Nichtlineare Zeitanpassung

17.01.12/24.01.12

Rekursion

$$D(1,1) = d((1,1))$$

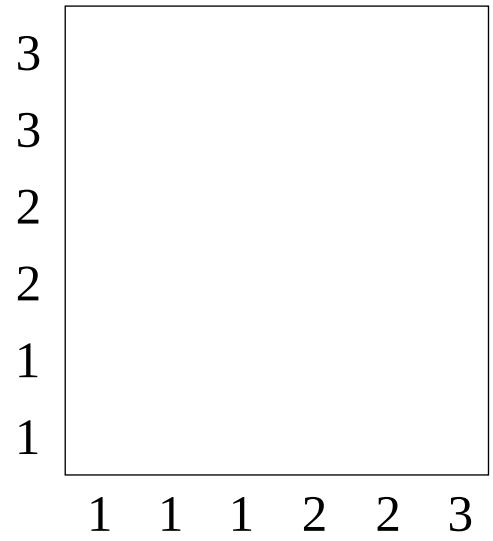
$$D(i,\ j) = d((i,\ j)) + \min\left\{D(i-1,\ j), D(i,\ j-1), D(i-1,\ j-1)\right\}$$

Beispiel 1

Klassenmuster

$$\mathbf{Q} = \mathbf{q}(1), \mathbf{q}(2), \ldots, \mathbf{q}(6)$$

$$\mathbf{q}(1) = q_1(1) = 1$$
$$\mathbf{q}(2) = q_1(2) = 1$$
$$\mathbf{q}(3) = q_1(3) = 2$$
$$\mathbf{q}(4) = q_1(4) = 2$$
$$\mathbf{q}(5) = q_1(5) = 3$$
$$\mathbf{q}(6) = q_1(6) = 3$$



$$d((i, j)) = \left| p_1(i) - q_1(j) \right|$$

Testmuster

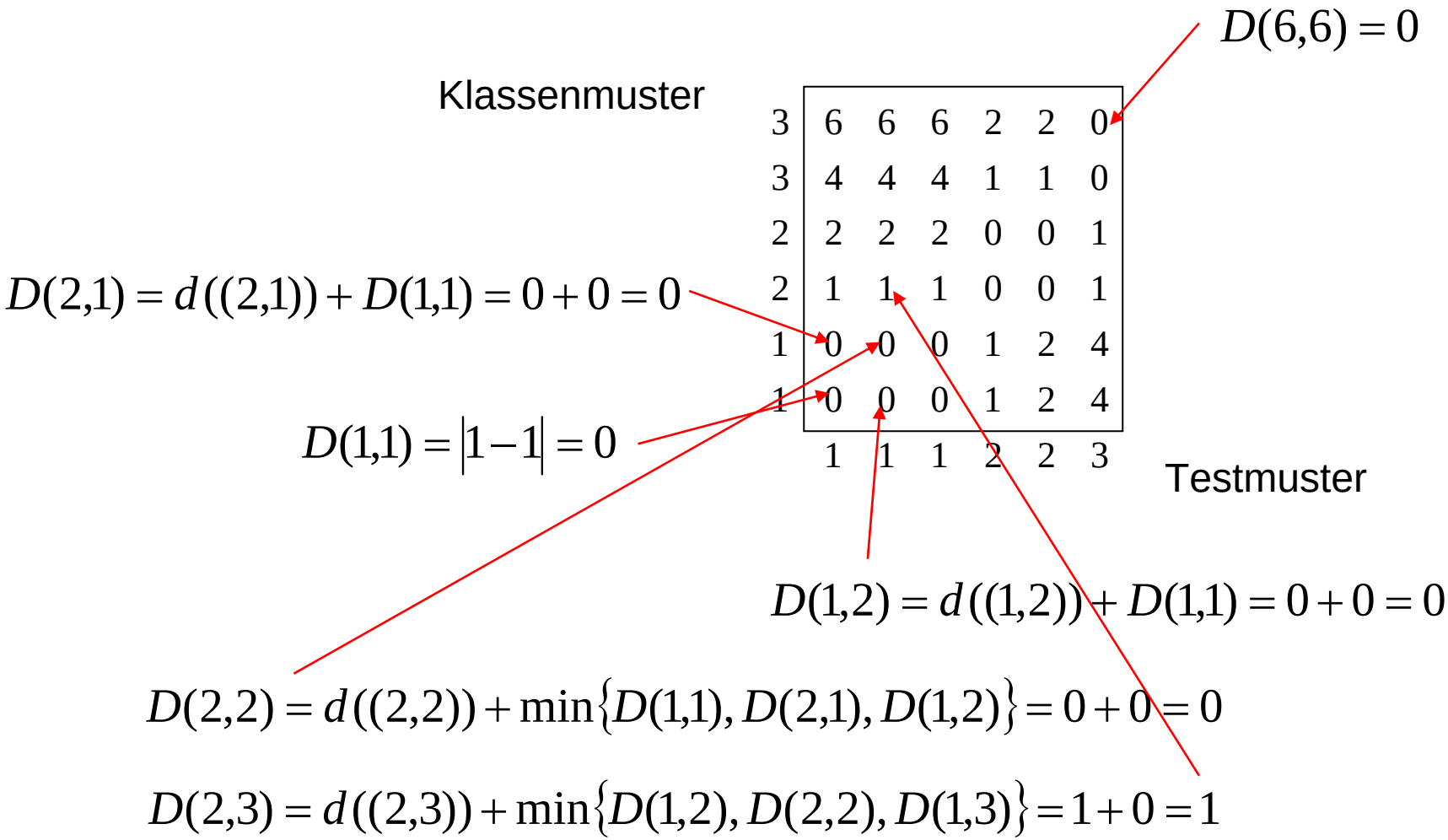
$$\mathbf{P} = \mathbf{p}(1), \mathbf{p}(2), \ldots, \mathbf{p}(6)$$

$$\mathbf{p}(1) = p_1(1) = 1$$
$$\mathbf{p}(2) = p_1(2) = 1$$
$$\mathbf{p}(3) = p_1(3) = 1$$
$$\mathbf{p}(4) = p_1(4) = 2$$
$$\mathbf{p}(5) = p_1(5) = 2$$
$$\mathbf{p}(6) = p_1(6) = 3$$

$$\left| \mathbf{P} - \mathbf{Q} \right| = \sum_{i=1}^{6} \left| p_1(i) - q_1(i) \right| = 2$$

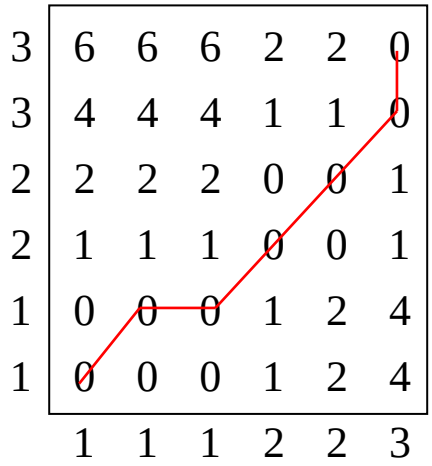
lineare Zeitanpassung

Beispiel 1


$D(6,6)=0$
Klassenmuster
3 6 6 6 2 2 0
3 4 4 4 1 1 0
2 2 2 2 0 0 1
2 1 1 1 0 0 1
1 0 0 0 1 2 4
1 0 0 0 1 2 4
1 1 1 2 2 3
Testmuster
$D(2,1)=d((2,1))+D(1,1)=0+0=0$
$D(1,1)=|1-1|=0$
$D(1,2)=d((1,2))+D(1,1)=0+0=0$
$D(2,2)=d((2,2))+\min\{D(1,1),D(2,1),D(1,2)\}=0+0=0$
$D(2,3)=d((2,3))+\min\{D(1,2),D(2,2),D(1,3)\}=1+0=1$

Beispiel 1

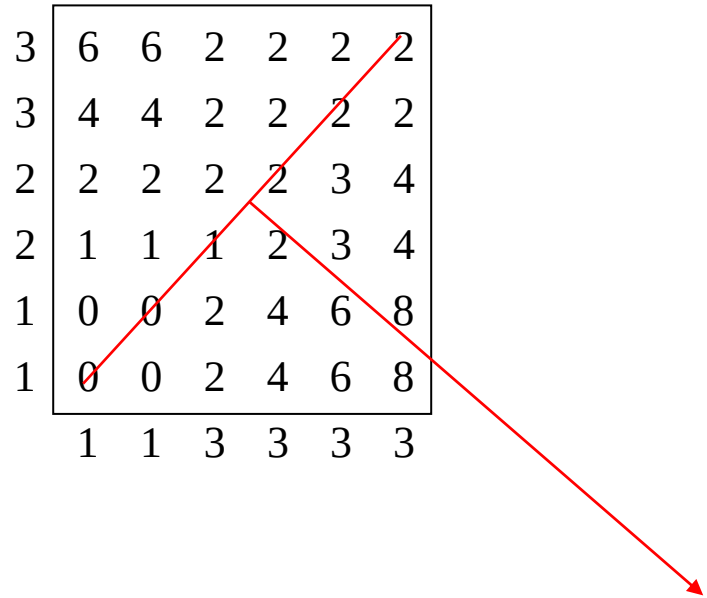
nichtlineare Zeitanpassung



$$W = (1,1),(2,2),(3,2),(4,3),(5,4),(6,5),(6,6)$$

$$\left|\mathbf{P}-\mathbf{Q}\right| = \sum_{l=1}^{7} d(w(l)) = \sum_{l=1}^{7} d((i(l), j(l))) = \sum_{l=1}^{7} \left| p_1(i(l)) - q_1(j(l)) \right| = 0$$

Beispiel 2



$$\left|\mathbf{P}-\mathbf{Q}\right| = \sum_{i=1}^{6} \left| p_1(i) - q_1(i) \right| = 2$$

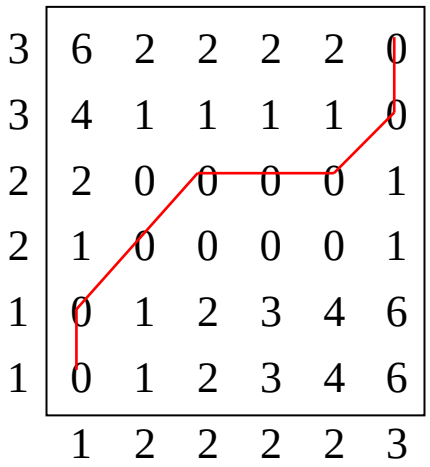
nichtlineare Zeitanpassung – kein Vorteil

lineare Zeitanpassung

Beispiel 3

$$\left|\mathbf{P}-\mathbf{Q}\right| = \sum_{i=1}^{6} \left| p_1(i) - q_1(i) \right| = 2$$

lineare Zeitanpassung



nichtlineare Zeitanpassung

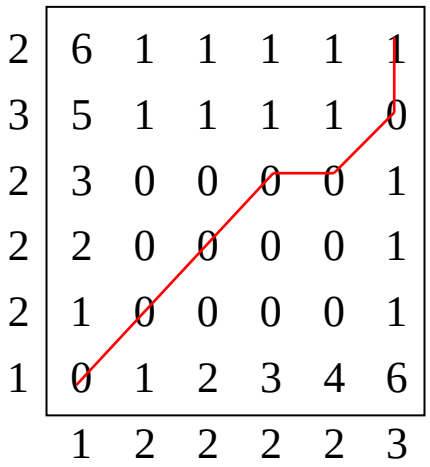
$$W = (1,1),(1,2),(2,3),(3,4),(4,4),(5,4),(6,5),(6,6)$$

$$\left|\mathbf{P}-\mathbf{Q}\right| = \sum_{l=1}^{8} d(w(l)) = \sum_{l=1}^{8} d((i(l), j(l))) = \sum_{l=1}^{8} \left| p_1(i(l)) - q_1(j(l)) \right| = 0$$

Beispiel 4

$$\left|\mathbf{P}-\mathbf{Q}\right| = \sum_{i=1}^{6} \left| p_1(i) - q_1(i) \right| = 2$$

lineare Zeitanpassung
(wie im Beispiel 3)



nichtlineare Zeitanpassung

$$W = (1,1),(2,2),(3,3),(4,4),(5,4),(6,5),(6,6)$$

$$\left|\mathbf{P}-\mathbf{Q}\right| = \sum_{l=1}^{7} d(w(l)) = \sum_{l=1}^{7} d((i(l), j(l))) = \sum_{l=1}^{7} \left| p_1(i(l)) - q_1(j(l)) \right| = 1$$

Beispiel 5

$$\left|\mathbf{P}-\mathbf{Q}\right| = \sum_{i=1}^{10} \left| p_1(i) - q_1(i) \right| = 4$$

lineare Zeitanpassung