28.05.19

# 3. Aufgabenblatt

① $\nabla E \begin{pmatrix} \frac{\partial E}{\partial w} \\ \frac{\partial E}{\partial b} \end{pmatrix}$

$$\frac{\partial E}{\partial w} = \frac{1}{2} \cdot \sum_{\mu=1}^{M} \left[ 2 \cdot \left( T_\mu - f(w \cdot x_\mu + b) \right) \cdot \left( -f'(w \cdot x_\mu + b) \right) \cdot x_\mu \right]$$

$$\frac{\partial E}{\partial b} = \frac{1}{2} \sum_{\mu=1}^{M} \left[ 2 \cdot \left( T_\mu - f(w \cdot x_\mu + b) \right) \cdot \left( -f'(w \cdot x_\mu + b) \right) \cdot 1 \right]$$

②

a) inkrementelle Version: S. 78

$$w(t+1) = w(t+1) + 2\, \ell(t) \cdot (T_\mu - y_\mu) \cdot f'(u_\mu) \cdot x_\mu$$
$$= w(t+1) + 2\eta \left( T_\mu - f(w x_\mu + b) \right) \cdot f'(w x_\mu + b)\, x_\mu$$
$$b(t+1) = b(t+1) + 2 \underbrace{\ell(t)}_{=\eta} \left( T_\mu - f(w x_\mu + b) \right) \cdot f'(w x_\mu + b)$$

b) Batch-Version:

$$w(t+1) = w(t+1) + 2\, \ell(t) \sum_{\mu=1}^{M} (T_\mu - y_\mu)\, f'(u_\mu) \cdot x_\mu$$
$$= w(t+1) + 2\eta \sum_{\mu=1}^{M} \left( T_\mu - f(w x_\mu + b) \right) \cdot f'(w x_\mu + b) \cdot x_\mu$$
$$b(t+1) = b(t+1) + 2 \underbrace{\ell(t)}_{=\eta} \sum_{\mu=1}^{M} \left( T_\mu - f(w x_\mu + b) \right) \cdot f'(w x_\mu + b)$$