

21L-5294

BCS-8B

Muhammad Larai b Akhtar

Assume H, W is 256×256 $m=32$ $K=3$

(a) Layer	Input	Output	Parameters	Operations
B1 Conv2D	$256 \times 256 \times 3$	$256 \times 256 \times 32$	$32 \times (3 \times 3 \times 3 + 1) = 896$	$256 \times 256 \times 32 \times 1.89 = m$ $\times (3 \times 3 \times 3)$
B1 MaxPool	$256 \times 256 \times 32$	$128 \times 128 \times 32$	0	0
B2 Conv2D	$128 \times 128 \times 32$	$128 \times 128 \times 32$ $64 \times 64 \times 32$	$32 \times (3 \times 3 \times 32 + 1) = 9284$	$128 \times 128 \times 32 \times 4.93$ $(3 \times 3 \times 32) = m$
B2 MaxPool	$128 \times 128 \times 32$	$64 \times 64 \times 32$	0	0
B3 Conv2D	$64 \times 64 \times 32$	$64 \times 64 \times 32$ $32 \times 32 \times 32$	9284	1.21m
B3 MaxPool	$64 \times 64 \times 32$	$32 \times 32 \times 32$	0	0
B4 Conv2D	$32 \times 32 \times 32$	$32 \times 32 \times 32$ $16 \times 16 \times 32$	9284	0.3m
B4 MaxPool	$32 \times 32 \times 32$	$16 \times 16 \times 32$	0	0
B5 Conv2D	$16 \times 16 \times 32$	$16 \times 16 \times 32$	9284	75K
B5 MaxPool	$16 \times 16 \times 32$	$8 \times 8 \times 32$	0	0

d.) $8 \times 8 \times 32 = 2048$ neurons.

(b) Computations

$$(1.89 + 4.93 + 1.21 + 0.3 + 0.075) \times 10^6$$

$$= 8.29 \times 10^6$$

c) Parameters.

layer 1

2-5

$$32(3^2 + 3 + 1) = 32(21 + 1) = 896$$

$$= 9248$$

Total.

$$896 + 4 \times 9248 =$$

37888 parameters.

Question 2 (a)

same padding means maintain size

1st block $256 \times 28 \times 32$

2nd block $128 \times 128 \times 32$

3rd block $64 \times 64 \times 32$

4th block $32 \times 32 \times 32$

5th block $16 \times 16 \times 32$

6th block $8 \times 8 \times 32$

b) $\delta = \begin{bmatrix} 1 & 0 & -1 \\ 2 & 1 & 0 \\ 0 & -1 & 2 \end{bmatrix}$

$w = \begin{bmatrix} 1 & 0 & 2 \\ 0 & -1 & 1 \\ 2 & 1 & 0 \end{bmatrix}$

flipped $\begin{bmatrix} 0 & 1 & 2 \\ 1 & -1 & 0 \\ 2 & 0 & 1 \end{bmatrix}$

Gradient

$= \begin{bmatrix} 0 & 1 & 1 \\ 1 & -1 & 0 \\ 2 & 0 & 1 \end{bmatrix}$

$0 + 0 \cdot 1 + (-1) \cdot 2 =$

$\begin{bmatrix} & & \\ & & \\ & & \end{bmatrix}$