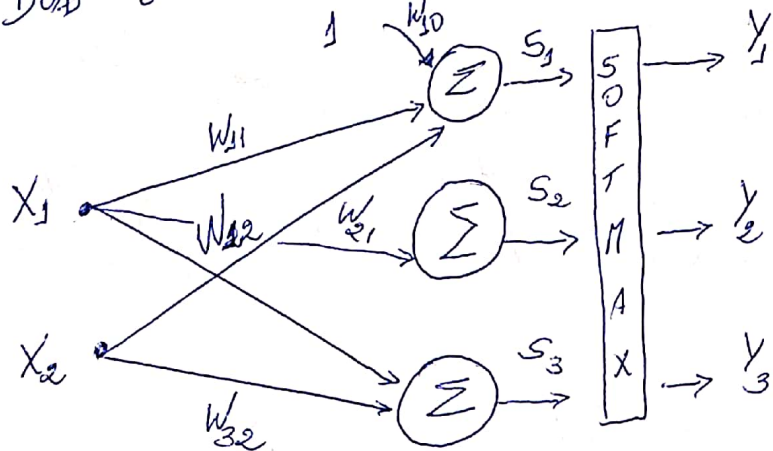


REGRESSÃO LOGÍSTICA

CONSIDERE UM PROBLEMA DE CLASSIFICAÇÃO COM DUAS ENTRADAS E TRES SAIDAS



$$W = \begin{bmatrix} w_{10} & w_{11} & w_{12} \\ w_{20} & w_{21} & w_{22} \\ w_{30} & w_{31} & w_{32} \end{bmatrix}$$

$$X = \begin{bmatrix} 1 & X_{11} & X_{12} \\ 1 & X_{21} & X_{22} \\ \vdots & \vdots & \vdots \\ 1 & X_{N1} & X_{N2} \end{bmatrix}$$

$$Y = \begin{bmatrix} Y_{11} & Y_{12} & Y_{13} \\ \vdots & \vdots & \vdots \\ Y_{N1} & Y_{N2} & Y_{N3} \end{bmatrix}$$

~~Y = SOFTMAX~~

$$Y = \text{SOFTMAX} \left(\begin{bmatrix} 1 & X_{11} & X_{12} \\ 1 & X_{21} & X_{22} \\ \vdots & \vdots & \vdots \\ 1 & X_{N1} & X_{N2} \end{bmatrix} \begin{bmatrix} w_{10} & w_{20} & w_{30} \\ w_{11} & w_{21} & w_{31} \\ w_{12} & w_{22} & w_{32} \end{bmatrix} \right)$$

$$\therefore Y = \text{SOFTMAX} (X * W^T)$$

$$P(C_{kn} | X_n) = \frac{Y_{kn}(X_n)}{K} = \frac{\text{EXP}(S_{kn})}{\sum_{j=1}^K \text{EXP}(S_{jn})}$$

~~PROBLEMA~~

LIKELIHOOD DATA OBSERVADOS

$$P(Y | W_1, \dots, W_K) = \prod_{n=1}^N \prod_{k=1}^K P(C_{kn} | X_n)^{Y_{kn}} = \prod_{n=1}^N \prod_{k=1}^K Y_{kn}^{Y_{kn}}$$

~~PROBLEMA~~ APLICANDO O LOGARITMO

$$E(W_1, \dots, W_K) = \ln P(Y | W_1, \dots, W_K) = \sum_{n=1}^N \sum_{k=1}^K Y_{kn} \ln Y_{kn}$$

PROBLEMA MINIMIZACION

$$E(W_1, \dots, W_K) = - \sum_{n=1}^N \sum_{k=1}^K Y_{kn} \ln Y_{kn}$$

GRADIENTE DA FUNCAO ERRO

$$\frac{\partial E}{\partial W_j} = - \sum_{n=1}^N (Y_{nj} - Y_{dnj}) X_n$$