# Homework5

于翠翠

2019 年 11 月 19 日星期二

Part1

已知：

$$x_{1:n} = x_1 \oplus x_2 \oplus \cdots \oplus x_n$$

$$c_i = f(w \cdot x_{i:i+h-1} + b_1)$$

$$P_i = w \cdot x_{i:i+h-1} + b_1$$

$$O = f(MU + b_2)$$

$$Q = MU + b_2$$

$$\hat{y} = soft\max(O).$$

$$J = CE(y, \hat{y}) = -\log(\hat{y})$$

损失函数 J 对 w 的偏导数：

当 $w \cdot x_{i:i+h-1} + b_1$ 大于 0， $MU + b_2$ 大于 0 时：

$$\frac{\partial J}{\partial w} = \frac{\partial J}{\partial \hat{y}} \cdot \frac{\partial \hat{y}}{\partial O} \cdot \frac{\partial O}{\partial Q} \cdot \frac{\partial Q}{\partial M} \cdot \frac{\partial M}{\partial c} \cdot \frac{\partial c}{\partial P} \cdot \frac{\partial P}{\partial w}$$

$$= -\frac{1}{\hat{y}} \hat{y}(y - \hat{y}) QU'IPx'$$

$$= (\hat{y} - y) QU'IPx'$$

当 $w \cdot x_{i:i+h-1} + b_1$， $MU + b_2$ 不全大于 0 时：

$$\frac{\partial J}{\partial w} = \frac{\partial J}{\partial \hat{y}} \cdot \frac{\partial \hat{y}}{\partial O} \cdot \frac{\partial O}{\partial Q} \cdot \frac{\partial Q}{\partial M} \cdot \frac{\partial M}{\partial c} \cdot \frac{\partial c}{\partial P} \cdot \frac{\partial P}{\partial w} = 0$$

反向传播，权重更新：

$$w' = w' - \lambda \frac{\partial J}{\partial w}$$