

① Parameters of receptive field

a) number of parameters channels
image dimensions

general case: $[O \times O \times C_o \leftarrow \text{output}, I \times I \times C_I \leftarrow \text{input}]$

operation	# shared parameters?	output dim. [O]
convolution $(K \times K, P, S)$ <div style="margin-left: 150px;">padding \swarrow stride \searrow</div>	$K \times K \times C_I \times C_o$	$\frac{I - K + 2P}{S} + 1$ <div style="margin-left: 100px;">Bias</div>
max pooling $(P_s \times P_s, S)$	0 (all hyperparameters)	$\frac{I - P_s}{S} + 1$
fully connected $(1, 1 \times C_o)$	$I \times I \times C_I \times C_o$	$1 \times 1 \times C_o$

HERE:

layer	1	2	3	4	5
# parameters	$5 \times 5 \times 3 \times 32$	$3 \times 3 \times 32 \times 32$	0	$3 \times 3 \times 32 \times 64$	$3 \times 3 \times 64 \times 64$
Output dim	$56 \times 56 \times 32$	$56 \times 56 \times 32$	$28 \times 28 \times 32$	$28 \times 28 \times 64$	$28 \times 28 \times 64$
6	7 (*)	8	9		
0	$5 \times 3 \times 64 \times 128$	$14 \times 14 \times 128 \times 512$	512×10		
$14 \times 14 \times 64$	$14 \times 14 \times 128$	$1 \times 1 \times 512$	$1 \times 1 \times 10$		

~~Total sum of parameters for each layer~~

Total number of parameters = sum of # parameters for each layer (not explicitly calculated)

b) receptive field

Dimension: $14 \times 14 \times 128$ (also see a))

general case [notation from article]:

	convolution	max pooling
n_{out}	$\frac{n_{in} + 2 - k}{s} (+1)$	$\frac{n_{in} - 2}{s} (+1)$
j_{out}	$j_{in} \cdot s$	$j_{in} * s$
r_{out}	$r_{in} + (k-1) \cdot j_{in}$	$r_{in} + (k-1) \cdot j_{in}$

HERE:

layer	0	1	2	3	4	5	6	7
n_{out}	56	56	56	28	28	28	14	14
j_{out}	1	1	1	2	2	2	4	4
r_{out}	1	5	7	9	12	16	18	<u>26</u>
		$\leq 1 + 4 \cdot 1$	$\leq 5 + 2 \cdot 1$	$\leq 7 + 1 \cdot 1$	$\leq 9 + 2 \cdot 2$	$\leq 12 + 1 \cdot 2$	$\leq 16 + 1 \cdot 2$	$\leq 18 + 2 \cdot 4$

∴ Theoretical receptive field: 26 at (*).