Quality assurance focuses on improving the software development process & making it efficient & effective as per quality standards defined for software product

* The main aim of QC is to check whether the products meet the specifications & requirements of the customer

CPE 593 - classwork

~~Activation function.~~

calculate Hidden layer 1 output

$H_1 = w_1 x_1 + w_2 x_2 + b_1$

$H_1 = (0.15 \times 0.05) + (0.20 \times 0.10) + 0.35$

$H_1 = 7.5 \times 10^{-3} + 0.02 + 0.35$

$H_1 = 0.3775$

$\text{out } H_1 = \dfrac{1}{1+e^{-0.3775}} = \dfrac{1}{1+0.6856} = 0.5933$

~~Ca~~ calculate Hidden layer 2 output

$H_2 = w_3 x_1 + w_4 x_2 + b_1$

$= (0.25 \times 0.05) + (0.30 \times 0.10) + 0.35$

$= 0.0125 + 0.03 + 0.35$

$= 0.3925$

$\text{out } H_2 = \dfrac{1}{1+e^{-0.3925}} = \dfrac{1}{1+0.6754} = 0.5969$

Calculate output Y_1

$Y_1 = (w_5 \times out\ H_1) + (w_6 \times out\ H_2) + b_2$

$Y_1 = (0.40 \times 0.5933) + (0.45 \times 0.5969) + 0.60$

$Y_1 = 0.2373 + 0.2686 + 0.60$

$Y_1 = 1.1059$

$out\ Y_1 = \frac{1}{1+e^{-1.1059}} = \frac{1}{1+0.3309} = 0.7514$

Calculate output Y_2

$Y_2 = (w_7 \times out\ H_1) + (w_8 \times out\ H_2) + b_2$

$Y_2 = (0.50 \times 0.5933) + (0.55 \times 0.5969) + 0.60$

$Y_2 = 0.2967 + 0.3283 + 0.60$

$Y_2 = 1.225$

$out\ Y_2 = \frac{1}{1+e^{-1.225}} = \frac{1}{1+0.2938} = 0.7729$

Back Propagation.

Comput error correcting function for out Y_1 & out Y_2

$\delta_1 = (t_1 - out\ Y_1)(f(out\ Y_1)[1 - f(out\ Y_1)])$

$\delta_1 = (0.01 - 0.7514)[0.7514[1 - 0.7514]]$

$-0.7414(0.7514 \times 0.2486)$

$= -0.7414 \times 0.1868$

$= -0.1385$

$\delta_2 = (t_2 - out\ Y_2)\ [f(out\ Y_2)\ [1 - f(out\ Y_2)]$

$\delta_2 = [0.99 - 0.7729]\ [0.7729\ [1 - 0.7729]]$

$\delta_2 = 0.2171\ [0.7729 \times 0.2271]$

$\delta_2 = 0.0381$

Calculate change in weight

$\Delta w_5 = \alpha \cdot \delta_1 \cdot out\ H_1$

$= 0.5 \times -0.1385 \times 0.7514$

$= -0.0520$ 0.348

$\Delta w_6 = \alpha \cdot \delta_{\cancel{1}} \cdot out\ H_2$

$= 0.5 \times \cancel{0.0381}\ -0.1385 \times 0.7729$

$= 0.\cancel{0147}$ -0.0535 0.3695

$\Delta w_7 = \alpha \cdot \delta_{\cancel{2}} \cdot out\ H_1$

$= 0.5 \times \cancel{-0.1385}\ 0.0381 \times 0.7514$

$= \cancel{-0.0520}\ 0.0143$

$\Delta w_8 = \alpha \cdot \delta_2 \cdot out\ H_2$ 0.5143

$= \cancel{0.0147}$

$= 0.5 \times 0.0381 \times 0.7729$

$= 0.0147$

Send error function to inner layer.

$\delta_{H_1} = \delta_{Y_1} \cdot w_5\ out\ H_1\ (1 - f(out\ H_1))$

$+ \delta_{Y_2} \cdot w_7\ (H_1\ (1 - f\ out\ H_1))$

$f(out\ H_1)\{1 - f(out\ H_1)\}(\delta y_1 \cdot w_5 + \delta y_2 \cdot w_7)$

$0.5933(1-0.5933)(-0.1385 \times 0.40 + 0.0381 \times 0.5)$

$\cancel{0.593}$

$0.2413(-0.0554 + 0.01905)$

-8.7713×10^{-3}

$\delta H_2 = 0.5969(1-0.5969)(\delta y_1 \cdot w_6 + \delta y_2 \cdot w_8)$

$\delta H_2 = 0.2406(-0.1385 \times 0.45 + 0.0381 \times 0.55)$

$= 0.2406(-0.0623 + 0.02096)$

$= -9.9464 \times 10^{-3}$ $\quad -0.04134$

$\Delta w_1 = \alpha\ \delta H_1 \cdot x_1$

$= 0.5 \times (-8.7713 \times 10^{-3}) \times 0.05$

$= -2.1928 \times 10^{-4}$

New $w_1 = 0.1498$

$\Delta w_2 = \alpha\ \delta H_1 \cdot x_2$

$= 0.5 \times (-8.7713 \times 10^{-3}) \times 0.10$

$= -4.38567 \times 10^{-4}$

New $w_1 = 0.15 + \Delta w_2$

$= 0.1498$ $\quad 0.1995614$

$\Delta w_3 = \alpha \, \delta H_2 \cdot x_1$

$= 0.5 \times (-9.9464 \times 10^{-3}) \times 0.05$

$= -2.4866 \times 10^{-4}$

New $w_3 = 0.25 + \Delta w_3$

$= 0.2498$

$-(0.01 - 0.7514) \times 0.7514(1-0.7514)$

$\times 0.5933$

$(11w + 35 \quad 172 \times$

$-(0.01 - 0.7514) \times 0.754$

0.1868

$\delta_2 = (t_2 - out\ Y_2)\ [f(out\ Y_2)\ [1 - f(out\ Y_2)]]$

$\delta_2 = [0.99 - 0.7729]\ [0.7729\ [1 - 0.7729]]$

$\delta_2 = 0.2171\ [0.7729 \times 0.2271]$

$\delta_2 = 0.0381$

Calculate change in weight

$\Delta W_5 = \alpha \cdot \delta_1 \cdot out\ H_1$

$= 0.5 \times -0.1385 \times \cancel{0.7514}\ 0.5933$

$= -0.0\cancel{41}0\ 8 \qquad 0.3892$

$\Delta W_6 = \alpha \cdot \delta_1 \cdot out\ H_2 \qquad 0.5969$

-0.1385

$= 0.5 \times \cancel{0.0381} \times \cancel{0.7729}\ \cancel{0.392}$

-0.0413

$= 0.\cancel{0147} \qquad -\cancel{0.0279} \qquad 0.3695$

$= 0.4087$

$\Delta W_7 = \alpha \cdot \delta_2 \cdot out\ H_1$

0.381

$= 0.5 \times \cancel{-0.1385} \times \cancel{0.7514}\ 0.5933$

$= \cancel{-0.0520}\ 0.0143$

$\Delta W_8 = \alpha \cdot \delta_2 \cdot out\ H_2 \qquad 0.5143$

$\cancel{0.0147}$

$= 0.5 \times 0.0381 \times \cancel{0.7729}\ 0.5969$

$= \cancel{0.0147}\ 0.0114$

Send error function to inner layer.

$\delta_{H_1} = \delta_{Y_1} \cdot W_5\ (out\ H_1\ (1 - f(out\ H_1))$

$+\ \delta_{Y_2} \cdot W_7\ (H_1\ (1 - f\ out\ H_1))$