

BE1 KNN et MLP

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1 Neural Network Backpropagation Formulas

1. Partial Derivative with Respect to $A^{(2)}$:

$$\frac{\partial C}{\partial A^{(2)}} = \frac{2}{N_{out}}(\hat{Y} - Y)$$

2. Partial Derivative with Respect to $Z^{(2)}$:

$$\frac{\partial C}{\partial Z^{(2)}} = \frac{\partial C}{\partial A^{(2)}} \cdot \sigma'(Z^{(2)}) = \frac{2}{N_{out}}(\hat{Y} - Y) \cdot \sigma(Z^{(2)}) \cdot (1 - \sigma(Z^{(2)}))$$

3. Partial Derivative with Respect to $W^{(2)}$:

$$\frac{\partial C}{\partial W^{(2)}} = \frac{\partial C}{\partial Z^{(2)}} \cdot A^{(1)T}$$

4. Partial Derivative with Respect to $B^{(2)}$:

$$\frac{\partial C}{\partial B^{(2)}} = \frac{\partial C}{\partial Z^{(2)}}$$

5. Partial Derivative with Respect to $A^{(1)}$:

$$\frac{\partial C}{\partial A^{(1)}} = (W^{(2)T} \cdot \frac{\partial C}{\partial Z^{(2)}})$$

6. Partial Derivative with Respect to $Z^{(1)}$:

$$\frac{\partial C}{\partial Z^{(1)}} = \frac{\partial C}{\partial A^{(1)}} \cdot \sigma'(Z^{(1)})$$

7. Partial Derivative with Respect to $W^{(1)}$:

$$\frac{\partial C}{\partial W^{(1)}} = \frac{\partial C}{\partial Z^{(1)}} \cdot A^{(0)T}$$

8. Partial Derivative with Respect to $B^{(1)}$:

$$\frac{\partial C}{\partial B^{(1)}} = \frac{\partial C}{\partial Z^{(1)}}$$