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CS534-S23-S01 Group Project Assignment #4

**Question 1.**

1. *Consider a 1-dimensional time-series with values [2, 1, 3, 4, 7].*

*Perform a convolution with a 1-dimensional filter [1, 0, 1] without padding.*

(2\*1) + (1\*0) + (3\*1) = 5

(1\*1) + (3\*0) + (4\*1) = 5

(3\*1) + (4\*0) + (7\*1) = 10

[5,5,10]

1. *Compute the convolution of the below input with the horizontal edge detection filter.*

*Use a stride of 1 without padding.*



(6\*1) + (3\*1) + (4\*1) + (4\*0) + (7\*0) + (4\*0) + (7\*-1) + (0\*-1) + (2\*-1) = 4

(3\*1) + (4\*1) + (4\*1) + (7\*0) + (4\*0) + (0\*0) + (0\*-1) + (2\*-1) + (3\*-1) = 6

(4\*1) + (4\*1) + (5\*1) + (4\*0) + (0\*0) + (4\*0) + (2\*-1) + (3\*-1) + (4\*-1) = 4

(4\*1) + (5\*1) + (0\*1) + (0\*0) + (4\*0) + (0\*0) + (3\*-1) + (4\*-1) + (5\*-1) = -3

(5\*1) + (0\*1) + (3\*1) + (4\*0) + (0\*0) + (4\*0) + (4\*-1) + (5\*-1) + (2\*-1) = -3

(4\*1) + (7\*1) + (4\*1) + (7\*0) + (0\*0) + (2\*0) + (3\*-1) + (7\*-1) + (5\*-1) = 0

(7\*1) + (4\*1) + (0\*1) + (0\*0) + (2\*0) + (3\*0) + (7\*-1) + (5\*-1) + (0\*-1) = -1

(4\*1) + (0\*1) + (4\*1) + (2\*0) + (3\*0) + (4\*0) + (5\*-1) + (0\*-1) + (3\*-1) = 0

(0\*1) + (4\*1) + (0\*1) + (3\*0) + (4\*0) + (5\*0) + (0\*-1) + (3\*-1) + (0\*-1) = 1

(4\*1) + (0\*1) + (4\*1) + (4\*0) + (5\*0) + (2\*0) + (3\*-1) + (0\*-1) + (7\*-1) = -2

(7\*1) + (0\*1) + (2\*1) + (3\*0) + (7\*0) + (5\*0) + (5\*-1) + (8\*-1) + (1\*-1) = -5

(0\*1) + (2\*1) + (3\*1) + (7\*0) + (5\*0) + (0\*0) + (8\*-1) + (1\*-1) + (2\*-1) = -6

(2\*1) + (3\*1) + (4\*1) + (5\*0) + (0\*0) + (3\*0) + (1\*-1) + (2\*-1) + (5\*-1) = 1

(3\*1) + (4\*1) + (5\*1) + (0\*0) + (3\*0) + (0\*0) + (2\*-1) + (5\*-1) + (4\*-1) = 1

(4\*1) + (5\*1) + (2\*1) + (3\*0) + (0\*0) + (7\*0) + (5\*-1) + (4\*-1) + (2\*-1) = 0

(3\*1) + (7\*1) + (5\*1) + (5\*0) + (8\*0) + (1\*0) + (8\*-1) + (0\*-1) + (1\*-1) = 6

(7\*1) + (5\*1) + (0\*1) + (8\*0) + (1\*0) + (2\*0) + (0\*-1) + (1\*-1) + (0\*-1) = 11

(5\*1) + (0\*1) + (3\*1) + (1\*0) + (2\*0) + (5\*0) + (1\*-1) + (0\*-1) + (6\*-1) = 1

(0\*1) + (3\*1) + (0\*1) + (2\*0) + (5\*0) + (4\*0) + (0\*-1) + (6\*-1) + (0\*-1) = -3

(3\*1) + (0\*1) + (7\*1) + (5\*0) + (4\*0) + (2\*0) + (6\*-1) + (0\*-1) + (0\*-1) = 4

(5\*1) + (8\*1) + (1\*1) + (8\*0) + (0\*0) + (1\*0) + (6\*-1) + (4\*-1) + (1\*-1) = 3

(8\*1) + (1\*1) + (2\*1) + (0\*0) + (1\*0) + (0\*0) + (4\*-1) + (1\*-1) + (3\*-1) = 3

(1\*1) + (2\*1) + (5\*1) + (1\*0) + (0\*0) + (6\*0) + (1\*-1) + (3\*-1) + (0\*-1) = 4

(2\*1) + (5\*1) + (4\*1) + (0\*0) + (6\*0) + (0\*0) + (3\*-1) + (0\*-1) + (4\*-1) = 4

(5\*1) + (4\*1) + (2\*1) + (6\*0) + (0\*0) + (0\*0) + (0\*-1) + (4\*-1) + (5\*-1) = 2

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| 4 | 6 | 4 | -3 | -3 |
| 0 | -1 | 0 | 1 | -2 |
| -5 | -6 | 1 | 1 | 0 |
| 6 | 11 | 1 | -3 | 4 |
| 3 | 3 | 4 | 4 | 2 |

1. *Perform a 4 × 4 max pooling at stride 1 of the above same input.*

Max(6,3,4,4,4,7,4,0,7,0,2,3,3,7,5,0) = 7

Max(3,4,4,5,7,4,0,4,0,2,3,4,7,5,0,3) = 7

Max(4,4,5,0,4,0,4,0,2,3,4,5,5,0,3,0) = 5

Max(4,5,0,3,0,4,0,4,3,4,5,2,0,3,0,7) = 7

Max(4,7,4,0,7,0,2,3,3,7,5,0,5,8,1,2) = 8

Max(7,4,0,4,0,2,3,4,7,5,0,3,8,1,2,5) = 8

Max(4,0,4,0,2,3,4,5,5,0,3,0,1,2,5,4) = 5

Max(0,4,0,4,3,4,5,2,0,3,0,7,2,5,4,2) = 7

Max(7,0,2,3,3,7,5,0,5,8,1,2,8,0,1,0) = 8

Max(0,2,3,4,7,5,0,3,8,1,2,5,0,1,0,6) = 8

Max(2,3,4,5,5,0,3,0,1,2,5,4,1,0,6,0) = 6

Max(3,4,5,2,0,3,0,7,2,5,4,2,0,6,0,0) = 7

Max(3,7,5,0,5,8,1,2,8,0,1,0,6,4,1,3) = 8

Max(7,5,0,3,8,1,2,5,0,1,0,6,4,1,3,0) = 8

Max(5,0,3,0,1,2,5,4,1,0,6,0,1,3,0,4) = 6

Max(0,3,0,7,2,5,4,2,0,6,0,0,3,0,4,5) = 7

|  |  |  |  |
| --- | --- | --- | --- |
| 7 | 7 | 5 | 7 |
| 8 | 8 | 5 | 7 |
| 8 | 8 | 6 | 7 |
| 8 | 8 | 6 | 7 |