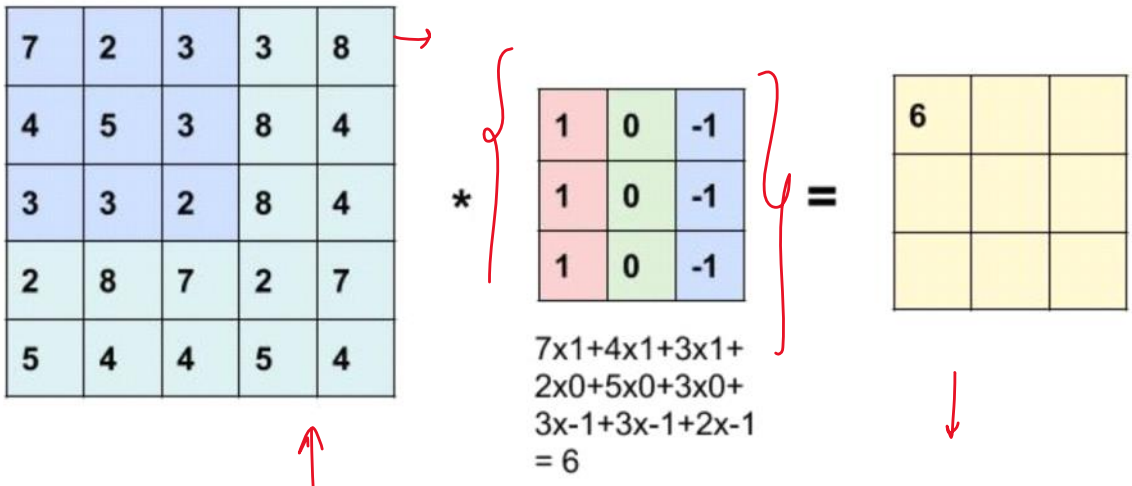
What is Padding?

26 August 2022 14:26



$n-f+1=n$

$n \times n$ → 5×5 → 7×7

$f \times f$ → 3×3

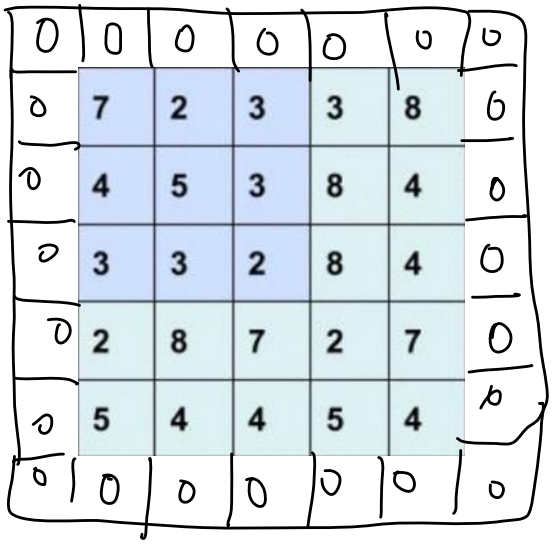
$\rightarrow (n-f+1)(n-f+1)$

$(5-3+1) = 3 \times 3$

$n-f+1 = 5$

$n-3+1=5 \Rightarrow n=8-1$

$n=7$



7×7

convolution

Zero padding

$5 \times 5 \longrightarrow 3 \times 3$

$5 \times 5 \longrightarrow 3 \times 3$

$(n - f + 1)$

↓

$(n + 2p - f + 1)$

$5 + 2(1) - 3 + 1$

$= 7 - 3 + 1 = 5$

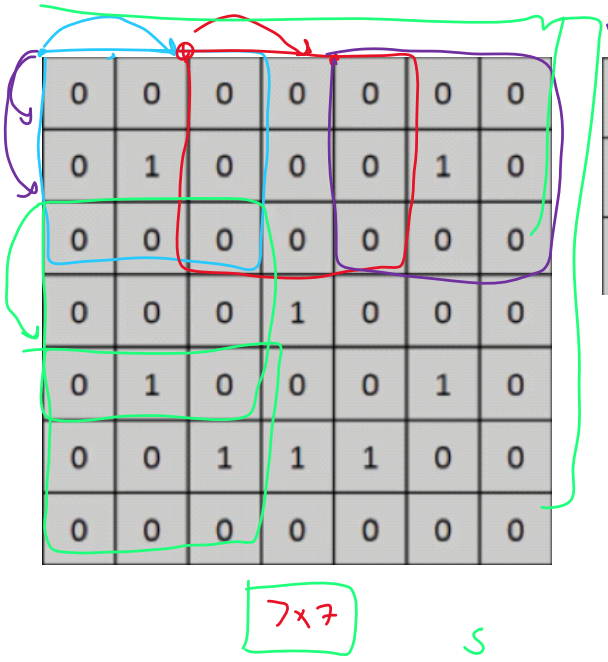
Keras

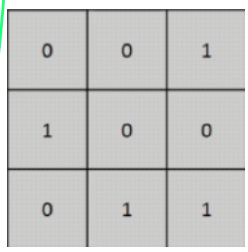
Valid

Same

Strides

27 August 2022 08:23





Stride = 1

(1,1)

3 x3

right

bottom

→ result feature

Stride = (2,2)

Stride = 2 →

$\frac{7-3}{2} + 1$

2+1 = 3

s

$(n-f+1) \longrightarrow \left[\frac{n-f}{s} + 1\right]$ ↘ $p = p$

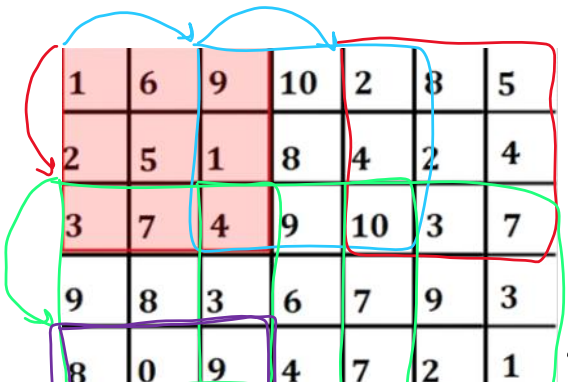
$\left[\frac{n+2p-f}{2} + 1\right]$ → strided convolution

$\frac{7+2-3}{2} + 1 = [4 \times 4]$

$\frac{n-f}{2}$ $\frac{6-3}{2}$ 1.5 = 1 + 1 = 2

Special case

Stride = 2



2x3

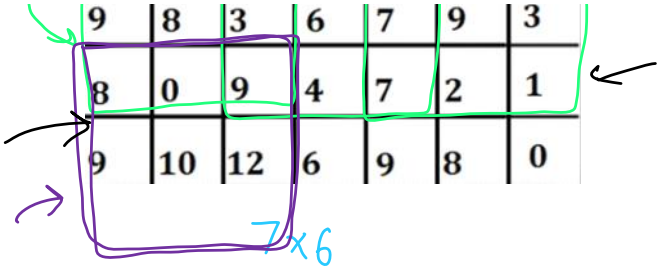
$\frac{6 \times 7}{3 \times 3}$

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

19 → 1

1.1 → 1

floor



$$\left[\frac{\cdot}{s}+1\right]$$ floor

$$\left[2 \quad \frac{6-3}{2}+1 = 1.5+1\right]$$

$1+1=2$

$$\frac{7-3}{2}+1 = 2+1=3$$

Why Strides are required?

27 August 2022 08:24

1) High level features

2) Computing →

Keras → stride

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

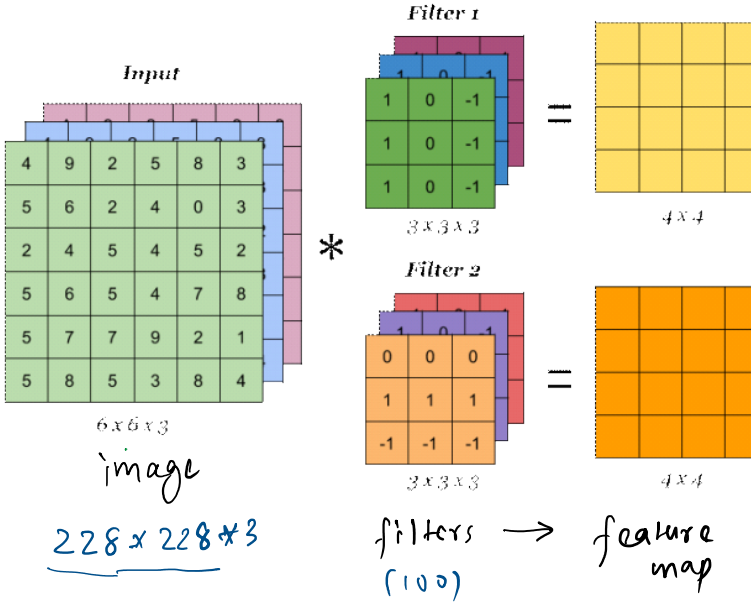
$$\frac{28+2-3}{2}+1$$

$$\frac{13.5}{}+1$$

$$13+1=14$$

The Problem with Convolution

01 September 2022 09:55



stride=2

1) Memory issue
2) Translation variance

reduce size of feature map

pooling

image

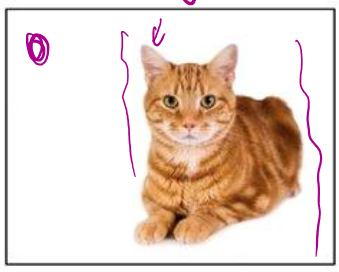
228 x 228 * 3

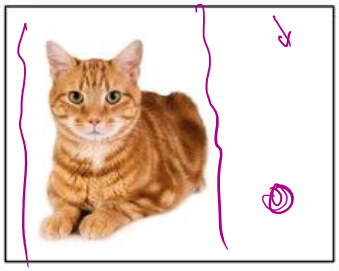
filters (100) → feature map → (226 * 226) * 100 * 32 → 19 MB

1 training → 100

1.5 GB

Translation Variance





features

location dependent

location

pooling

down sample your feature map