Problema 2

Solutie

Vom afla w^* calculând derivata parțială față de w cu 0.

$$\frac{\partial}{\partial w}\left(\frac{1}{m}\sum_{i=1}^{m} L(w^T x_i, y_i) + \frac{\lambda}{2}\|w\|^2\right) = 0 \quad (1)$$

$$\Rightarrow \frac{\partial}{\partial w}\left(\frac{1}{m}\sum_{i=1}^{m} L(w^T x_i, y_i)\right) + \lambda w = 0 \quad (2)$$

$$\Rightarrow -\frac{1}{m}\sum_{i=1}^{m} \frac{\partial L}{\partial w}(w^T x_i, y_i) + \lambda w = 0 \quad (3)$$

$$\Rightarrow \lambda w = \frac{1}{m}\sum_{i=1}^{m} \frac{\partial L}{\partial w}(w^T x_i, y_i) \quad (4)$$

$$w^* = \frac{1}{\lambda m}\sum_{i=1}^{m} \frac{\partial L}{\partial w}(w^T x_i, y_i) \quad (5)$$

$$\frac{\partial L}{\partial w}(w^T x_i, y_i) = \frac{\partial L}{\partial z}(w^T x_i) x_i \quad (6)$$

$$\Rightarrow w^* = \frac{1}{\lambda m}\sum_{i=1}^{m} \frac{\partial L}{\partial z}(w^T x_i) x_i$$

Q.E.D.