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Pemrosesan Sinyal Optimasi

Latihan Konvolusi 2D

$x(n_1, n_2)$

1	4	1
2	5	3

0

$h(n_1, n_2)$

1	1
1	-1

0

Konvolusikan sinyal ~~tersebut~~ diatas tersebut.

$$g(n_1, n_2) = \sum_{k_2=-\infty}^{\infty} \sum x(k_1, k_2) h(n_1 - k_1, n_2 - k_2)$$

Jawab

* Cerminkan $h(n_1, n_2)$

1	1
1	-1

* Lalu, dikonvolusikan

(I)

•) 1 4 1
-1 (1.2) 5 3 ↔ -1(0) + (2) = 2.
1 1

•) 1 4 1
(-1.2) (1.5) 3 ↔ -1(2) + (5) = 3
1 1

•) 1 4 1
2 ((-1.5) (1.3) ↔ (-5) + (3) = -2
1 1

•) 1 4 1
2 5 ((-1.3)) 1 ↔ (-3) + 1(0) = -3
1 1

(II)

•) -1 (1.1) 4 1 ↔ 1(1) + 1(2) = 3
1 (1.2) 5 3

•) (-1.1) (1.4) 1 ↔ (-1) + 4 + 2 + 5 = 10.
(1.2) (1.5) 3

•) 1 (-1.4) (1.1) ↔ (-4) + 1 + 5 + 3 = 5
2 (1.5) (1.3)

•) 1 4 (-1.1) 1 ↔ (-1) + (3) + 1(0) + 1(0) = 2
5 (1.3) 1

(III)

•) -1 1
1 (1.1) 4 1 ↔ (-1).0 + 1(0) + 1(0) + 1 = 1
2 5 3

•) -1 1
(1.1) (1.4) 1 ↔ (1-1.0) + 1(0) + 1(1) + 1(4) = 5
2 5 3

•) -1 1
1 (1.4) (1.1) ↔ (-1).0 + 1(0) + 1(4) + 1(1) = 5
2 5 3

•) -1 1
1 4 (1.1) 1 ↔ (-1).0 + 1(0) + (1)1 + 1(0) = 1
2 5 3

* maka, hasil akhir konvolusi ini adalah

$$g(n_1, n_2) = \begin{array}{|cccc|} 1 & 5 & 5 & 1 \\ 3 & 10 & 5 & 2 \\ 2 & 3 & -2 & -3 \end{array}$$