2020314482 인공지능융합전공 황선우

숙제1

$Data = \{(0.0, 0.0), (1.0, 1.0), (1.0, 2.0), (2.0, 1.0)\}$

$f(x; w_0, w_1, w_2) = w_2 x^2 + w_1 x + w_0$

$E(w_0, w_1, w_2) = (0.0 - f(0.0; w_0, w_1, w_2))^2 + (1.0 - f(1.0; w_0, w_1, w_2))^2 + (2.0 - f(1.0; w_0, w_1, w_2))^2 +$

$\qquad (1.0 - f(2.0; w_0, w_1, w_2))^2$

$\qquad = (0.0 - w_0)^2 + (1.0 - (w_2 + w_1 + w_0))^2 + (2.0 - (w_2 + w_1 + w_0))^2 + (1.0 - (4w_2 + 2w_1 + w_0))^2$

$\qquad = w_0^2 + 1 - 2(w_2 + w_1 + w_0) + (w_2 + w_1 + w_0)^2 + 4 - 4(w_2 + w_1 + w_0) + (w_2 + w_1 + w_0)^2 +$

$\qquad 1 - 2(4w_2 + 2w_1 + w_0) + (4w_2 + 2w_1 + w_0)^2$

$\qquad = w_0^2 + 6 - (14w_2 + 10w_1 + 8w_0) + 2(w_2 + w_1 + w_0)^2 + (4w_2 + 2w_1 + w_0)^2$

$\qquad = 6 - 14w_2 + 18w_2^2 - 10w_1 + 20w_1 w_2 + 6w_1^2 - 8w_0 + 12w_0 w_2 + 8w_0 w_1 + 4w_0^2$

$\dfrac{\partial E}{\partial w_2} = 36w_2 + 20w_1 + 12w_0 - 14$

$\dfrac{\partial E}{\partial w_1} = 20w_2 + 12w_1 + 8w_0 - 10$

$\dfrac{\partial E}{\partial w_0} = 12w_2 + 8w_1 + 8w_0 - 8$

$\begin{cases} 36w_2 + 20w_1 + 12w_0 - 14 = 0 & \cdots ① \\ 20w_2 + 12w_1 + 8w_0 - 10 = 0 & \cdots ② \\ 12w_2 + 8w_1 + 8w_0 - 8 = 0 & \cdots ③ \end{cases}$

②-③ $= 8w_2 + 4w_1 - 2 = 0$ $\cdots$ ④

① $- \dfrac{3}{2}$② $= 6w_2 + 2w_1 + 1 = 0$ $\cdots$ ⑤

2⑤ - ④ $= 4w_2 + 4 = 0$

$w_2 = -1$

⑤에 $w_2 = -1$을 대입하면,

$-6 + 2w_1 + 1 = 2w_1 - 5 = 0$

$w_1 = \dfrac{5}{2}$

③에 $w_2 = -1$, $w_1 = \dfrac{5}{2}$를 대입하면,

$-12 + 20 + 8w_0 - 8 = 0$

$w_0 = 0$

$\therefore w_0 = 0$, $w_1 = \dfrac{5}{2}$, $w_2 = -1$

$\therefore f(x) = -x^2 + \dfrac{5}{2}x + 0$

x의 차수가 높아지면 파라미터도 많아져서
문제가 복잡해짐.
이론상으로는 풀수있지만 실제로는
풀기 어려운 문제가 됨.