1. Theoretical Tasks - Solutions

Task 1.1 Convolution

$$k = \begin{bmatrix} 4 & 5 & 6 & 4 \\ 5 & 3 & 3 & 6 \\ 1 & -7 & -7 & 0 \\ 4 & 1 & 0 & 4 \end{bmatrix}$$

Task 1.2 Non Linearity

$$k = \begin{bmatrix} 4 & 5 & 6 & 4 \\ 5 & 3 & 3 & 6 \\ 1 & 0 & 0 & 0 \\ 4 & 1 & 0 & 4 \end{bmatrix}$$

Task 1.3 Max Pooling

$$I = \begin{bmatrix} 5 & 6 \\ 4 & 4 \end{bmatrix}$$

Task 1.4 Flattening

$$I_{flattened} = [5, 6, 4, 4]^T$$

Task 1.5 Fully Connected Layer

$$k = \begin{bmatrix} 1 \times 5 + 2 \times 6 + 3 \times 4 + 4 \times 4 = 45 \\ 5 \times 5 + 6 \times 6 + 7 \times 4 + 8 \times 4 = 121 \end{bmatrix}$$

Task 1.6 SoftMax

$$\frac{e^{45}}{e^{45} + e^{121}} = 9.85 * 10^{-34} \approx 0$$

$$\frac{e^{121}}{e^{45} + e^{121}} \approx 1$$

The two values sum up to 1. The input will be classified as class two.