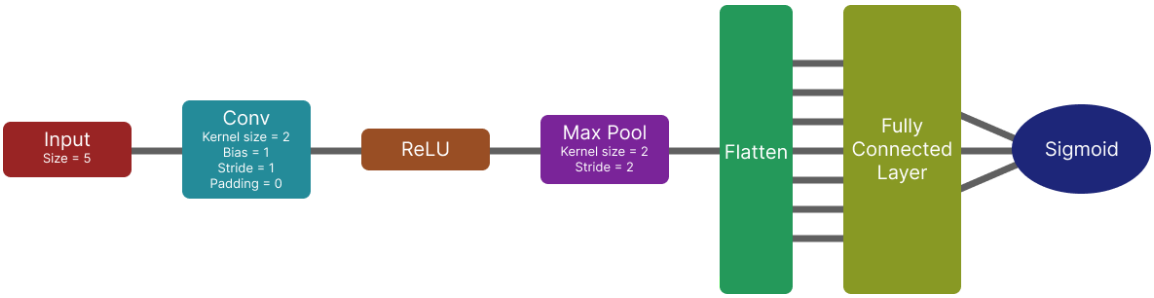
Given



Input

1	2	0	2	1
0	1	1	2	1
1	2	0	1	0
1	2	1	2	1
0	0	3	2	3

Kernel

1	-1
-1	1

Convolution

1	3	0	1
1	-1	1	1
1	2	1	1
0	5	x	3

Initial weights fcnn

1	1	-1	1

Initial bias for convolution = 1 Initial bias for fcnn = 0 Learning Rate = 0.1

dL/d(z_conv)

0	-0.358	0	-0.119
0	0	0	0
0	0	0	0
0	-0.596	0	-0.358

Find

Find the last number X in the convolution, the flatten layer, the loss, and the updated kernel

Solution

Start by convolution

((1*1*)-(*1*2)-(3*1*)+(*2*1))+1 = -1

Last number is found

1	3	0	1
1	-1	1	1
1	2	1	1
0	5	-1	3

ReLU

1	3	0	1
1	0	1	1
1	2	1	1
0	5	0	3

Max Pool

3	1
5	3

Flatten

3	1	5	3

z = (1 * 3 + 1 * 1 - 1 * 5 + 1 * 3) + 0 = 2

a = 1/(1 + np.exp(-2)) = 0.88

Loss = -1 * (1 * log(0.88) + (1-1) * log(1-0.88)) = 0.055

Finding gradient kernel

using delta

0	-0.358	0	-0.119
0	0	0	0
0	0	0	0
0	-0.596	0	-0.358

using input

1	2	0	2	1
0	1	1	2	1
1	2	0	1	0
1	2	1	2	1
0	0	3	2	3

(0,0) = 2-*0.358+2*-0.119+2-*0.596+2*-0.358 = -2.862

(0,1) = 0-*0.358+1*-0.119+1-*0.596+1*-0.358 = -1.073

(1,0) = 1-*0.358+2*-0.119+0-*0.596+2*-0.358 = -1.312

(1,1) = 1-*0.358+1*-0.119+3-*0.596+3*-0.358 = -3.338

Gradient kerlen

-2.862	-1.073
-1.312	-3.338

Updating kernel with learning rate

kernel

1	-1
-1	1

learning rate = 0.1

new kernel

1	-1
-1	1

(-)

-.2862	-.1073
-.1312	-.3338

=

1.286	-0.893
-0.893	1.334