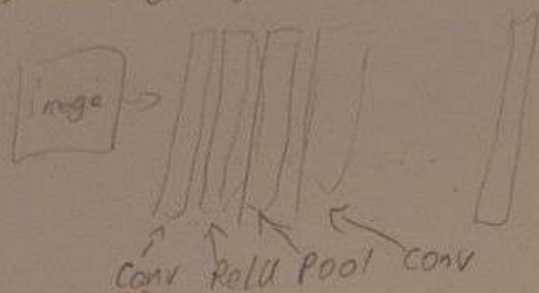Name: Rakhat
Surname: Yskak   SE-2108

1.1) Pooling layer is located between Convolution layers

Conv ReLU Pool Conv

Its used to decrease the spatial size to reduce amount of parameters
the most common filter size 2×2
Requires 2 hyperparameters
F - spatial extent   S - stride

1.2) Batch Normalization is technique used to normalize a small portion, like simple normalization with substracting the mean and dividing by standard derivation, then scaling it.
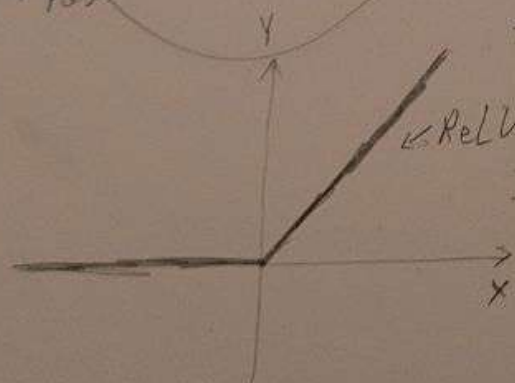In some cases is used to regalize the data like dropout

1.3) ReLU $f(x) = \max(0, X)$

Pros
• Simple
• Fast

Cons
• Error prune, i.e. in large data activation weights on data point become dead, never activate again,

←ReLU If less than 0 becomes 0
If greater doesnot change

2.1. $I = 9 \times 9$ $F = 5 \times 5$ $S = 2$
Assuming depth is D size will be $3 \times 3 \times D$

Height $= (9 - 5)/2 + 1 = 3$
Width $= (9 - 5)/2 + 1 = 3$

$W_o = (W_I - F)/S + 1$
$H_o = (W_I - F)/S + 1$

$D_b = D_I$

O - Output I - input

2.2) $W_O = (W_I - F + 2P)/S + 1$ Assuming D_I is some depth

$H_O = (H_I - F + 2P)/S + 1$ $W_O = (6 - 2 + 2)/2 + 1 = 4$

$D_O = D_I$ $H_O = (6 - 2 + 2)/2 + 1 = 4$

Size is $\boxed{4 \times 4 \times D_I}$

3.3)

2	3	4	7	5
5	6	8	9	3
3	5	4	0	4
8	3	4	5	6
6	8	9	4	2

Check if it needs padding

$(5-3)/2 + 1 = 3$ is integer

no padding is needed

Max pool chose max number

2	3	4
5	6	8
3	5	4

→ 8

3 4 7
6 8 9 → 9
5 4 0

4 7 5
8 9 3 → 9
4 0 4

5 6 8
3 5 4 → 8
8 3 4

6 8 9
5 4 0 → 9
3 4 5

8 9 3
4 0 4 → 3
4 5 6

3 4 5
8 3 4 → 9
6 8 9

5 4 0
3 4 5 → 9
8 9 4

4 0 4
4 5 6 → 9
9 4 2

↓

8	9	9
8	9	9
9	9	9