Team 2 – Jarrett Arredondo, Krystal Grant, Colin Mettler, Chloé Plasse April 14, 2023
CS534-S23-S01 Group Project Assignment #4

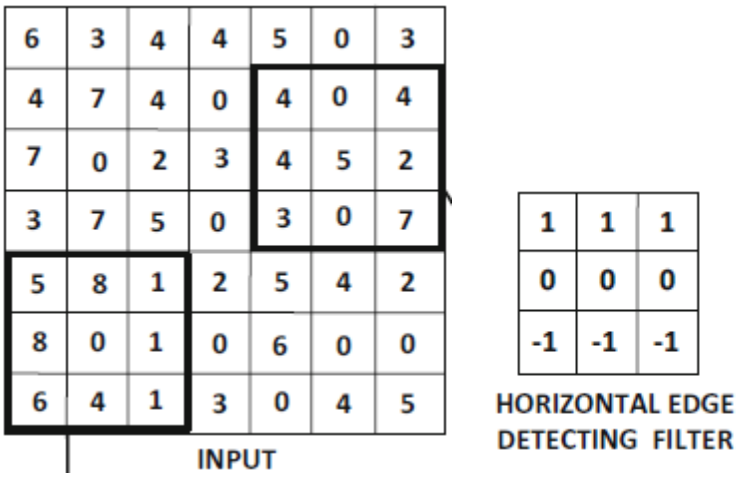
Question 1.

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]

2. *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

3. *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