

Week 01

Formula = (A)

$$\begin{aligned} z_1 &= (0.4032 \times 1.23) + (0.4583 \times -0.58) \\ &= 0.495936 + (-0.265814) \\ &= 0.230122 \end{aligned}$$

$$\begin{aligned} z_2 &= (0.4032 \times 0.34) + (0.4583 \times 1.07) \\ &= 0.137088 + 0.490381 \\ &= 0.627469 \end{aligned}$$

$$\begin{aligned} z_3 &= (0.4032 \times -3.71) + (0.4583 \times -0.65) \\ &= -1.495872 + (-0.297895) \\ &= -1.793767 \end{aligned}$$

$$A = \frac{1}{1 + (e^{-z})}$$

$$\therefore A_1 = 0.55727, \quad A_2 = 0.65191, \quad A_3 = 0.14261$$

$$\begin{aligned} z_4 &= (A_1 \times 0.66) + (A_2 \times 1.25) + (A_3 \times -1.02) \\ &= 0.3677982 + 0.8148875 + (-0.1454622) \\ &= 1.0372 \end{aligned}$$

$$\hat{y} = \frac{1}{1 + e^{-z_4}}$$

$$= 0.7383$$

$$\approx 73.83\%$$

MATRICES (A)

$$\begin{bmatrix} 0.4022 & 0.4583 \end{bmatrix} \begin{bmatrix} 1.23 & 0.34 & -3.71 \\ -0.58 & 1.07 & -0.65 \end{bmatrix}$$

$$= \begin{bmatrix} 0.2301 & 0.6274 & -1.7937 \end{bmatrix}$$

$$\text{sigmoid} \begin{bmatrix} 0.2301 & 0.6274 & -1.7937 \end{bmatrix}$$

$$= \begin{bmatrix} 0.5572 & 0.6519 & 0.1426 \end{bmatrix}$$

$$z_4 = \begin{bmatrix} 0.5572 & 0.6519 & 0.1426 \end{bmatrix} \begin{bmatrix} 0.66 \\ 1.25 \\ -1.02 \end{bmatrix}$$
$$= \begin{bmatrix} 1.0372 \end{bmatrix}$$

$$\text{sigmoid} \begin{bmatrix} 1.0372 \end{bmatrix} = \begin{bmatrix} 0.7383 \end{bmatrix}$$

$$\approx 73.83\%$$

FORMULA

(B)

$$\begin{aligned}
 z_1 &= (0.6129 \times 1.23) + (0.5 \times -0.58) \\
 &= 0.753867 + (-0.29) \\
 &= 0.463867
 \end{aligned}$$

$$\begin{aligned}
 z_2 &= (0.6129 \times 0.34) + (0.5 \times 1.07) \\
 &= 0.208386 + 0.535 \\
 &= 0.743386
 \end{aligned}$$

$$\begin{aligned}
 z_3 &= (0.6129 \times -3.71) + (0.5 \times -0.65) \\
 &= -2.273859 + (-0.325) \\
 &= -2.598859
 \end{aligned}$$

$$A = \frac{1}{1 + e^{-z}}$$

$$\therefore A_1 = 0.61393, \quad A_2 = 0.67773, \quad A_3 = 0.06921$$

$$\begin{aligned}
 z_4 &= (A_1 \times 0.66) + (A_2 \times 1.25) + (A_3 \times -1.02) \\
 &= 0.4051938 + 0.8471625 + (-0.0705942) \\
 &= 1.1817621
 \end{aligned}$$

$$\hat{y} = \frac{1}{1 + e^{-z_4}}$$

$$= 0.76526$$

$$\approx 76.52\%$$

MATRICES (B)

$$z_1, z_2, z_3 = \begin{bmatrix} 0.6129 & 0.5 \end{bmatrix} \begin{bmatrix} 1.23 & 0.34 & -3.71 \\ -0.58 & 1.07 & -0.68 \end{bmatrix}$$
$$= \begin{bmatrix} 0.4638 & 0.7433 & -2.5988 \end{bmatrix}$$

$$\text{sigmoid} \begin{bmatrix} 0.4638 & 0.7433 & -2.5988 \end{bmatrix}$$

$$= \begin{bmatrix} 0.6139 & 0.6777 & 0.0692 \end{bmatrix}$$

$$z_4 = \begin{bmatrix} 0.6139 & 0.6777 & 0.0692 \end{bmatrix} \begin{bmatrix} 0.66 \\ 1.25 \\ -1.02 \end{bmatrix}$$

$$= \begin{bmatrix} 1.1817 \end{bmatrix}$$

$$\text{sigmoid} \begin{bmatrix} 1.1817 \end{bmatrix} = \begin{bmatrix} 0.7652 \end{bmatrix}$$

$$\approx 76.52\%$$

ERROR for (A) & (B)

$$\text{Error}_{\text{TOTAL}} = \sum_{n=0}^{\text{outputs}} \frac{1}{2} (\text{target} - \hat{y})^2$$

$$= \frac{1}{2} (0.62 - 0.7383)^2 + \frac{1}{2} (0.78 - 0.7652)^2$$

$$= \frac{1}{2} (0.013994) + \frac{1}{2} (0.000219)$$

$$\text{Error}_{\text{TOTAL}} = 0.0071$$