Методы оптимизации, лабораторная № 1

23 февраля 2020 г.

1 Логистическая регрессия

$$a(x) = sign(\langle w, x \rangle)$$

$$p_+(x) = \sigma(\langle w, x \rangle)$$

$$Q(w) = \frac{1}{L} \sum_{i=1}^{L} ln(1 + e^{-\langle w, x_i \rangle \cdot y_i})$$

$$\frac{\partial Q}{\partial w_j} = \frac{1}{L} \sum_{i=1}^{L} - \frac{e^{-\langle w, x_i \rangle \cdot y_i} \cdot y_i \cdot x_{i,j}}{1 + e^{-\langle w, x_i \rangle \cdot y_i}} = -\frac{1}{L} \sum_{i=1}^{L} \frac{y_i \cdot x_{i,j}}{1 + e^{\langle w, x_i \rangle \cdot y_i}}$$

$$\left(\frac{\partial Q}{\partial w} \right)_{F+1} = -\frac{1}{L} A_{F+1,L} \cdot b_L$$

$$A_{j,i} = y_i \cdot x_{i,j}$$

$$b_i = \frac{1}{1 + e^{\langle w, x_i \rangle \cdot y_i}}$$

$$Q^{l_2}(w) = Q(w) + \frac{\lambda}{2} ||w||^2 = Q(w) + \frac{\lambda}{2} \sum_{i=1}^{F+1} w_i^2$$

$$\frac{\partial Q^{l_2}}{\partial w_j} = \frac{\partial Q}{\partial w_j} + \lambda \cdot w_j$$

$$\frac{\partial Q^{l_2}}{\partial w} = \frac{\partial Q}{\partial w} + \lambda \cdot w = -\frac{1}{L} A \cdot b + \lambda w$$