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Section: 7B

ML - Assignment 04

Question No: 1

Solution:

0	0	10	10	10
0	0	10	10	10
0	0	10	10	10
0	0	10	10	10
0	0	10	10	10

Vertical:

1	2	1
0	0	0
-1	-2	-1

Output:

0	0	0
0	0	0
0	0	0

⟹ Each pixel has zero value which means their are no ~~horizontal~~ vertical edges in the image

Horizontal:

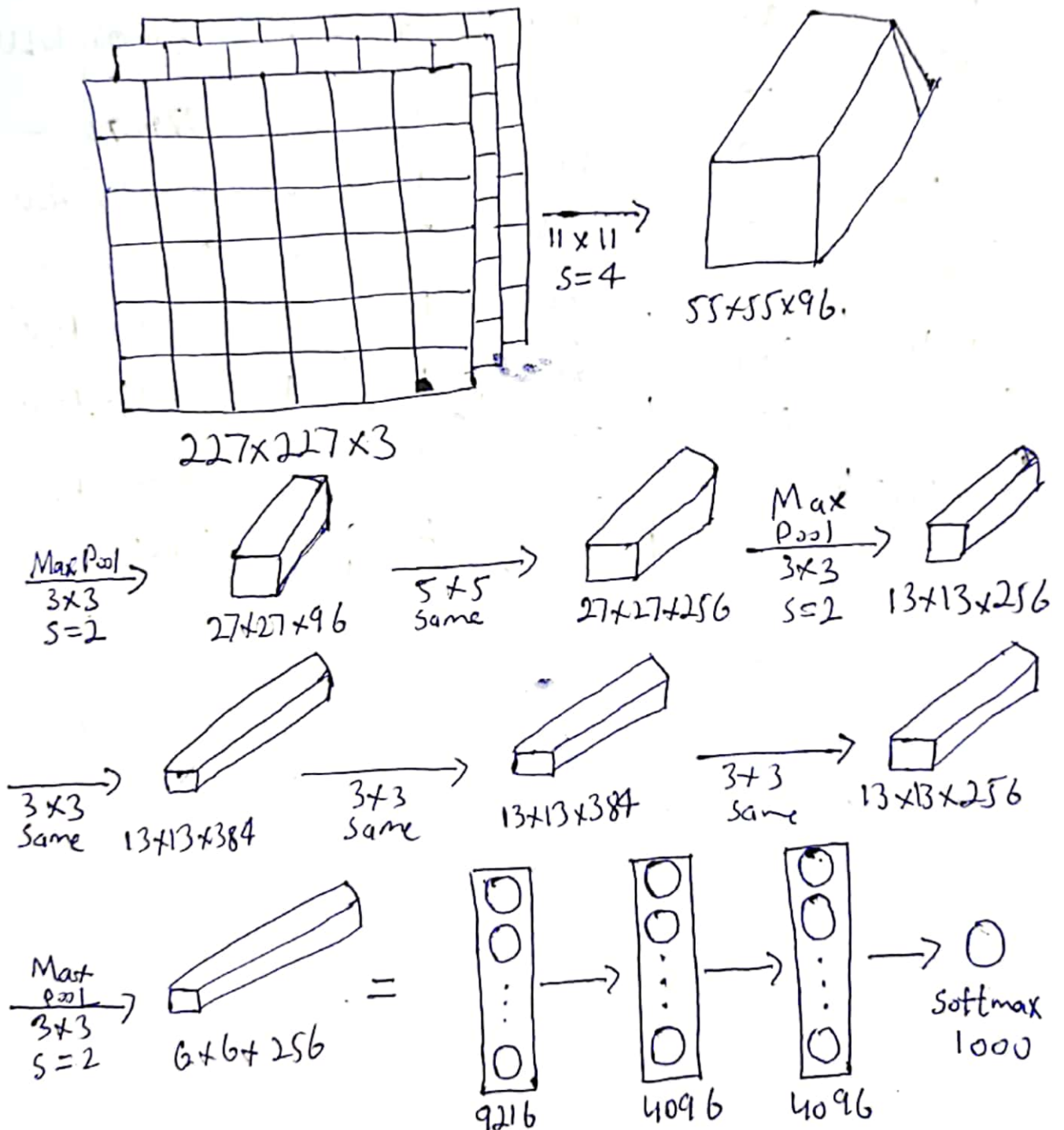| -1	0	1
-2	0	2
-1	0	1

Output:

40	40	0
40	40	0
40	40	0

⟹ The output shows that their exists horizontal edges.

Question No:2

1) AlexNet:

Structure

227×227×3 → (11×11, S=4) → 55×55×96.

Max Pool 3×3 S=2 → 27×27×96 → (5×5 Same) → 27×27×256 → Max Pool 3×3 S=2 → 13×13×256

3×3 Same → 13×13×384 → 3×3 Same → 13×13×384 → 3×3 Same → 13×13×256

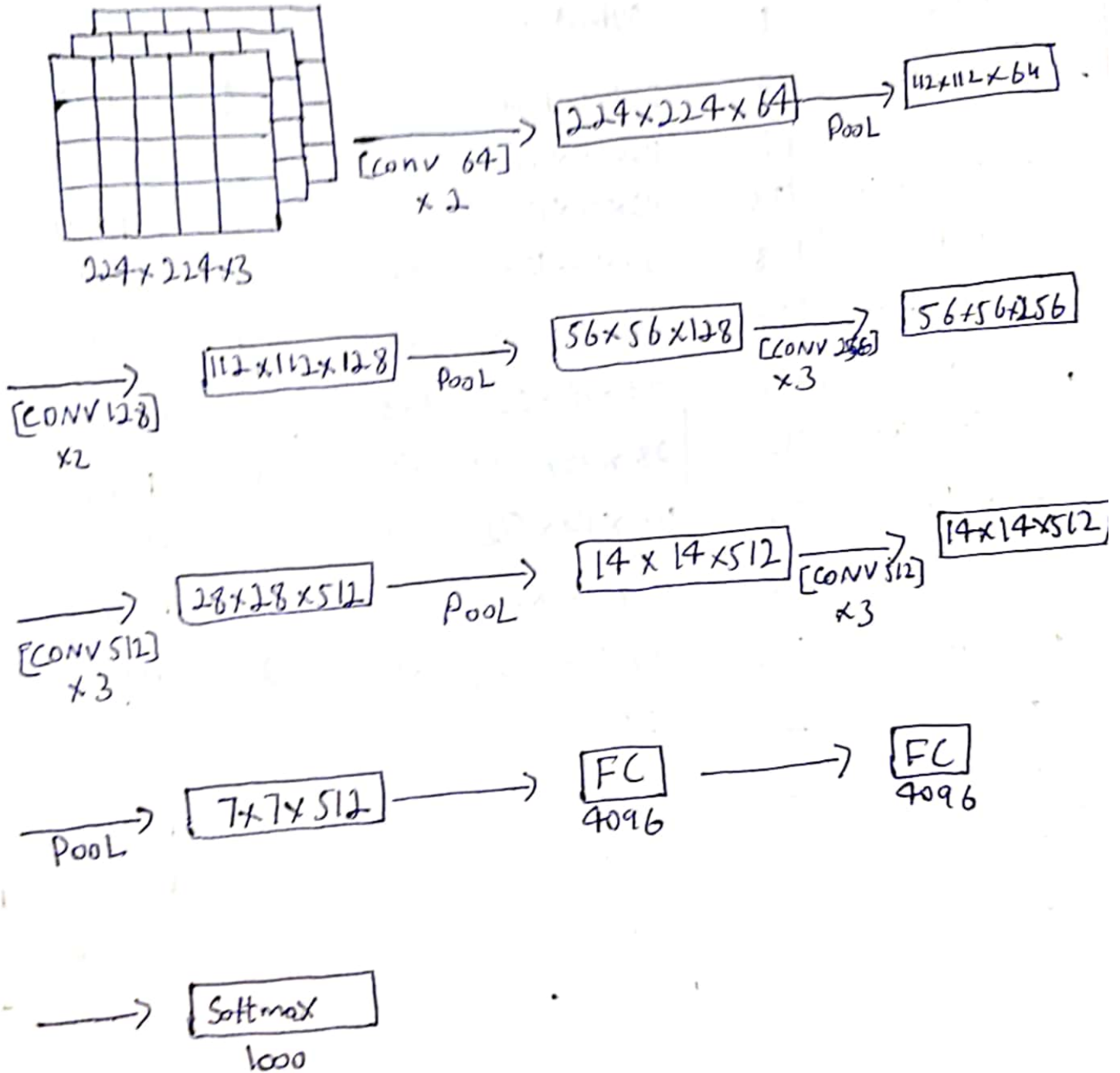Max Pool 3×3 S=2 → 6×6×256 = [9216] → [4096] → [4096] → ◯ Softmax 1000

60M parameters. For Linearity, they used ReLU

Table

Layer	No. of filters / neurons	Filter size	stride	Padding	size of feature map	Activation fraction
Input	—	—	—	—	227×227×3	—
Conv 1	96	11×11	4	—	55×55×96	ReLU
Max Pool 1	—	3×3	2	—	27×27×96	—
Conv 2	256	5×5	1	2	27×27×256	ReLU
Max Pool 2	—	3×3	2	—	13×13×256	—
Conv 3	384	3×3	1	1	13×13×384	ReLU
Conv 4	384	3×3	1	1	13×13×384	ReLU
Conv 5	256	3×3	1	1	13×13×256	ReLU
Max Pool 3	—	3×3	2	—	6×6×256	—

-) VGG-16

Structure

$224 \times 224 \times 3$

$\xrightarrow[\times 2]{[conv\ 64]}$ $224 \times 224 \times 64$ $\xrightarrow{Pool}$ $112 \times 112 \times 64$

$\xrightarrow[\times 2]{[CONV\ 128]}$ $112 \times 112 \times 128$ $\xrightarrow{Pool}$ $56 \times 56 \times 128$ $\xrightarrow[\times 3]{[CONV\ 256]}$ $56 \times 56 \times 256$

$\xrightarrow[\times 3]{[CONV\ 512]}$ $28 \times 28 \times 512$ $\xrightarrow{Pool}$ $14 \times 14 \times 512$ $\xrightarrow[\times 3]{[CONV\ 512]}$ $14 \times 14 \times 512$

$\xrightarrow{Pool}$ $7 \times 7 \times 512$ $\longrightarrow$ FC 4096 $\longrightarrow$ FC 4096

$\longrightarrow$ Softmax 1000

Table

Layer	Feature Map	Size	Kernel Size	Stride	Activation
Image	1	224x224x3	—	1	ReLU
2x Convolution	64	224x224x64	3x3	2	ReLU
Max Pool	64	112x112x64	3x3	1	ReLU
2x Convolution	128	112x112x128	3x3	2	ReLU
Max Pool	128	56x56x128	3x3	1	ReLU
2x Convolution	256	56x55x256	3x3	2	ReLU
Max Pool	256	28x28x512	3x3	1	ReLU
3x Convolution	512	28x28x512	3x3	2	ReLU
Max Pool	512	14x14x512	3x3	1	ReLU
3x Convolution	512	14x14x512	3x3	2	ReLU
Max Pool	512	7x7x512	3x3	—	ReLU
FC	—	25088	—	—	ReLU
FC	—	4096	—	—	ReLU
FC	—	4096	—	—	ReLU
FC	—	4096	—	—	softmax