

## Megadott paraméterek, összefüggések

$$I(P(v_1), \dots, P(v_K)) = -\sum_{i=1}^K P(v_i) \cdot \log_2(P(v_i))$$

$$M(A) = \sum_{i=1}^N \frac{n_{i,1} + \dots + n_{i,N}}{n_1 + \dots + n_N} \cdot I(P(v_{i1}), \dots, P(v_{iK}))$$

$$D = \sum_{i=1}^k \left( \frac{(p_i - \hat{p}_i)^2}{\hat{p}_i} + \frac{(n_i - \hat{n}_i)^2}{\hat{n}_i} \right)$$

$$R(T_n) + \alpha \cdot |T_n| = R(\{T_n\}) + \alpha \cdot |\{T_n\}|$$

$$\Pr(y(\mathbf{x}_{teszt}) \neq d_{teszt}) \leq \Pr(y(\mathbf{x}_{tanító}) \neq d_{tanító}) + O\left(\sqrt{\frac{Td_{VC}}{N}}\right)$$

$$U^\pi(s) = R(s) + \gamma \max_a \sum_{s'} T(s, a, s') U^\pi(s')$$

$$\pi^*(s) = \arg \max_a \sum_{s'} T(s, a, s') U(s')$$

$$U^+(s) \leftarrow R(s) + \gamma \max_a f \left( \sum_{s'} T(s, a, s') U^+(a', s'), N(a, s) \right)$$

$$Q(a, s) = R(s) + \gamma \max_a \sum_{s'} T(s, a, s') \max_{a'} Q(a', s')$$

$$\frac{1}{\varepsilon} (\ln(|H|) - \ln(\delta)) \leq N$$

$$y = \mu = \sum_{k=1}^K g_k \mu_k$$

$$g_i^{(\ell)} = \frac{e^{f_i(\mathbf{v}_i^T \mathbf{x}^{(\ell)})}}{\sum_{k=1}^K e^{f_k(\mathbf{v}_k^T \mathbf{x}^{(\ell)})}}$$

$$\frac{\partial L}{\partial \mu_i} = \frac{g_i^{(\ell)}}{\sum_j g_j^{(\ell)} P(y^{(\ell)} | \mathbf{x}^{(\ell)}, \theta_j)} \cdot \frac{\partial}{\partial \mu_i} P(y^{(\ell)} | \mathbf{x}^{(\ell)}, \theta_i)$$

$$\frac{\partial L}{\partial \theta_i} = h_i^{(\ell)} \cdot \frac{(y^{(\ell)} - \mu_i^{(\ell)}) \mathbf{x}^{(\ell)}}{\sigma_i^2}$$

$$\frac{\partial L}{\partial \mathbf{v}_i} = (h_i^{(\ell)} - g_i^{(\ell)}) \cdot \mathbf{x}^{(\ell)}$$

$$\mathbf{R}(\mathbf{w}) \leq \mathbf{R}_{\text{emp}}(\mathbf{w}) + \frac{\varepsilon(h)}{2} \sqrt{1 + \frac{4 \cdot \mathbf{R}_{\text{emp}}(\mathbf{w})}{\varepsilon(h)}}$$

$$\varepsilon_t = \sum_{\substack{i=1 \\ y_t(\mathbf{x}_i) \neq d_i}}^N D_t(i)$$

$$\alpha_t = \frac{1}{2} \ln\left(\frac{1 - \varepsilon_t}{\varepsilon_t}\right)$$

$$D_{t+1}^*(i) = \begin{cases} D_t(i) \cdot \exp(-\alpha_t) & \text{ha } y_t(\mathbf{x}_i) = d_i \\ D_t(i) \cdot \exp(+\alpha_t) & \text{ha } y_t(\mathbf{x}_i) \neq d_i \end{cases}$$

$$D_{t+1}(i) = \frac{D_{t+1}^*(i)}{\sum_{k=1}^N D_{t+1}^*(k)}$$

$$y(\mathbf{x}) = \text{sign}\left(\sum_{t=1}^T \alpha_t y_t(\mathbf{x})\right)$$

$$m(\mathbf{x}_k, d_k) = \frac{d_k \sum_t \alpha_t y_t(\mathbf{x}_k)}{\sum_t \alpha_t}$$

$$\Pr(y(\mathbf{x}_{teszt}) \neq d_{teszt}) \leq \Pr(|m(\mathbf{x}_{tanító}, d)| \leq \theta) + O\left(\sqrt{\frac{d_{VC}}{N\theta^2}}\right)$$

$$\Pr(y(\mathbf{x}) \neq d) \leq \prod_t [2 \sqrt{\varepsilon_t(1-\varepsilon_t)}] = \prod_t \sqrt{1-4\gamma_t^2} \leq e^{-2\sum_t \gamma_t^2}$$

$$\Pr(y(\mathbf{x}) \neq d) \leq e^{-2T\gamma^2}$$

$$h_i^{(\ell)} = \frac{g_i^{(\ell)} P(y^{(\ell)} | \mathbf{x}^{(\ell)}, \theta_i)}{\sum_j g_j^{(\ell)} P(y^{(\ell)} | \mathbf{x}^{(\ell)}, \theta_j)}$$

$$\varepsilon(h) = 4 \cdot \frac{\ln(2\frac{L}{h} + 1) - \ln(\frac{\eta}{4})}{L/h}$$

$$E\{z_i^{(\ell)}(t+1)\} = \hat{P}\left(i \mid x^{(\ell)}, \boldsymbol{\theta}(t+1)\right) = \frac{\frac{1}{\hat{\sigma}_i(t)} e^{-\frac{(x^{(\ell)} - \hat{\mu}_i(t))^2}{2 \cdot \hat{\sigma}_i(t)^2}} \hat{P}_i(t)}{\sum_{j=1}^K \frac{1}{\hat{\sigma}_j(t)} e^{-\frac{(x^{(\ell)} - \hat{\mu}_j(t))^2}{2 \cdot \hat{\sigma}_j(t)^2}} \hat{P}_j(t)}$$

$$\hat{\mu}_i(t+1) = \frac{\sum_{\ell=1}^L E\{z_i^{(\ell)}(t+1)\} \cdot x^{(\ell)}}{\sum_{\ell=1}^L E\{z_i^{(\ell)}(t+1)\}}$$

$$\hat{\sigma}_i(t+1)^2 = \frac{\sum_{\ell=1}^L E\{z_i^{(\ell)}(t+1)\} \cdot (x^{(\ell)} - \hat{\mu}_i(t+1))^2}{\sum_{\ell=1}^L E\{z_i^{(\ell)}(t+1)\}}$$

$$\hat{P}_i(t+1) = \frac{1}{L} \sum_{\ell=1}^L \hat{P}\left(i \mid x^{(\ell)}, \boldsymbol{\theta}(t+1)\right) = \frac{1}{L} \sum_{\ell=1}^L E\{z_i^{(\ell)}(t+1)\}$$

$\chi^2$  táblázat

SzF	P <sub>0,5</sub>	P <sub>0,2</sub>	P <sub>0,1</sub>	P <sub>0,05</sub>	P <sub>0,01</sub>	P <sub>0,005</sub>	P <sub>0,001</sub>
1	0,46	1,64	2,71	3,84	6,64	7,88	10,83
2	1,39	3,22	4,61	5,99	9,21	10,60	13,82
3	2,37	4,64	6,25	7,82	11,35	12,84	16,27
4	3,36	5,99	7,78	9,49	13,28	14,86	18,47
5	4,35	7,29	9,24	11,07	15,09	16,75	20,52
6	5,35	8,56	10,65	12,59	16,81	18,55	22,46
7	6,35	9,80	12,02	14,07	18,48	20,28	24,32
8	7,34	11,03	13,36	15,51	20,09	21,96	26,12
9	8,34	12,24	14,68	16,92	21,67	23,59	27,88
10	9,34	13,44	15,99	18,31	23,21	25,19	29,59