Week 2 Assignment

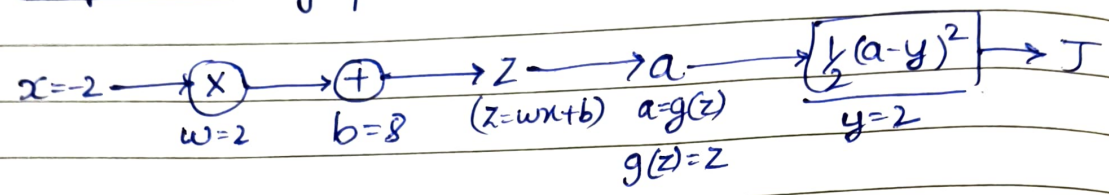
Given that

$w=2, b=8$, Input: $x=-2$, Label: $y=2$,

Activation function: $g(z)=z$

Cost function: $J(w,b)=\frac{1}{2}(a-y)^2$

Computational graph:



Forward Pass: $z=wx+b \Rightarrow z=2(-2)+8=4$

$a=g(z)=z=4$

$J=\frac{1}{2}(a-y)^2=\frac{1}{2}(4-2)^2=2$

Backpropagation:

$$\frac{\partial J}{\partial a}=a-y=4-2=2$$

$\because g(z)=z, \quad \frac{\partial a}{\partial z}=1 \Rightarrow \frac{\partial J}{\partial z}=\frac{\partial J}{\partial a}\cdot\frac{\partial a}{\partial z}=2$

$$\frac{\partial J}{\partial w}=x=-2$$

$$\frac{\partial J}{\partial w}=\frac{\partial J}{\partial z}\cdot\frac{\partial z}{\partial w}=2\cdot(-2)=-4$$

$$\frac{\partial z}{\partial b}=1 \quad , \quad \frac{\partial J}{\partial b}=2$$

If w is changed by a small amount ϵ, $\Delta J \approx \frac{\partial J}{\partial w}\epsilon$

$$\Rightarrow \boxed{\Delta J=-4\epsilon}$$

- This shows that ↑ w ↓ cost.

∴ Backpropagation indicates that ↑ the weight & ↑ the bias will reduce the loss.

Teacher's Signature:.....