

1 Introduction

One college:

$$\ell(f_i(x), 1) + \lambda c(x_z, x) \quad (1)$$

$$\ell(f_i(x), 1) = (1 - f_i(x))^2 \quad (2)$$

$$f_i(x) = (1 - \frac{1}{1 + e^{w^T x}})^2 \quad (3)$$

$$(1 - \frac{1}{1 + e^{w^T x}})^2 + \lambda c(x_z, x) \quad (4)$$

$$c(x_z, x) = \|x_z - x\|^2 \quad (5)$$

$$(1 - \frac{1}{1 + e^{w^T x}})^2 + \lambda = \|x_z - x\|^2 \quad (6)$$

$$f(x) = \frac{d}{dx} (1 - \frac{1}{1 + e^{w^T x}})^2 + \lambda \|x_z - x\|^2 \quad (7)$$

$$(8)$$

$$f'(x) = 2 \cdot \frac{-w e^{w^T x}}{(1 + e^{w^T x})^2} \cdot (1 - \frac{1}{1 + e^{w^T x}})^2 + -2\lambda(x_z - x) \quad (9)$$

$$f''(x) = \frac{2 \left(\lambda e^{4w^T x} + (4\lambda - w^{2T}) e^{3w^T x} + (6\lambda + 2w^{2T}) e^{2w^T x} + 4\lambda e^{w^T x} + \lambda \right)}{(e^{w^T x} + 1)^4} \quad (10)$$

Two colleges:

$$\ell(f_i(x), 1) + \lambda c(x_z, x) \quad (11)$$

$$f(x) = 1 - \prod_{i=1}^n (1 - f_i(x)) \quad (12)$$

$$f_1(x) = (1 - \frac{1}{1 + e^{w^T x}})^2 \quad (13)$$

$$f_2(x) = (1 - \frac{1}{1 + e^{w^T x}})^2 \quad (14)$$

$$f(x) = 1 - \prod_{i=1}^n (1 - f_i(x)) \quad (15)$$

$$f(x) = 1 - [(1 - (1 - \frac{1}{1 + e^{w^T x}}))^2 \cdot (1 - (1 - \frac{1}{1 + e^{w^T x}}))^2] \quad (16)$$