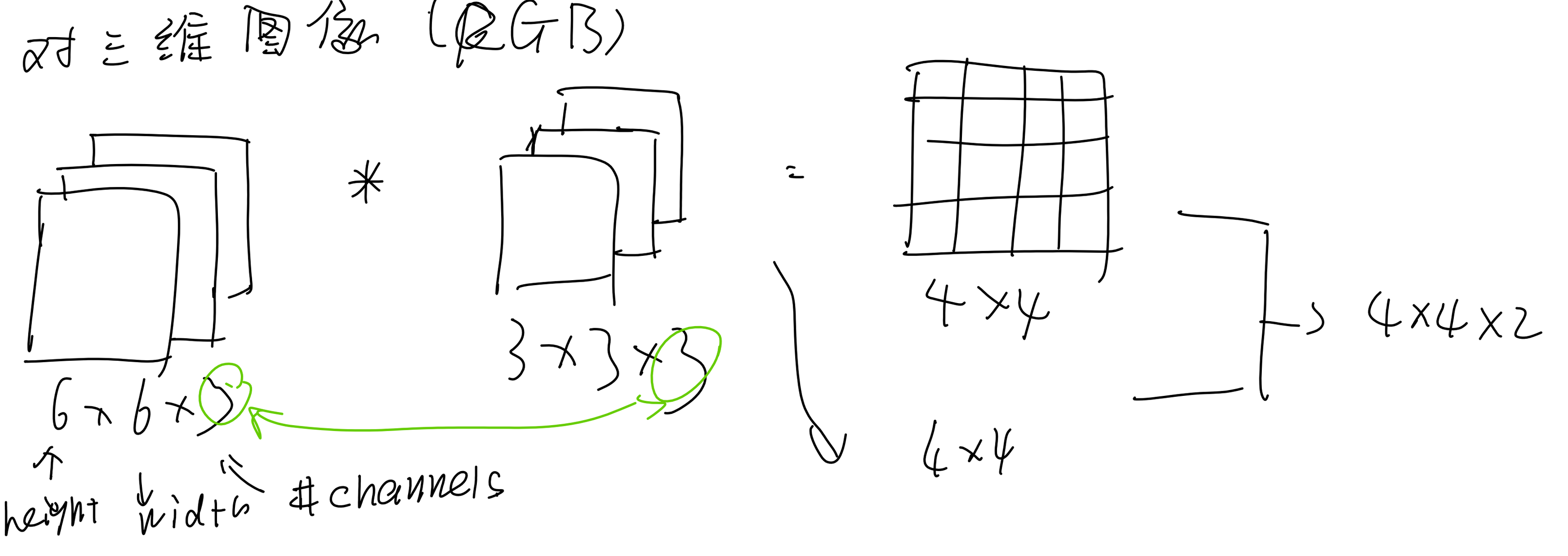
$$\left[\frac{n+2p-f}{s}+1\right]\times\left[\frac{n+2p-f}{s}+1\right]$$

以上被称为交叉相关，文献被称为卷积

有 $(A*B)*C=A*(B*C)$

Convolutions Over Volume

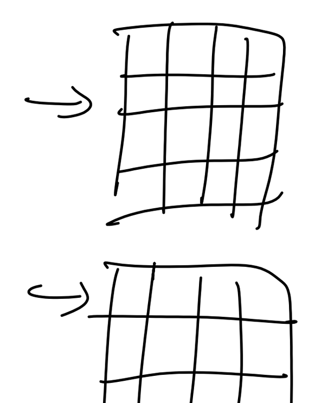
对三维图像 (RGB)



One layer of Convolutional Network

(6×6) ∗ (3×3) = Relu[(4×4)+b1] →

(6×6) ∗ (3×3) = Relu[(4×4)+b2] →



$f^{[l]}$: filter size

$p^{[l]}$: padding

$s^{[l]}$ = stride

$$\Rightarrow n^{[l]}=\left[\frac{n^{[l-1]}+2p^{[l]}-f^{[l]}}{s^{[l]}}+1\right]$$

$n_c^{[l]}$: number of filters

Each filter is: $f^{[l]}\times f^{[l]}\times n_c^{[l-1]}$

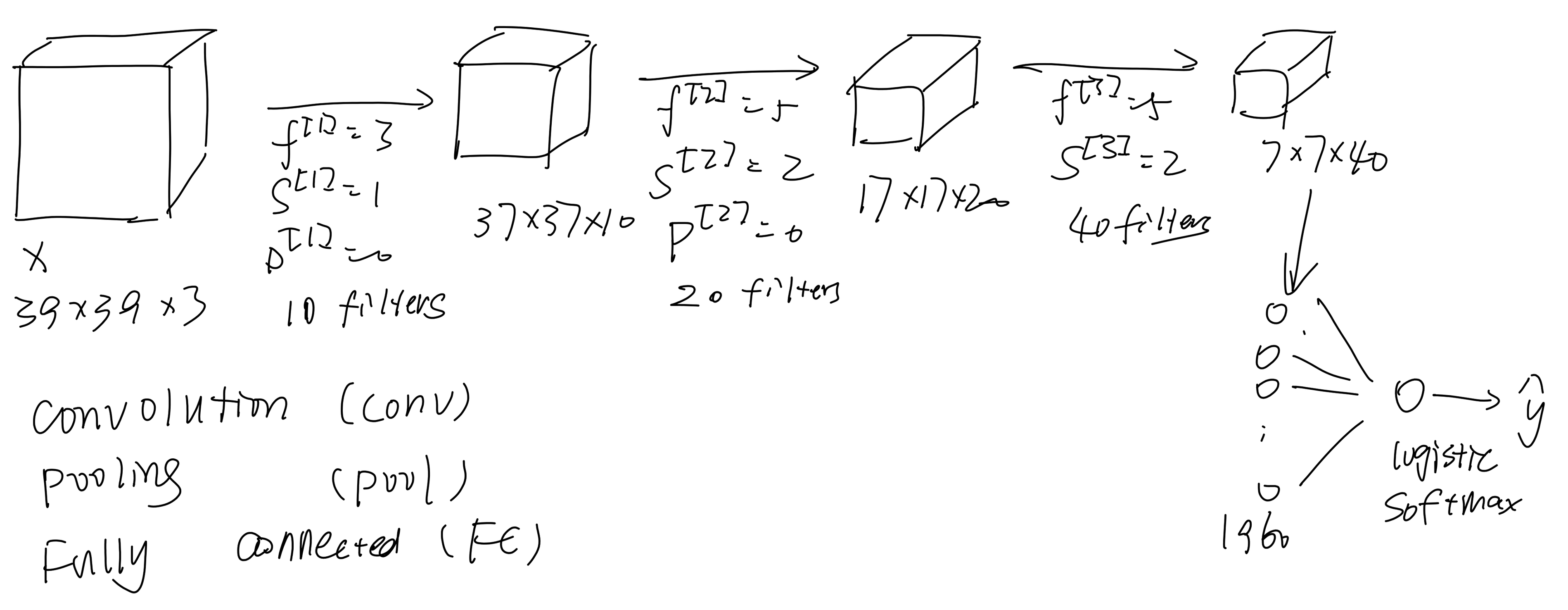
Activations: $a^{[l]}\to n_H^{[l]}\times n_W^{[l]}\times n_c^{[l]}$

Weights: $f^{[l]}\times f^{[l]}\times n_c^{[l-1]}\times n_c^{[l]}$

bias: $n_c^{[l]}$ – $(1,1,1,n_c^{[l]})$

$A^{[l]}\to m\times n_H^{[l]}\times n_W^{[l]}\times n_c^{[l]}$

Simple Convolutional Network Example

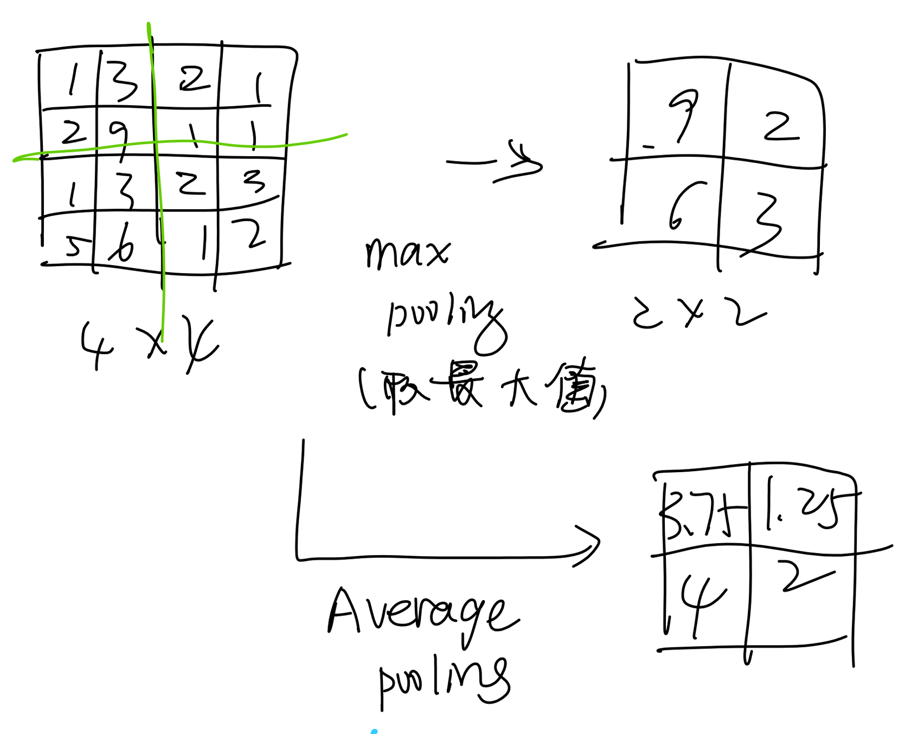


convolution (conv)

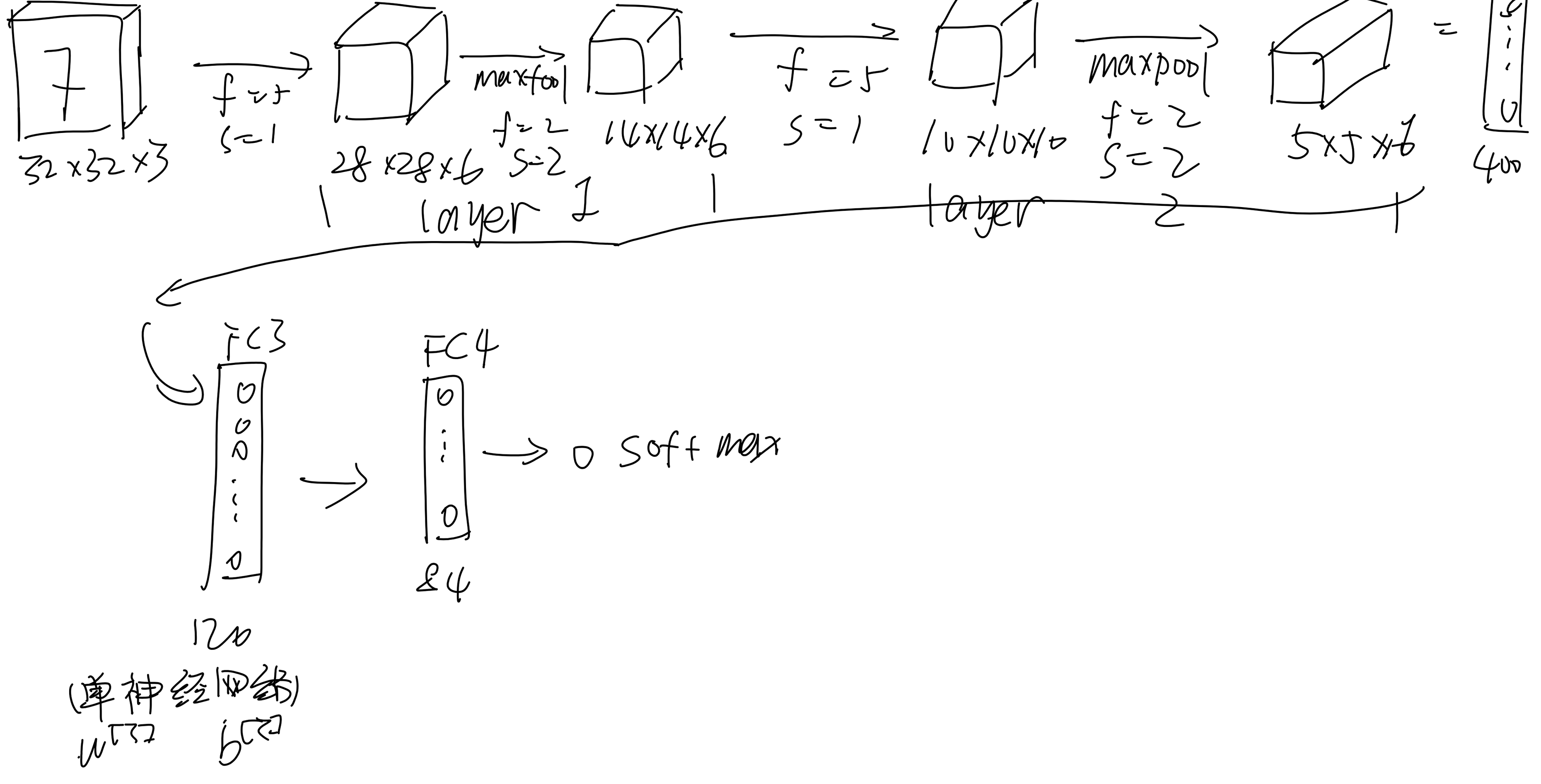
pooling (pool)

Fully connected (FC)

Pooling layers



CNN Example



120 (单神经网络) $w^{[3]}$ $b^{[3]}$

Why convolutions?

1. 参数少 (filter 3×3, 5×5, 7×7) ...)
2. 参数共享
3. 连接稀疏