Question 1

Kernel Size	Input Size	No of Kernels	Value	Output Size	Params
3×3	$150 \times 150 \times 3$	32	Wt: $3 \times 3 \times 3$ $= 27$ $27 \times 32 = 864$ Bias: $1 \times 32 = 32$ Total: 896	$\dfrac{(150 - 3 + 2)}{1} + 1$ $= 150 \times 150 \times 32$	896
2×2	$150 \times 150 \times 32$			$\dfrac{(150 - 2)}{2} + 1$ $= 75$ $75 \times 75 \times 32$	
3×3	$75 \times 75 \times 32$	64	Wts $= 3 \times 3 \times 32$ $= 288$ $288 \times 64 = 18432$ B: 1×64 Total: 18496	$\dfrac{(75 - 3 + 2)}{1} + 1$ $= 75 \times 75 \times 64$	18496
2×2	$75 \times 75 \times 64$			$\left(\dfrac{75 - 2}{2}\right) + 1$ $= 37$ $37 \times 37 \times 64$	
3×3	$37 \times 37 \times 64$	128	Wts: $3 \times 3 \times 64$ $= 576$ $576 \times 128 = 73728$ Bias: 1×128 Total $= 73856$	$\left(\dfrac{37 - 3 + 2}{1}\right) + 1$ $= 37 \times 37 \times 128$	73856
2×2	$37 \times 37 \times 128$			$\left(\dfrac{37 - 2}{2}\right) + 1 = 18$ $18 \times 18 \times 128$	

Kernel Size	Input Size	No of kernels	Calu	Output size	Params
		64	$18 \times 18 \times 128$ = 4147 2		
	64		64×41 = 2657 972 208		2659272
			64×1 = 64		
			Total = 2 659272		
	1		$1 \times 64 = 64$		65
			$1 \times 1 = 1$		
			65		

Total = 2 7 7 5 8 5

Question 2

Kernel size	Input size	No. of k	Calcu	Outputs	Params
(1,2) 3×3	150×150×3	25	WE: 3×3×3 = 27 27×25 = 675 B: 1×25 total: 700	$\left(\dfrac{150-3}{2}\right)+1$ $= 74×74×25$	700
(3) 2×2	74×74×25			$\left(\dfrac{74-2}{2}\right)+1$ $= 37×37×25$	
(4) 3×3	37×37×25	35	WE: 3×3×25 = 225 225×35 = 7875 B: 1×35 T: 7910	$\left(\dfrac{37-3}{2}\right)+1$ $= 18×18×35$	7910
(5) 2×2	18×18×35			$\left(\dfrac{18-2}{2}\right)+1$ $= 8+1 = 9$ $9×9×35$	
(6) 3×3	9×9×35	50	WE: 3×3×35 = 315 315×50 = 15750 B: 50 T: 15800	$\left(\dfrac{9-3}{1}\right)+1$ $= 7×7×50$	15800
(7) 2×2	7×7×50			$\left(\dfrac{7-2}{2}\right)+1$ $3×3×50$	

Catu   Os

3 X 3 X 50
= 450

1029   wt: 450×1029 = 460800   461829

B: 1×1029

T: 461829

100   wt: 100×1029 = 102900   10250

B: 1×10 = 100

102500

TOTAL: 102900900   588739

Question 3

Kernel size	Input Size	No of Kernels
7×7	224×224×3	32
3×3	55×55×32	—
3×3	27×27×32	64
3×3	25×25×64	—
3×3	12×12×64	128

Calculation

Weights = 7×7×3
= 147
147×32 = 4704
Bias = 1×32 = 32
Total = 4736

—

Weights = 3×3×32
= 288
288×64 = 18432
Bias = 1×64 = 64
Total = 18496

—

Weights = 3×3×64
= 576
576×128 = 73728
Bias = 1×128
Total = 73856

Output

$O_w = \dfrac{224-7}{4} + 1$
$= 55$
55×55×32

$O_w = \dfrac{55-3}{2} + 1 = 27$
27×27×32

$O_w = \dfrac{27-3}{1} + 1$
$= 25$
25×25×64

$O_w = \dfrac{25-3}{2} + 1$
$= 12$
12×12×64

$O_w = \dfrac{12-3}{1} + 1$
$= 10$
10×10×128

Params

4736

—

18496

—

73856

3×3 $10 \times 10 \times 128$

$O_W = \dfrac{10-3}{2} + 1$

$= 4$

$4 \times 4 \times 128$

$4 \times 4 \times 128$ 2048

$= 2048$

Weights $= 2048 \times 512$

$= 1048576$ 1049088

Bias $= 1 \times 512$

Total $= 1049088$

Weights $= 100 \times 512$

$= 51200$ 51300

Bias $= 1 \times 100$

Total $= 51300$

Total $= 1197476$

Manual Parameter Calc

Kernel size	Input size	No of kernels	Calc	Output size	Parameters
11 × 11	229×229×3	64	Wts: 11×11×3 = 363 $64 × 363 = 23232$ Bias: 1×64 = 64 Total = 23296	$OW = \left(\frac{W-F+2P}{S}\right)+1$ $= \left(\frac{229-11+0}{2}\right)+1$ $= 107$ 107 × 107 × 64	23296
3 × 3	107×107×64			$O_S = \left(\frac{07-3+0}{2}\right)+1$ $= 52 + 1$ $= 53 × 53 × 64$	
5×5	53×53×64	128	Wts: 5×5×64 = 1600 $1600 × 128 = 204800$ Bias: 1×128 = 128 Total = 204928	$OW = \left(\frac{53-5+2×2}{}\right)+1$ $= 53$ 53 × 53 × 128	204928
3×3	53×53×128			$O_S = \left(\frac{53-3}{2}\right)+1$ $= 26×26×128$	
3×3	26×26×128	256	Wts: 3×3×128 = 1152 $256 × 1152 = 294912$ BPas: 1×256 Tot = 295168	$(26-3+2)-1$ $= 26×26×256$	295168

Kernel Size	Input Size	No of Kernels	Calcu	Output Size	Params
3×3	26×26×256	256	Wts: 3×3×256 = 2304 2304×256 Bias: 1×256 Total = 590 080	(26-3+1)+1 = 589824 26×26×256	590080
3×3	26×26×256	512	Wts: 3×3×256 = 2304 2304×512 Bias: 1×512 Params: 1180 160	26×26×512	1180160
3×3	26×26×512			$\left(\dfrac{26-3}{2}\right)+1$ = 12 12×12×512 12×12×512	
		2048	12×12×512 = 73728 Wts: 2048 × 73728 = 150994944 Bias: 1×2048 Total: 150 996 992		150996992
		1024	Wt: 1024×2048 = 2097152 Total: 2098 176		2098176

10   Wt: 10×1024
               =10240
          Bias: 1×10
               =10
          Total=10250

TOTAL : 155399050

Qs 5

Kernel size	Input size	No of kernels	Calc	Output size	Params
0⑦ 7×7	229×229×3	32	W: $7×7×3$ = 147	$\left(\dfrac{229-7}{2}\right)+1$ = 109×109×32	1736
			147×32 = 4704		
			B: 1×32		
			T = 4736		
③ 2×2	109×109×32			$\left(\dfrac{109-2}{2}\right)+1$ = 54×54×32	
④ 5×5	54×54×32	32	W: $5×5×$ 32 = 800	$\left(\dfrac{54-5+1}{1}\right)+1$ = 54×54×32	25632
			800×32 = 25600		
			B: 1×32		
			T = 25632		
⑤ 2×2	54×54×32			$\left(\dfrac{54-2}{2}\right)+1$ = 27×27×32	
⑥ 3×3	27×27×32	32	W = $3×3$ ×32 = 288	$\left(\dfrac{27-3+2}{1}\right)+1$ = 27×27×32	9248
			288×32 = 9216		
			B: 32		
			T = 9248		
⑦ 2×2	27×27×32			$\left(\dfrac{27-2}{2}\right)+1$ = 13×13×32	

Kernel size	Input size	No. of kernels	Calc		Output size	Params

① 3×3   18×13×32   32   W: 3×3 ×32 =288
288×32 =9216
B: 1×32
TP: 9218

(13-3+2)+1
=13×13×32   9218

② 2×2   13×13×32

$(\frac{13-2}{2})+1$
= 6×6×32

6×6 ×32
= 1152

1024 : W = 1152 × 1024
= 1179648
B: 1×1024

T= 1180672   1180672

10   W: 1024 ×10 = 10240
B = 10
TP = 10250   10250

TOTAL params : 1239786