Computational Intelligence

Homework-7

CSE17348

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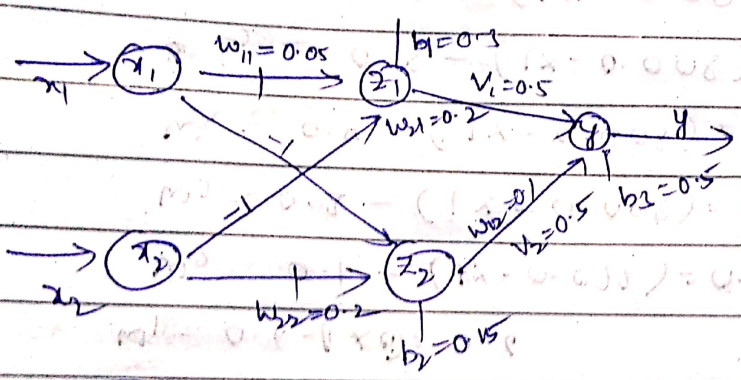
(1)



$x_1=1 \quad x_2=1$

$net\ z_1 = w_{11}x_1 + w_{21}x_2 + b_1$

$z_1 = 0.05\times 1 + 0.2\times 1 + 0.3$

$= 0.55$

$net\ z_2 = w_{12}x_1 + w_{22}x_2 + b_2$

$= 0.1\times 1 + 0.2\times 1 + 0.15$

$= 0.45$

Since z_1 & $z_2 > 0$ Therefore $z_1 = z_2 = 1$

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$y_{in} = v_1 z_1 + v_2 z_2 + b_1$

$= 1.5$

t = 1 hence $t \neq 0$ so w_{11} (new obtained) $= w_{11}$ (old) $+ \alpha (t - z_1)(x_i)$

$-1 - 1.5 = -2.5$

$= 0.05 + 0.5(-1 - 0.55)(1)$

$= 0.05 + (-0.775) = 0.725$

w_{12} (new) $= w_{12}$ (old) $+ \alpha (t - z_2)(x_i)$

$= 0.1 + 0.5(-1 - 0.45)1 = 0.1 - 0.725 = -0.625$

w_{21} (new) $= w_{21}$ (old) $+ \alpha (t - z_1) x_i$

$= 0.2 + 0.5(-1 - 0.55)(1) = 0.2 - 0.775 = -0.575$

$w_{22} = 0.2 - 0.725 = -0.525$

$b_1 = 0.3 + \alpha$ (Error) $= 0.3 + 0.5(-1 - 0.55) = 0.3 - 0.725 = -0.425$

$b_2 = 0.15 - 0.725 = -0.575$

$x_1 = 1 ; x_2 = -1$

net $z_1 = w_{11} x_1 + w_{21} x_2 + b_1$

$= -0.725(1) + (-0.525)(-1) + (0.475)$

$= -0.625$

net $z_2 = w_{12} x_1 + w_{22} x_2 + b_2$

$= -0.625(1) + (-0.525)(-1) + [-0.525)$

$= -0.675$

Since $z_1 = z_2 = -1$

$y_{in} = b_2 + z_1 w_1 + z_2 w_2$

$= -0.5 + (-0.5) + 0.5$

$= -0.5 \quad t = 1 \quad 0.5$

$t - y_{in} \neq 0$

$w_{11}(\text{new}) = w_{11}(\text{old}) + \alpha(\text{target}) x_1$

$= -0.725 + 0.5[1 + 0.625)(1)$

$= 0.0875$

$w_{21}(\text{new}) = w_{21}(\text{old}) + \alpha(\text{target})(x_2)$

$= -0.525 - 0.8125 = -1.3375$

$w_{12}(\text{new}) = w_{12}(\text{old}) + \alpha(\text{target})(z_1)$

$= -0.625 + 0.5(1 + 0.675)$

$= 0.1625$

$b_2(\text{new}) = b_2(\text{old}) + \alpha(\text{target})$

$= -0.575 + 0.5375$

$= 0.2625$

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$w_{22}(new) = w_{22}(old) + b_2(error)\, x_2$

$= -0.525 - 0.8375 = -1.3625$

$B_1(new) = B_1(old) + b_0(error)$

$= -0.475 + 0.8125 = 0.3375$

$x_2 = -1, x_2 = 1$

$net\ z_1 = w_{11}x_2 + w_{21}x_2 + b_1$

$= 0.0825(-1) + (-1.3375) + 0.3375$

$= -1.1375$

$net\ z_2 = w_{12}x_1 + w_{22}x_2 + b_2$

$= 0.2125(-1) + (-1.3375) + 0.2625$

$= -1.3125$

Since $z_1 * z_2 < 0$ $z_1 = z_2 = -1$ $y_{in} = -1(0.5) - 1(0.5) + 0.5$

$= -0.5$

$t = 1$

$t - y_{in} \neq 0$

$1 - 0.5 = 0.5$

$w_{11}(new) = w_{11}(old) + \alpha[t - z_{in}(1)]$

$= 0.0875 + 0.5(1 - 0.4875)(-1)$

$= -0.168$

$w_{21} = w_{21}(old) + \alpha(t - z_{in})$

$= -1.3375 + 0.25625$

$= -1.13125$

$B_1(new) = B_1(old) + lr(error)$
$= 0.33725 + 0.25625$
$= 0.59375$

$B_2(new) = B_2(old) + lr(error)$
$= 0.2625 + 0.31675$
$= 0.58195$

$x_1 = -1\ x_2 = -1\ t = -1$

net $z_1 = w_{11}x_1 + w_{21}x_2 + b_1$
$= 1.893$

net $z_2 = w_{12}x_1 + w_{22}x_2 + b_2$
$= 1.9306$

Since $z_1, z_2 > 0$ $z_1 = z_2 = 1$

$y_{in} = 1.5$ $t = -1$ $t - y_{in} \neq 0$
$-1 - 1.5 = -2.5 \neq 0$

$w_{11}(new) = w_{11}(old) + lr(t - z_1)x_1$
$= -0.168 + 1.4465 = 1.2725$

$w_{21}(new) = w_{21}(old) + lr(error)(x_1)$
$= -1.13125 + 1.44465$
$= 0.315525$

$w_{12}(new) = w_{12}(old) + 0.5(-1 - 1.7300)(-1)$
$= 1.259$

$w_{22}(new) = -1.043 + 1.365$
$= 0.32225$

$B_1(new) = B_1(old) + lr(error)$
$= -0.85725$

$B_2(new) = B_2(old) + lr(error)$
$= -0.484$

$x_1 = 1, x_2 = 1, t = -1$

net $z_1 = w_{11}x_1 + w_{12}x_2 + b_1$

$= 1.2185 + 0.21525 - 0.83275$

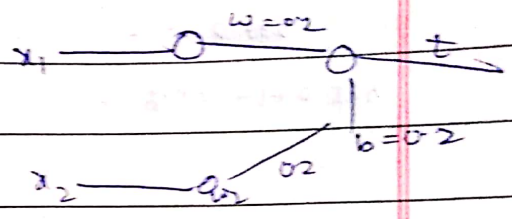
$= 0.7941$

net $z_2 = w_{11}x_1 + w_{22}x_2 + b_2$

$= 0.7975$

(2)

x_1	x_2	t
1	1	-1
1	-1	1
-1	1	-1
-1	-1	-1



(1) $x_1 = 1, x_2 = 1$

$w_1 = 0.2 \quad w_2 = 0.2 \quad b_2 = 0.2 \quad \alpha = 0.2$

$y_{in} = b + w_1x_1 + w_2x_2 = 0.6$

$w_1(new) = w_1(old) + \alpha(t - y_{in})x_1$

$= -0.12$

$w_2(new) = -0.12$

$b_{new} = -0.12$

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(ii) $x_1 = 1, x_2 = -1, t = 1$

$y_{in} = -0.12(1) - 0.12(-1) - 0.12$

$= -0.12$

$w_1(n) = w_1(0) + \alpha(t - y_{in})x_1$

$= 0.104$

$t - y_{in} = 1 + 0.12$

$= 1.12$

$w_2(n) = w_2(0) + \alpha(t - y_{in})x_2$

$= -0.12 + 0.2(1.12)$

$= -0.344$

$b(n) = b(0) + \alpha(t - y_{in}) = -0.12 + 0.2(1.12)$

$= 0.104$

(iii) $x_1 = -1, x_2 = 1, t = -1$

$y_{in} = w_1x_1 + w_2x_2 + b$

$= 0.344$

$t - y_{in} = -1 + 0.344$

$= -0.656$

$w_1(n) = w_1(0) + \alpha(t - y_{in})x_1$

$= 0.2352$

$w_2(n) = w_2(0) + \alpha(t - y_{in})x_2$

$= -0.4752$

$b(n) = 0.104 + 0.2(-0.656) = -0.0272$

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iv) $x_1 = -1$; $x_2 = -1$ $t_2 = -1$

$y_{in} = w_1 x_1 + w_2 x_2 + b_1$

$= 0.2352(-1) + (-0.4752)(-1) - 0.0272$

$= 0.2128$

$t - y_{in} = -1 - 0.2128$

$= -1.2128$

$w_1(n) = w_1(0) + \alpha(t - y_{in}) x_1$

$= 0.2352 + 0.2(-1.2128)(-1)$

$= 0.4776$

$w_2(n) = w_2(0) + \alpha(t - y_{in}) x_2$

$= -0.4752 + 0.2(-1.2128)(-1)$

$= -0.2327$

$b(n) = -0.0272 + 0.2(-1.2128) = -0.2697$

Submitted By:
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