# Input Image

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| -1 | -1 | -1 | -1 | -1 | -1 | -1 | -1 | -1 |
| -1 | 1 | -1 | -1 | -1 | -1 | -1 | 1 | -1 |
| -1 | -1 | 1 | -1 | -1 | -1 | 1 | -1 | -1 |
| -1 | -1 | -1 | 1 | -1 | 1 | -1 | -1 | -1 |
| -1 | -1 | -1 | -1 | 1 | -1 | -1 | -1 | -1 |
| -1 | -1 | -1 | 1 | -1 | 1 | -1 | -1 | -1 |
| -1 | -1 | 1 | -1 | -1 | -1 | 1 | -1 | -1 |
| -1 | 1 | -1 | -1 | -1 | -1 | -1 | 1 | -1 |
| -1 | -1 | -1 | -1 | -1 | -1 | -1 | -1 | -1 |

# Filter

|  |  |  |
| --- | --- | --- |
| 1 | -1 | -1 |
| -1 | 1 | -1 |
| -1 | -1 | 1 |

# Feature Map Calculation

Output Height: ((9 - 3 + 2 \* 0) / 1) + 1 = 7

Output Width: ((9 - 3 + 2 \* 0) / 1) + 1 = 7

Feature Map[0, 0] = Sum(Receptive Field \* Filter) = [

[-1 -1 -1]  
 [-1 1 -1]  
 [-1 -1 1]] \* [[ 1 -1 -1]  
 [-1 1 -1]  
 [-1 -1 1]] = 7.0

Feature Map[0, 1] = Sum(Receptive Field \* Filter) = [

[-1 -1 -1]  
 [ 1 -1 -1]  
 [-1 1 -1]] \* [[ 1 -1 -1]  
 [-1 1 -1]  
 [-1 -1 1]] = -1.0

Feature Map[0, 2] = Sum(Receptive Field \* Filter) = [

[-1 -1 -1]  
 [-1 -1 -1]  
 [ 1 -1 -1]] \* [[ 1 -1 -1]  
 [-1 1 -1]  
 [-1 -1 1]] = 1.0

Feature Map[0, 3] = Sum(Receptive Field \* Filter) = [

[-1 -1 -1]  
 [-1 -1 -1]  
 [-1 -1 -1]] \* [[ 1 -1 -1]  
 [-1 1 -1]  
 [-1 -1 1]] = 3.0

Feature Map[0, 4] = Sum(Receptive Field \* Filter) = [

[-1 -1 -1]  
 [-1 -1 -1]  
 [-1 -1 1]] \* [[ 1 -1 -1]  
 [-1 1 -1]  
 [-1 -1 1]] = 5.0

Feature Map[0, 5] = Sum(Receptive Field \* Filter) = [

[-1 -1 -1]  
 [-1 -1 1]  
 [-1 1 -1]] \* [[ 1 -1 -1]  
 [-1 1 -1]  
 [-1 -1 1]] = -1.0

Feature Map[0, 6] = Sum(Receptive Field \* Filter) = [

[-1 -1 -1]  
 [-1 1 -1]  
 [ 1 -1 -1]] \* [[ 1 -1 -1]  
 [-1 1 -1]  
 [-1 -1 1]] = 3.0

Feature Map[1, 0] = Sum(Receptive Field \* Filter) = [

[-1 1 -1]  
 [-1 -1 1]  
 [-1 -1 -1]] \* [[ 1 -1 -1]  
 [-1 1 -1]  
 [-1 -1 1]] = -1.0

Feature Map[1, 1] = Sum(Receptive Field \* Filter) = [

[ 1 -1 -1]  
 [-1 1 -1]  
 [-1 -1 1]] \* [[ 1 -1 -1]  
 [-1 1 -1]  
 [-1 -1 1]] = 9.0

Feature Map[1, 2] = Sum(Receptive Field \* Filter) = [

[-1 -1 -1]  
 [ 1 -1 -1]  
 [-1 1 -1]] \* [[ 1 -1 -1]  
 [-1 1 -1]  
 [-1 -1 1]] = -1.0

Feature Map[1, 3] = Sum(Receptive Field \* Filter) = [

[-1 -1 -1]  
 [-1 -1 -1]  
 [ 1 -1 1]] \* [[ 1 -1 -1]  
 [-1 1 -1]  
 [-1 -1 1]] = 3.0

Feature Map[1, 4] = Sum(Receptive Field \* Filter) = [

[-1 -1 -1]  
 [-1 -1 1]  
 [-1 1 -1]] \* [

[ 1 -1 -1]  
 [-1 1 -1]  
 [-1 -1 1]] = -1.0

Feature Map[1, 5] = Sum(Receptive Field \* Filter) = [

[-1 -1 1]  
 [-1 1 -1]  
 [ 1 -1 -1]] \* [[ 1 -1 -1]  
 [-1 1 -1]  
 [-1 -1 1]] = 1.0

Feature Map[1, 6] = Sum(Receptive Field \* Filter) = [

[-1 1 -1]  
 [ 1 -1 -1]  
 [-1 -1 -1]] \* [[ 1 -1 -1]  
 [-1 1 -1]  
 [-1 -1 1]] = -1.0

Feature Map[2, 0] = Sum(Receptive Field \* Filter) = [

[-1 -1 1]  
 [-1 -1 -1]  
 [-1 -1 -1]] \* [[ 1 -1 -1]  
 [-1 1 -1]  
 [-1 -1 1]] = 1.0

Feature Map[2, 1] = Sum(Receptive Field \* Filter) = [

[-1 1 -1]  
 [-1 -1 1]  
 [-1 -1 -1]] \* [[ 1 -1 -1]  
 [-1 1 -1]  
 [-1 -1 1]] = -1.0

Feature Map[2, 2] = Sum(Receptive Field \* Filter) = [

[ 1 -1 -1]  
 [-1 1 -1]  
 [-1 -1 1]] \* [[ 1 -1 -1]  
 [-1 1 -1]  
 [-1 -1 1]] = 9.0

Feature Map[2, 3] = Sum(Receptive Field \* Filter) = [

[-1 -1 -1]  
 [ 1 -1 1]  
 [-1 1 -1]] \* [[ 1 -1 -1]  
 [-1 1 -1]  
 [-1 -1 1]] = -3.0

Feature Map[2, 4] = Sum(Receptive Field \* Filter) = [

[-1 -1 1]  
 [-1 1 -1]  
 [ 1 -1 -1]] \* [[ 1 -1 -1]  
 [-1 1 -1]  
 [-1 -1 1]] = 1.0

Feature Map[2, 5] = Sum(Receptive Field \* Filter) = [

[-1 1 -1]  
 [ 1 -1 -1]  
 [-1 -1 -1]] \* [[ 1 -1 -1]  
 [-1 1 -1]  
 [-1 -1 1]] = -1.0

Feature Map[2, 6] = Sum(Receptive Field \* Filter) = [

[ 1 -1 -1]  
 [-1 -1 -1]  
 [-1 -1 -1]] \* [[ 1 -1 -1]  
 [-1 1 -1]  
 [-1 -1 1]] = 5.0

Feature Map[3, 0] = Sum(Receptive Field \* Filter) = [

[-1 -1 -1]  
 [-1 -1 -1]  
 [-1 -1 -1]] \* [[ 1 -1 -1]  
 [-1 1 -1]  
 [-1 -1 1]] = 3.0

Feature Map[3, 1] = Sum(Receptive Field \* Filter) = [

[-1 -1 1]  
 [-1 -1 -1]  
 [-1 -1 1]] \* [[ 1 -1 -1]  
 [-1 1 -1]  
 [-1 -1 1]] = 3.0

Feature Map[3, 2] = Sum(Receptive Field \* Filter) = [

[-1 1 -1]  
 [-1 -1 1]  
 [-1 1 -1]] \* [[ 1 -1 -1]  
 [-1 1 -1]  
 [-1 -1 1]] = -3.0

Feature Map[3, 3] = Sum(Receptive Field \* Filter) = [

[ 1 -1 1]  
 [-1 1 -1]  
 [ 1 -1 1]] \* [[ 1 -1 -1]  
 [-1 1 -1]  
 [-1 -1 1]] = 5.0

Feature Map[3, 4] = Sum(Receptive Field \* Filter) = [

[-1 1 -1]  
 [ 1 -1 -1]  
 [-1 1 -1]] \* [[ 1 -1 -1]  
 [-1 1 -1]  
 [-1 -1 1]] = -3.0

Feature Map[3, 5] = Sum(Receptive Field \* Filter) = [

[ 1 -1 -1]  
 [-1 -1 -1]  
 [ 1 -1 -1]] \* [[ 1 -1 -1]  
 [-1 1 -1]  
 [-1 -1 1]] = 3.0

Feature Map[3, 6] = Sum(Receptive Field \* Filter) = [

[-1 -1 -1]  
 [-1 -1 -1]  
 [-1 -1 -1]] \* [[ 1 -1 -1]  
 [-1 1 -1]  
 [-1 -1 1]] = 3.0

Feature Map[4, 0] = Sum(Receptive Field \* Filter) = [

[-1 -1 -1]  
 [-1 -1 -1]  
 [-1 -1 1]] \* [[ 1 -1 -1]  
 [-1 1 -1]  
 [-1 -1 1]] = 5.0

Feature Map[4, 1] = Sum(Receptive Field \* Filter) = [

[-1 -1 -1]  
 [-1 -1 1]  
 [-1 1 -1]] \* [[ 1 -1 -1]  
 [-1 1 -1]  
 [-1 -1 1]] = -1.0

Feature Map[4, 2] = Sum(Receptive Field \* Filter) = [

[-1 -1 1]  
 [-1 1 -1]  
 [ 1 -1 -1]] \* [[ 1 -1 -1]  
 [-1 1 -1]  
 [-1 -1 1]] = 1.0

Feature Map[4, 3] = Sum(Receptive Field \* Filter) = [

[-1 1 -1]  
 [ 1 -1 1]  
 [-1 -1 -1]] \* [[ 1 -1 -1]  
 [-1 1 -1]  
 [-1 -1 1]] = -3.0

Feature Map[4, 4] = Sum(Receptive Field \* Filter) = [

[ 1 -1 -1]  
 [-1 1 -1]  
 [-1 -1 1]] \* [[ 1 -1 -1]  
 [-1 1 -1]  
 [-1 -1 1]] = 9.0

Feature Map[4, 5] = Sum(Receptive Field \* Filter) = [

[-1 -1 -1]  
 [ 1 -1 -1]  
 [-1 1 -1]] \* [[ 1 -1 -1]  
 [-1 1 -1]  
 [-1 -1 1]] = -1.0

Feature Map[4, 6] = Sum(Receptive Field \* Filter) = [

[-1 -1 -1]  
 [-1 -1 -1]  
 [ 1 -1 -1]] \* [[ 1 -1 -1]  
 [-1 1 -1]  
 [-1 -1 1]] = 1.0

Feature Map[5, 0] = Sum(Receptive Field \* Filter) = [

[-1 -1 -1]  
 [-1 -1 1]  
 [-1 1 -1]] \* [[ 1 -1 -1]  
 [-1 1 -1]  
 [-1 -1 1]] = -1.0

Feature Map[5, 1] = Sum(Receptive Field \* Filter) = [

[-1 -1 1]  
 [-1 1 -1]  
 [ 1 -1 -1]] \* [[ 1 -1 -1]  
 [-1 1 -1]  
 [-1 -1 1]] = 1.0

Feature Map[5, 2] = Sum(Receptive Field \* Filter) = [

[-1 1 -1]  
 [ 1 -1 -1]  
 [-1 -1 -1]] \* [[ 1 -1 -1]  
 [-1 1 -1]  
 [-1 -1 1]] = -1.0

Feature Map[5, 3] = Sum(Receptive Field \* Filter) = [

[ 1 -1 1]  
 [-1 -1 -1]  
 [-1 -1 -1]] \* [[ 1 -1 -1]  
 [-1 1 -1]  
 [-1 -1 1]] = 3.0

Feature Map[5, 4] = Sum(Receptive Field \* Filter) = [

[-1 1 -1]  
 [-1 -1 1]  
 [-1 -1 -1]] \* [[ 1 -1 -1]  
 [-1 1 -1]  
 [-1 -1 1]] = -1.0

Feature Map[5, 5] = Sum(Receptive Field \* Filter) = [

[ 1 -1 -1]  
 [-1 1 -1]  
 [-1 -1 1]] \* [[ 1 -1 -1]  
 [-1 1 -1]  
 [-1 -1 1]] = 9.0

Feature Map[5, 6] = Sum(Receptive Field \* Filter) = [

[-1 -1 -1]  
 [ 1 -1 -1]  
 [-1 1 -1]] \* [[ 1 -1 -1]  
 [-1 1 -1]  
 [-1 -1 1]] = -1.0

Feature Map[6, 0] = Sum(Receptive Field \* Filter) = [

[-1 -1 1]  
 [-1 1 -1]  
 [-1 -1 -1]] \* [[ 1 -1 -1]  
 [-1 1 -1]  
 [-1 -1 1]] = 3.0

Feature Map[6, 1] = Sum(Receptive Field \* Filter) = [

[-1 1 -1]  
 [ 1 -1 -1]  
 [-1 -1 -1]] \* [[ 1 -1 -1]  
 [-1 1 -1]  
 [-1 -1 1]] = -1.0

Feature Map[6, 2] = Sum(Receptive Field \* Filter) = [

[ 1 -1 -1]  
 [-1 -1 -1]  
 [-1 -1 -1]] \* [[ 1 -1 -1]  
 [-1 1 -1]  
 [-1 -1 1]] = 5.0

Feature Map[6, 3] = Sum(Receptive Field \* Filter) = [

[-1 -1 -1]  
 [-1 -1 -1]  
 [-1 -1 -1]] \* [[ 1 -1 -1]  
 [-1 1 -1]  
 [-1 -1 1]] = 3.0

Feature Map[6, 4] = Sum(Receptive Field \* Filter) = [

[-1 -1 1]  
 [-1 -1 -1]  
 [-1 -1 -1]] \* [[ 1 -1 -1]  
 [-1 1 -1]  
 [-1 -1 1]] = 1.0

Feature Map[6, 5] = Sum(Receptive Field \* Filter) = [

[-1 1 -1]  
 [-1 -1 1]  
 [-1 -1 -1]] \* [[ 1 -1 -1]  
 [-1 1 -1]  
 [-1 -1 1]] = -1.0

Feature Map[6, 6] = Sum(Receptive Field \* Filter) = [

[ 1 -1 -1]  
 [-1 1 -1]  
 [-1 -1 -1]] \* [[ 1 -1 -1]  
 [-1 1 -1]  
 [-1 -1 1]] = 7.0

# Feature Map (Rounded)

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| 0.78 | -0.11 | 0.11 | 0.33 | 0.56 | -0.11 | 0.33 |
| -0.11 | 1.0 | -0.11 | 0.33 | -0.11 | 0.11 | -0.11 |
| 0.11 | -0.11 | 1.0 | -0.33 | 0.11 | -0.11 | 0.56 |
| 0.33 | 0.33 | -0.33 | 0.56 | -0.33 | 0.33 | 0.33 |
| 0.56 | -0.11 | 0.11 | -0.33 | 1.0 | -0.11 | 0.11 |
| -0.11 | 0.11 | -0.11 | 0.33 | -0.11 | 1.0 | -0.11 |
| 0.33 | -0.11 | 0.56 | 0.33 | 0.11 | -0.11 | 0.78 |

# Max Pooling Calculation

Pooled Height: 7 // 2 = 3

Pooled Width: 7 // 2 = 3

Pooled Feature Map[0, 0] = Max(Pool Region) = [[ 0.78 -0.11]  
 [-0.11 1. ]] -> 1.0

Pooled Feature Map[0, 1] = Max(Pool Region) = [[ 0.11 0.33]  
 [-0.11 0.33]] -> 0.33

Pooled Feature Map[0, 2] = Max(Pool Region) = [[ 0.56 -0.11]  
 [-0.11 0.11]] -> 0.56

Pooled Feature Map[1, 0] = Max(Pool Region) = [[ 0.11 -0.11]  
 [ 0.33 0.33]] -> 0.33

Pooled Feature Map[1, 1] = Max(Pool Region) = [[ 1. -0.33]  
 [-0.33 0.56]] -> 1.0

Pooled Feature Map[1, 2] = Max(Pool Region) = [[ 0.11 -0.11]  
 [-0.33 0.33]] -> 0.33

Pooled Feature Map[2, 0] = Max(Pool Region) = [[ 0.56 -0.11]  
 [-0.11 0.11]] -> 0.56

Pooled Feature Map[2, 1] = Max(Pool Region) = [[ 0.11 -0.33]  
 [-0.11 0.33]] -> 0.33

Pooled Feature Map[2, 2] = Max(Pool Region) = [[ 1. -0.11]  
 [-0.11 1. ]] -> 1.0

# Pooled Feature Map

|  |  |  |
| --- | --- | --- |
| 1.0 | 0.33 | 0.56 |
| 0.33 | 1.0 | 0.33 |
| 0.56 | 0.33 | 1.0 |