

$$d_N(x) = \sum_{n=0}^N \gamma_n b_n(x)$$

$$\sum_{i=1}^l L(y_i, d_{N-1}(x_i) + \gamma_N b_N) \rightarrow \min_{b_N, \gamma_N}$$

$$\gamma_0, b_0 \quad \gamma_0 = 1$$

$$b_0 = \frac{1}{l} \sum y_i$$

$$s_i = - \left. \frac{\partial L(y, z)}{\partial z} \right|_{z = d_{N-1}(x_i)}$$

$$b_N(x) = \underset{b \in \Delta}{\operatorname{argmin}} \sum_{i=1}^l (b(x_i) - s_i)^2$$

$$\gamma_N = \underset{\gamma \in \mathbb{R}}{\operatorname{argmin}} \sum_{i=1}^l L(y_i, d_{N-1}(x_i) + \gamma b_N(x_i))$$

$$(y_i - s_i)^2 \text{ vs } (y_i - \underbrace{(y_i - d_{N-1}(x_i))}_{\text{red bracket}})^2$$

$$L(y, z) = \frac{1}{2} (10 [z \geq y] + [z < y]) (y - z)^2$$

$$x_1, x_2 \quad d_{N-1}(x_1) = 5$$

$$y_1 = y_2 = 0 \quad d_{N-1}(x_2) = -5$$

$$\begin{aligned} 0 - 5 &\Rightarrow -5 & s_1 &= -50 \\ 0 + 5 &= +5 & s_2 &= 5 \end{aligned}$$

$$Y = \{-1, +1\} \quad |y_i - a_{N-1}(x_i)| \in \{0, +2\}$$

$a_N(x)$  будем вычислять рекур

$$a_N(x) = \log \frac{p(y=+1|x)}{1 - p(y=+1|x)}$$

$$p(y=+1|x) = \sigma(a_N(x)) = \frac{1}{1 + \exp(-a_N(x))}$$

$$L(y, z) = \log(1 + \exp(-yz))$$

$$s_i = \frac{y_i}{1 + \exp(y_i a_{N-1}(x_i))}$$

$$b_N(x) = \underset{b \in \Delta}{\operatorname{argmin}} \sum_{i=1}^l (b(x_i) - s_i)^2$$

$$\Rightarrow \min_{b_N}$$

$$\begin{aligned} \sum (b_N(x_i) - s_i)^2 &= \sum (b_N^2(x_i) - 2s_i b_N(x_i) + \cancel{s_i^2}) = \\ &= \sum b_N^2(x_i) - 2 \left( \sum s_i b_N(x_i) \right) = \\ &\quad \langle s, b_N(x) \rangle \end{aligned}$$

$$= \sum b_N^2(x_i) - 2 \|s\| \|b_N(x)\| \cos(s, b_N(x)) \rightarrow \min_{b_N}$$

$$h_0 = 0$$

$$\begin{aligned} h_k &= \alpha h_{k-1} + \eta_k \nabla_w Q(w^{(k-1)}) \\ w^{(k)} &= w^{(k-1)} + h_k \end{aligned}$$

$$h_0 = 0$$

$$h_k = \alpha h_{k-1} + \eta_k \nabla_w Q(w^{(k-1)} - \alpha h_{k-1})$$

$$h_0(x) = a_0(x) = b_0(x)$$

$$s_i = - \frac{\partial L(y_i, z)}{\partial z} \Big|_{z = a_{N-1}(x_i) + h_{N-1}(z_i)}$$

$$h_N(x) = \alpha h_{N-1}(x) + \eta b_N(x)$$

$$a_N(x) = a_{N-1}(x) + h_N(x)$$