Compute adaptive weight for ANN (by hand)

Given the initial weights:
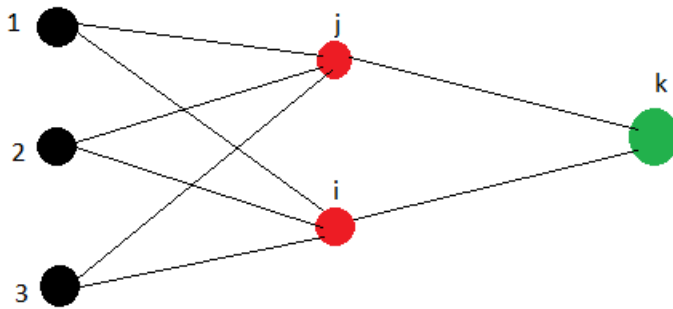
w1j w1i w2j w2i w3j w3i wjk wik

0.2 0.1 0.3 -0.1 -0.1 0.2 0.1 0.5

Input: [1, 0.4, 0.7]

Nodes:

(1,2,3) -> (j,i) -> k

Calculate the updated weights for the first iteration:

$o_j = w_{1j}x_{1j} + w_{2j}x_{2j} + w_{3j}x_{3j} = 1*0.2 + 0.3*0.4 + (-0.1)*0.7 = 0.25$

$o_i = w_{1i}x_{1i} + w_{2i}x_{2i} + w_{3i}x_{3i} = 1*0.1 + 1.3*(-0.1) + 0.2*0.7 = 0.2$

$o_k = w_{jk}x_j + w_{ik}x_j = w_{jk}o_j + w_{ik}o_i = 0.1*0.25 + 0.5*0.2 = 0.125$

$\delta_k = o_k (1 - o_k)(t_k - o_k) = 0.125(1 - 0.125)(t_k - 0.125).$

$\delta_j = o_j(1 - o_j)\sum_k w_{jk}\delta_k = 0.25(1-0.25)0.1*\delta_k = 0.01875\delta_k$

$\delta_i = o_j(1 - o_i)\sum_k w_{ik}\delta_k = 0.2(1-0.2)0.5*\delta_k = 0.08\delta_k$

Chọn α = 0, η = 1;

$\Delta w_{jk} = \eta* \delta_k*o_j = \delta_k*0.25 = 0.25\delta_k$;   **$W_{jk} \leftarrow w_{jk} + \Delta w_{jk}; w_{jk} = 0.1 + 0.25\delta_k$**

$\Delta w_{ik} = \eta* \delta_k*o_i = 1\delta_k*0.2 = 0.2\delta_k$;   **$W_{ik} \leftarrow w_{jk} + \Delta w_{ik}; w_{ik} = 0.5 + 0.25\delta_k$**

$\Delta w_{1j} = \eta* \delta_j*x_{1j} = 1*0.01875\delta_k = 0.01875\delta_k;$ **$W_{1j} \leftarrow w_{1j} + \Delta w_{1j}; w_{1j} = 0.2 + 0.25\delta_k$**

$\Delta w_{2j} = \eta* \delta_k*x_{2j} = 0.4*0.01875\delta_k = 0.0075\ \delta_k;$ **$W_{2j} \leftarrow w_{2j} + \Delta w_{2j}; w_{2j} = 0.3 + 0.0075\delta_k$**

$\Delta w_{3j} = \eta* \delta_k*x_{3j} = 0.7*0.01875\delta_k = 0.013125\ \delta_k;$ **$W_{3j} \leftarrow w_{3j} + \Delta w_{3j}; w_{3j} = -0.1 + 0.013125\ \delta_k$**

$\Delta w_{1i} = \eta* \delta_k*x_{1j} = 1*0.08\delta_k = 0.08\delta_k;$ **$W_{1i} \leftarrow w_{1i} + \Delta w_{1i}; w_{1i} = 0.1 + 0.08\delta_k$**

$\Delta w_{2i} = \eta* \delta_k*x_{1j} = 0.4*0.08\delta_k = 0.032\delta_k;$ **$W_{2i} \leftarrow w_{2i} + \Delta w_{2i}; w_{2i} = -0.1 + 0.032\delta_k$**

$\Delta w_{3i} = \eta* \delta_k*x_{1j} = 0.7*0.08\delta_k = 0.042\delta_k;$ **$W_{3i} \leftarrow w_{3i} + \Delta w_{3i}; w_{3i} = 0.2 + 0.042\delta_k$**