CSCI 585 HW4 Q4

Thursday, November 30, 2023 5:16 PM

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[[ 0.57355803  4.33381305  4.48264021  7.17923159]
 [ 1.14075424  4.13435859 -6.72940986 -5.48075424]
 [-0.74729319 -0.4652327  -1.69616486  2.27117356]]
[[ -1.00453775]
 [  5.89444927]
 [ 10.35035355]
 [-10.16747511]]
[[0.00346498]
 [0.99147137]
 [0.9925926 ]
 [0.00978869]]
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$Y = f(x_1 + x_2 + x_3)$ $\quad \sigma(x) = \frac{1}{1+e^{-x}}$

$= \sigma\left(\sum_{i=0}^{3}\left(\sigma(w_{0,1,i} \cdot x_1 + w_{0,1,i} \cdot x_2 + w_{0,1,i} \cdot x_3) \cdot w_{i,2,0}\right)\right)$

$f = (0, 0, 1)$

$= \sigma\Big(\sum_{i=0}^{3}\big(\sigma(0.57354803 \cdot (0) + 1.14075424 \cdot (0) + -0.74729319 \cdot (1)) \cdot -1.00453775\big)$

$\big(\sigma(4.33381305 \cdot (0) + 4.13458859 \cdot (0) + -0.46523227 \cdot (1)) \cdot 5.89444927\big)$

$\big(\sigma(4.48264021 \cdot (0) + -6.72940986 \cdot (0) + -1.69616486 \cdot (1)) \cdot 10.35035355\big)$

$\big(\sigma(7.17923159 \cdot (0) + -5.48075424 \cdot (0) + 2.27117356 \cdot (1)) \cdot -10.16747511\big)\Big)$

$= \sigma((-0.32286987) + (2.27375563) + (1.60396138) + (-9.21642311))$

$= \sigma(-5.66157969) \rightarrow$ **$f(0,0,1) = 0.00346498$**

$f = (0, 1, 1)$

$= \sigma\Big(\sum_{i=0}^{3}\big(\sigma(0.57354803 \cdot (0) + 1.14075424 \cdot (1) + -0.74729319 \cdot (1)) \cdot -1.00453775\big)$

$\big(\sigma(4.33381305 \cdot (0) + 4.13458859 \cdot (1) + -0.46523227 \cdot (1)) \cdot 5.89444927\big)$

$\big(\sigma(4.48264021 \cdot (0) + -6.72940986 \cdot (1) + -1.69616486 \cdot (1)) \cdot 10.35035355\big)$

$\big(\sigma(7.17923159 \cdot (0) + -5.48075424 \cdot (1) + 2.27117356 \cdot (1)) \cdot -10.16747511\big)\Big)$

$= \sigma((-5.99825216) + (5.74788538) + (0.00226818) + (-0.39456758))$

$= \sigma(4.75576081) \rightarrow$ **$f(0,1,1) = 0.99147137$**

$f = (1, 0, 1)$

$= \sigma\Big(\sum_{i=0}^{3}\big(\sigma(0.57354803 \cdot (1) + 1.14075424 \cdot (0) + -0.74729319 \cdot (1)) \cdot -1.00453775\big)$

$\big(\sigma(4.33381305 \cdot (1) + 4.13458859 \cdot (0) + -0.46523227 \cdot (1)) \cdot 5.89444927\big)$

$\big(\sigma(4.48264021 \cdot (1) + -6.72940986 \cdot (0) + -1.69616486 \cdot (1)) \cdot 10.35035355\big)$

$\big(\sigma(7.17923159 \cdot (1) + -5.48075424 \cdot (0) + 2.27117356 \cdot (1)) \cdot -10.16747511\big)\Big)$

$= \sigma((-0.45874741) + (5.77384518) + (9.74941813) + (-10.16667544))$

$= \sigma(4.89784046) \rightarrow$ **$f(1,0,1) = 0.9925926$**

$f = (1, 1, 1)$

$= \sigma\Big(\sum_{i=0}^{3}\big(\sigma(0.57354803 \cdot (1) + 1.14075424 \cdot (1) + -0.74729319 \cdot (1)) \cdot -1.00453775\big)$

$\big(\sigma(4.33381305 \cdot (1) + 4.13458859 \cdot (1) + -0.46523227 \cdot (1)) \cdot 5.89444927\big)$

$\big(\sigma(4.48264021 \cdot (1) + -6.72940986 \cdot (1) + -1.69616486 \cdot (1)) \cdot 10.35035355\big)$

$$\left(\sigma\left(7.17923159\cdot(1)+-5.48075424\cdot(1)+2.27117356\cdot(1)\right)\cdot-10.16747511\right)$$

$$=\sigma\left((-0.72791265)+(5.89247834)+(0.19688815)+(-9.97407037)\right)$$

$$=\sigma(-4.61751653)\rightarrow \boxed{f=(1,1,1)=0.00978069}$$