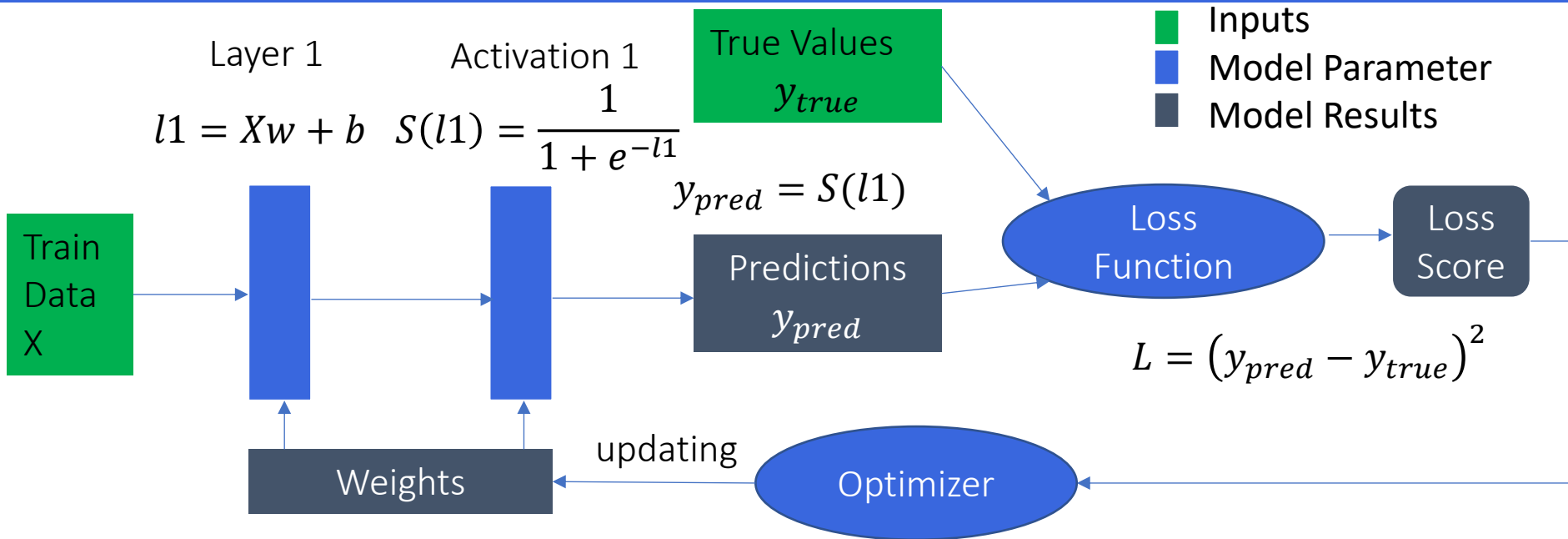


Neural Network from Scratch

Neural Network from Scratch

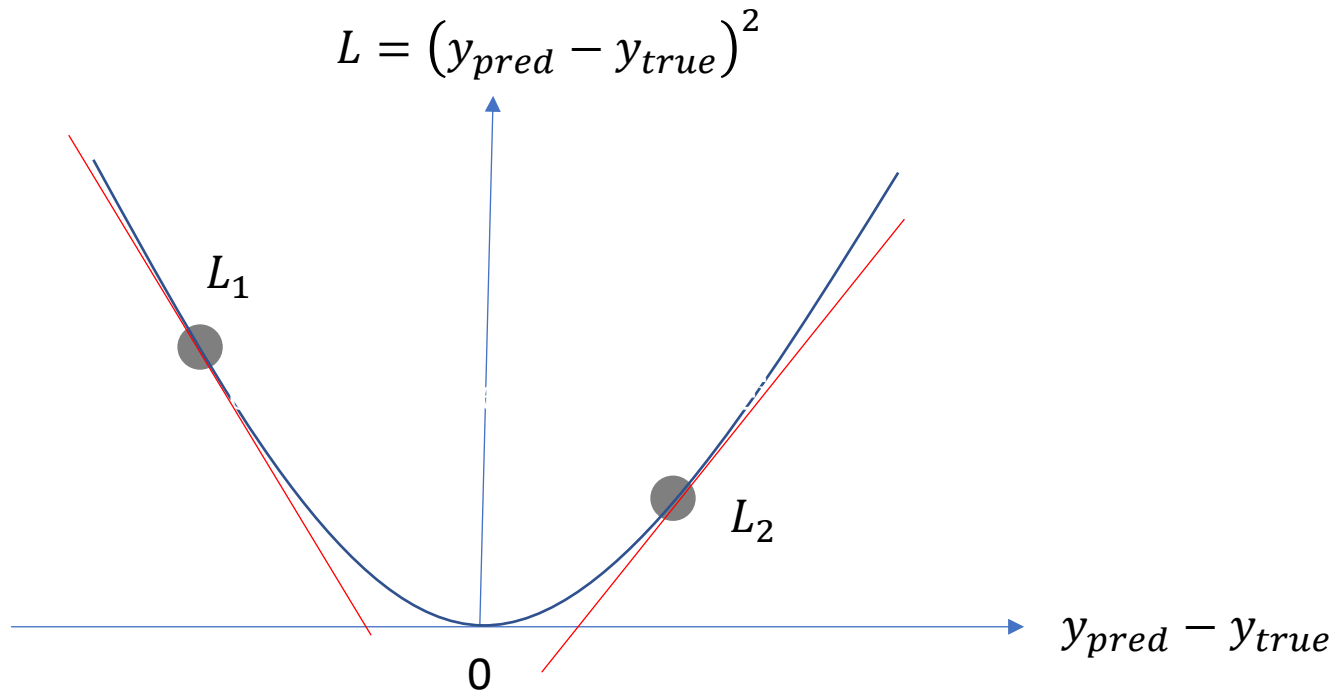
Forward Pass



How to update the weights?

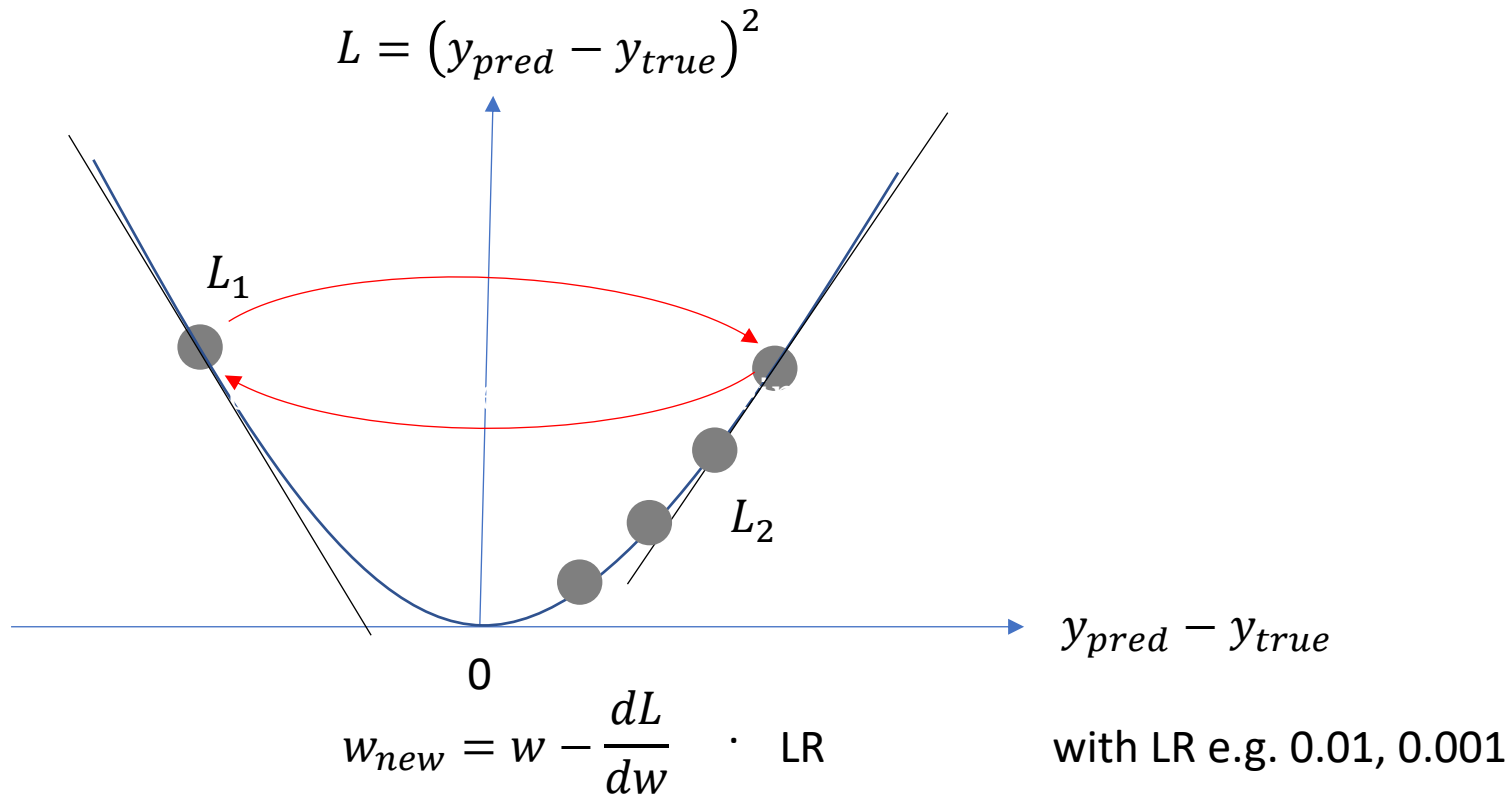
Neural Network from Scratch

Weight Update



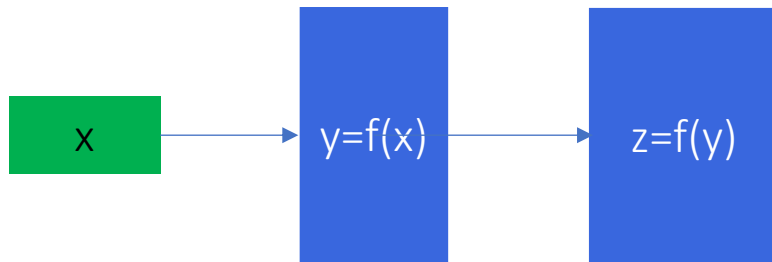
Neural Network from Scratch

Learning Rate



Neural Network from Scratch

Chain Rule



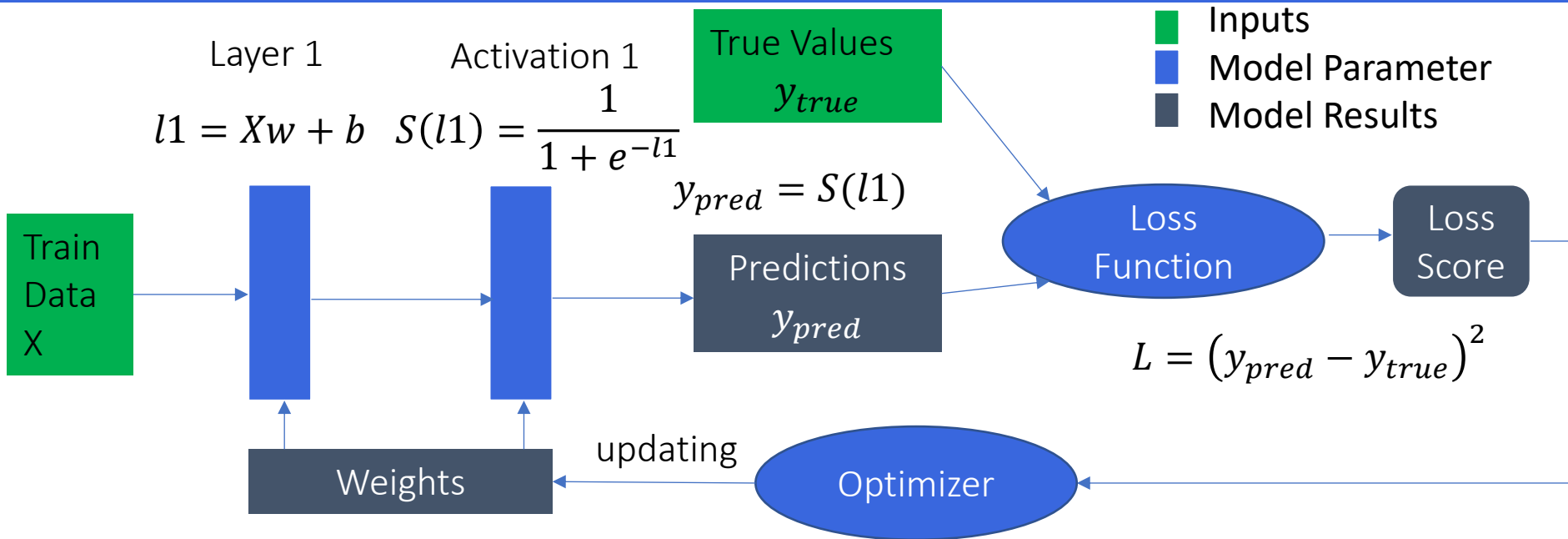
Target: get derivative of z to x !

$$\frac{dz}{dx} = \frac{dy}{dx} \cdot \frac{dz}{dy}$$

Chain Rule

Neural Network from Scratch

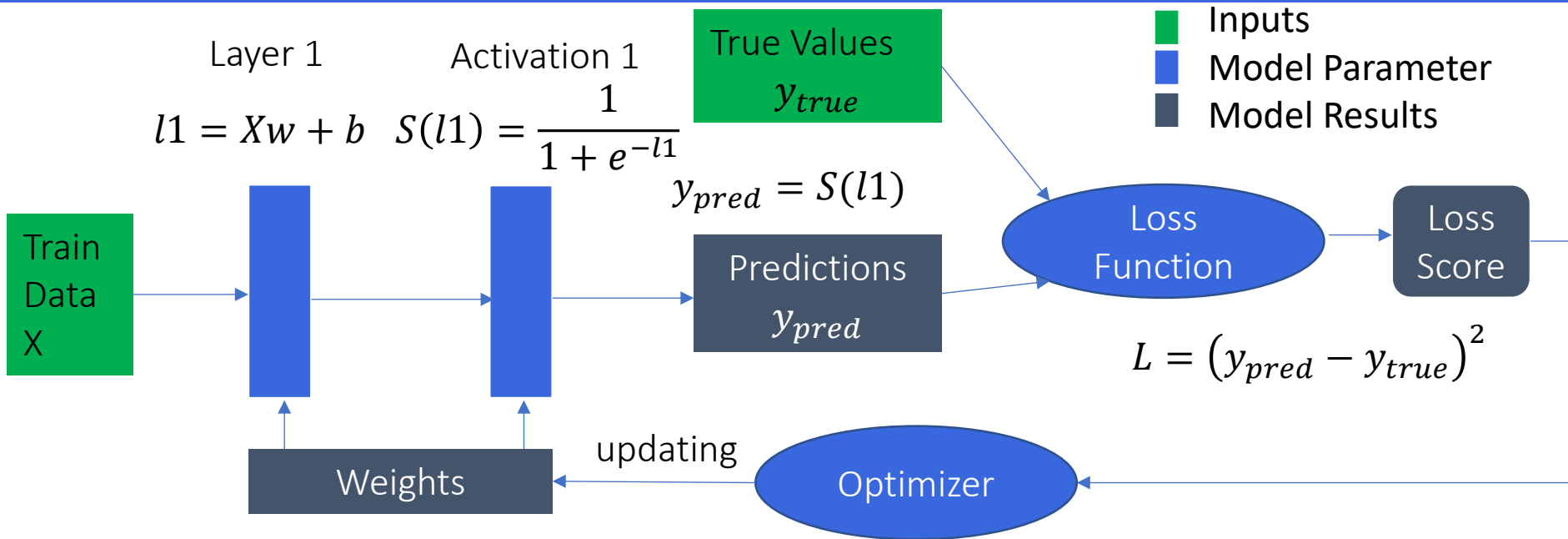
Weights Update



$$\frac{dL}{dw} = \frac{d_{layer_1}}{dw} = X \cdot \frac{dy_{pred}}{dl_1} = \frac{dS(l1)}{dl_1} \cdot \frac{dL}{dy_{pred}} = 2(y_{pred} - y_{true})$$

Neural Network from Scratch

Bias Update



$$\frac{dL}{db} = \frac{d_{layer_1}}{db} = 1 \cdot \frac{dy_{pred}}{dl_1} = \frac{dS(l1)}{dl_1} \cdot \frac{dL}{dy_{pred}} = 2(y_{pred} - y_{true})$$

Neural Network from Scratch

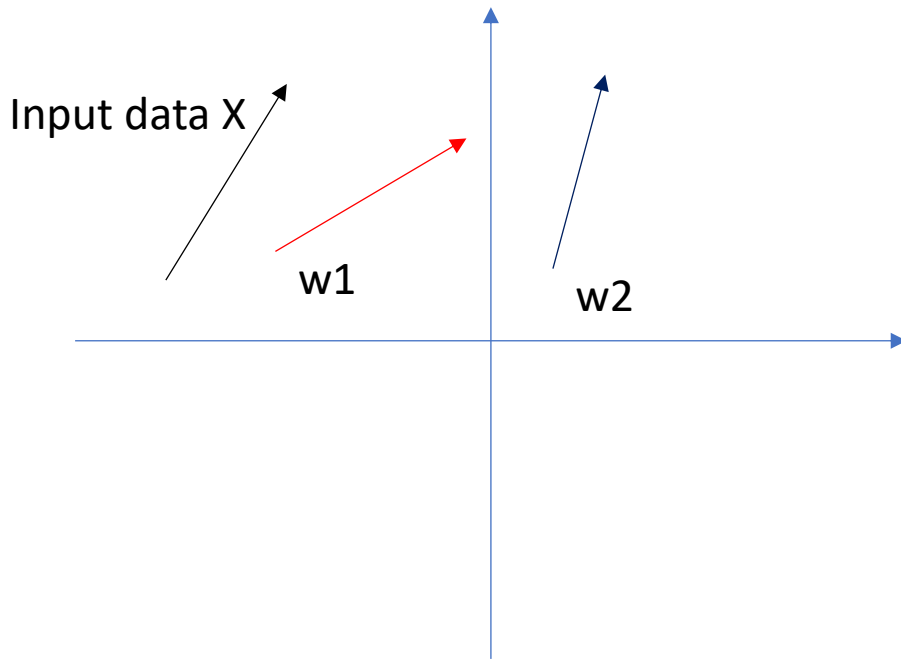
Dot Product

- Finally, weights shall be adapted to map input data to outputs.
- Which weight is more similar to X?
- Dot product applied
- Weight is more similar, if
 - Magnitude is similar
 - Angle is similar

Angle between vectors

$$\vec{a} \cdot \vec{b} = \|\vec{a}\| \|\vec{b}\| \cos(\theta)$$

Magnitude (length) of vector



Neural Network from Scratch

Dot Product

- Finally, weights shall be adapted to map input data to outputs.
- Which weight is more similar to X?
- Dot product applied

X		w1
0	*	2
1	*	3

Dot product

$$X \cdot w1 = 0 * 2 + 1 * 3$$