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Training Set (OR)

$X_1 = 1, X_2 = 1 \rightarrow 1$

$X_1 = 1, X_2 = 0 \rightarrow 1$

$X_1 = 0, X_2 = 1 \rightarrow 1$

$X_1 = 0, X_2 = 0 \rightarrow 0$

Random Weight.

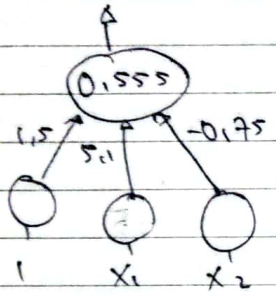
$W_0 = 1,5$, $W_1 = 5,1$ $W_2 = -0,175$

fungsi aktivasi ( ) = 0,555.

learning rate (η) = 0,575

wrong ⇒ perubahan bias ⇒ $X_0 = 1$.

Epoch 1.



a) $X_1 = 1 \; X_2 = 1 \rightarrow 1,5.1 + 5,1.1 + (-0,175).1 = 5,185 \rightarrow 1$ Ok.

b) $X_1 = 1, X_2 = 0 \rightarrow 1,5.1 + 5,1.1 + (-0,175).0 = 6,6 \rightarrow 1$ Ok

c) $X_1 = 0, X_2 = 1 \rightarrow 1,5.1 + 5,1.0 + (-0,175).1 = 0,175 \rightarrow 1$ Ok.

d) $X_1 = 0, X_2 = 0 \rightarrow 1,5.1 + 5,1.0 + (-0,175).1 = 1,5 \rightarrow 1$ Wrong

↳ Err = target − Output = 0 − 1 = −1

$\Delta W_0 = \eta . Err . X_0 = 0,575 . -1 . 1 = -0,575$

$\Delta W_1 = \eta . Err . X_1 = 0,575 . -1 . 0 = 0$

$\Delta W_2 = \eta . Err . X_2 = 0,575 . -1 . 0 = 0$

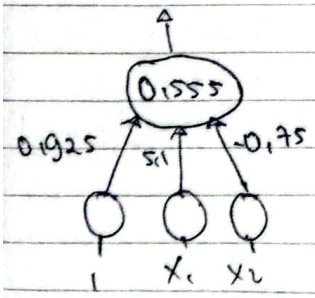
$W_0\text{-baru} = W_0 + \Delta W_0 = 1,5 + (-0,575) = 0,925$

$W_1\text{-baru} = W_1 + \Delta W_1 = 5,1 + 0 = 5,1$

$W_2\text{-baru} = W_2 + \Delta W_2 = -0,175 + 0 = -0,175$

$W_0 = 0,925$; $W_1 = 5,1$; $W_2 = -0,175$

Epoch 2.



a) $X_1 = 1, X_2 = 1 \rightarrow 0,925.1 + 5,1.1 + (-0,175).1 = 5,275 \rightarrow 1$ Ok.

b) $X_1 = 1, X_2 = 0 \rightarrow 0,925.1 + 5,1.1 + (-0,175).0 = 6,0245 \rightarrow 1$ Ok

c) $X_1 = 0, X_2 = 0 \rightarrow 0,925.1 + 5,1.0 + (-0,175).1 = 0,175 \rightarrow 0$ Wrong

↳ Err = target − Output = 1 − 0 = 1

$\Delta W_0 = \eta . Err . X_0 = 0,575 . 1 . 1 = 0,575$

$\Delta W_1 = \eta . Err . X_1 = 0,575 . 1 . 0 = 0$

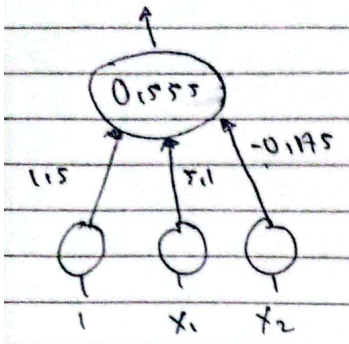
$\Delta W_2 = \eta . Err . X_2 = 0,575 . 1 . 1 = 0,575$

$W_0\text{-baru} = W_0 + \Delta W_0 = 0,925 + 0,575 = 1,5$

$W_1\text{-baru} = W_1 + \Delta W_1 = 5,1 + 0 = 5,1$

$W_2\text{-baru} = W_2 + \Delta W_2 = -0,175 + 0,575 = 0,175$

$W_0 = 1,5$; $W_1 = 5,1$; $W_2 = -0,175$



d) $X_1=0, X_2=0 \rightarrow 1,1,5+5,1.0+(-0,175).0=1,5\rightarrow 1$ (Wrong)

↳ Err = target − Output = 0 − 1 = −1

$\Delta w_0 = \eta . Err . x_0 = 0,575 . -1 . 1 = -0,575$

$\Delta w_1 = \eta . Err . x_1 = 0,575 . -1 . 0 = 0$

$\Delta w_2 = \eta . Err . x_2 = 0,575 . -1 . 0 = 0$

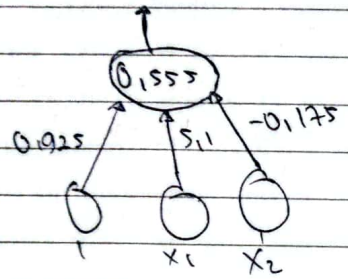
$w_{0\text{-baru}} = 1,5 + (-0,575) = 0,925$

$w_{1\text{-baru}} = 5,1 + 0 = 5,1$

$w_{2\text{-baru}} = -0,175 + 0 = -0,175$

$w_0 = 0,925 ; w_1 = 5,1 ; w_2 = -0,175$

Epoch 3



a) $X_1=1 ; X_2=1 \rightarrow 0,925.1+5,1.1+(-0,175).1=5,85\rightarrow 1$ Ok

b) $X_1=1 ; X_2=0 \rightarrow 0,925.1+5,1.1+(-0,175).0=6,0245\rightarrow 1$ Ok

c) $X_1=0 ; X_2=1 \rightarrow 0,925.1+5,1.0+(-0,175).1=0,75\rightarrow 1$ Ok

d) $X_1=0 ; X_2=0 \rightarrow 0,925.1+5,1.0+(-0,175).0=0,925\rightarrow 1$ Wrong

↳ Err = target − Output = 0 − 1 = −1

$\Delta w_0 = \eta . err . x_0 = 0,575 . -1 . 1 = -0,575$

$\Delta w_1 = \eta . err . x_1 = 0,575 . -1 . 0 = 0$

$\Delta w_1 = \eta . Err . x_2 = 0,575 . -1 . 0 = 0$

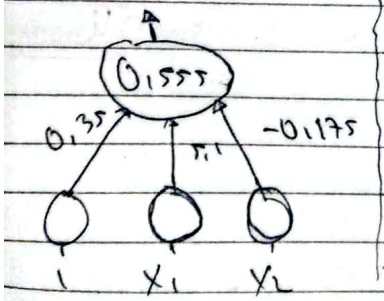
$w_{0\text{-baru}} = w_0 + \Delta w_0 = 0,925 + (-0,575) = 0,35$

$w_{1\text{-baru}} = w_1 + \Delta w_1 = 5,1 + 0 = 5,1$

$w_{2\text{-baru}} = w_2 + \Delta w_2 = -0,175 + 0 = -0,175$

$w_0 = 0,135 ; w_1 = 5,1 ; w_2 = -0,175$

Epoch 4



a) $X_1=1 ; X_2=1 \rightarrow 0,135.1+5,1.1+(-0,175).1=5,275\rightarrow 1$ Ok

b) $X_1=1 ; X_2=0 \rightarrow 0,35.1+5,1.1+(-0,175).0=5,45\rightarrow 1$ Ok.

c) $X_1=0 ; X_2=1 \rightarrow 0,35.1+5,1.0+(-0,175).1=0,175\rightarrow 0$ Wrong

↳ Err = Target − Output = 1 − 0 = 1

$\Delta w_0 = 0,575 . 1 . 1 = 0,575$

$\Delta w_1 = 0,575 . 1 . 0 = 0$

$\Delta w_2 = 0,575 . 1 . 1 = 0,575$

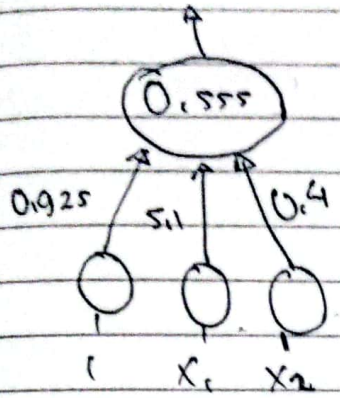
$w_{0\text{-baru}} = w_0 + \Delta w_0 = 0,35 + 0,575 = 0,925$

$w_{1\text{-baru}} = w_1 + \Delta w_1 = 5,1 + 0 = 5,1$

$w_{2\text{-bar}} = w_2 + \Delta w_2 = -0,175 + 0,575 = 0,4$

$w_0 = 0,925 ; w_1 = 5,1 ; w_2 = 0,4$

Epoch 4 (lanjutan Sebelumnya)



d) $X_1 = 0; X_2 = 0 \rightarrow 0,925 \cdot 1 + 5,1 \cdot 0 + 0,4 \cdot 0 = 0,925 \rightarrow 1$ (Wrong)

Err = Target − Output = 0 − 1 = −1

$\Delta w_0 = \eta \cdot Err \cdot x_0 = 0,575 \cdot -1 \cdot 1 = -0,575$

$\Delta w_1 = \eta \cdot E \cdot x_1 = 0,575 \cdot -1 \cdot 0 = 0$

$\Delta w_2 = \eta \cdot E \cdot x_2 = 0,575 \cdot -1 \cdot 0 = 0$

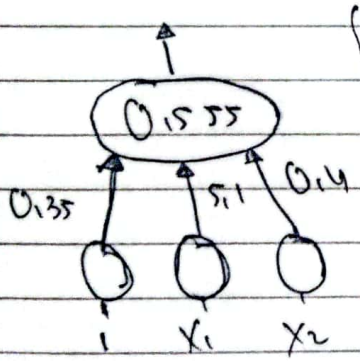
$w_{0\_baru} = 0,925 + (-0,575) = 0,35$

$w_{1\_baru} = 5,1 + 0 = 5,1$

$w_{2\_baru} = 0,4 + 0 = 0,4$

$w_0 = 0,35; \; w_1 = 5,1; \; w_2 = 0,4$

Epoch 5



a) $X_1 = 1; X_2 = 1 \rightarrow 0,35 \cdot 1 + 5,1 \cdot 1 + 0,4 \cdot 1 = 5,85 \rightarrow 1$ Ok

b) $X_1 = 1; X_2 = 0 \rightarrow 0,35 \cdot 1 + 5,1 \cdot 1 + 0,4 \cdot 0 = 5,45 \rightarrow 1$ Ok

c) $X_1 = 0; X_2 = 1 \rightarrow 0,35 \cdot 1 + 5,1 \cdot 0 + 0,4 \cdot 1 = 0,75 \rightarrow 1$ Ok

d) $X_1 = 0; X_2 = 0 \rightarrow 0,35 \cdot 1 + 5,1 \cdot 0 + 0,4 \cdot 0 = 0,35 \rightarrow 0$ Ok

Karena Semua iterasi Pada Epoch ke-5 Sudah Sesuai dengan target maka perceptron berhenti dan telah selesai di Epoch ke-5

Implementasi ke dalam kode python

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https://www.kaggle.com/code/rizkipurnomo/menghitung-epoch