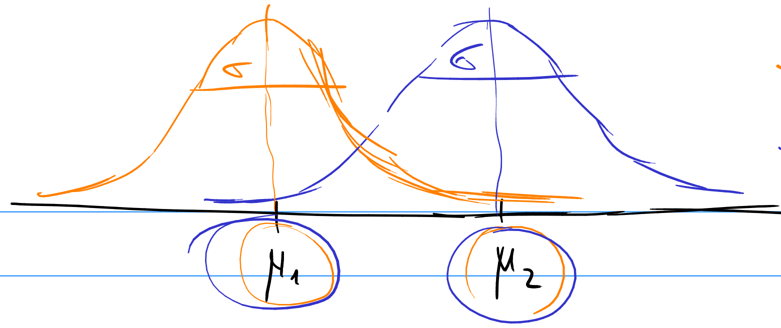


$s_1 \sim \mathcal{N}(s_1 | \mu_1, \sigma^2)$

$s_2 \sim \mathcal{N}(s_2 | \mu_2, \sigma^2)$

$$\begin{cases} s_1 - s_2 > \varepsilon \Rightarrow 1\text{ в} \\ |s_1 - s_2| \le \varepsilon \Rightarrow \text{н.} \\ \ldots \to 2\text{ в.} \end{cases}$$

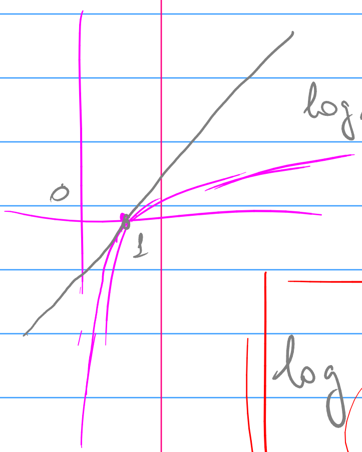
Bradley-Terry models

$1, \ldots, n$ $\qquad \gamma_i, \ i = 1..n$ $\qquad p(i > j) = \dfrac{\gamma_i}{\gamma_i + \gamma_j}$

$\#\{i > j\}$ $\qquad w_{ij}$ $\qquad p(j > i) = \dfrac{\gamma_j}{\gamma_i + \gamma_j}$

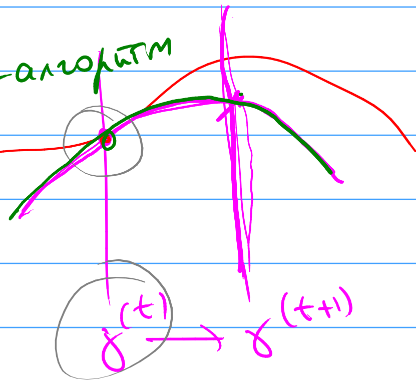
$$p(D | \bar\gamma) = \prod_{i,j=1}^{n} \left(\frac{\gamma_i}{\gamma_i + \gamma_j}\right)^{w_{ij}} \xrightarrow[\bar\gamma]{} \max$$

$$\log p(D | \bar\gamma) = \sum_{i,j=1}^{n} \left[w_{ij} \log \gamma_i - w_{ij} \log(\gamma_i + \gamma_j) \right] \xrightarrow[\gamma]{} \max$$



$\cancel{E \log p(x \mid t \mid -)}$

MM-алгоритм



$$\boxed{\log \frac{\gamma_i + \gamma_j}{\gamma_i^{(t)} + \gamma_j^{(t)}} \le \frac{\gamma_i + \gamma_j}{\gamma_i^{(t)} + \gamma_j^{(t)}} - 1}$$

$$\log p(D | \bar\gamma) \ge \sum_{i,j} \left[w_{ij} \log \gamma_i - w_{ij} \left(\frac{\gamma_i + \gamma_j}{\gamma_i^{(t)} + \gamma_j^{(t)}} - 1 + \log(\gamma_i^{(t)} + \gamma_j^{(t)}) \right) \right]$$

$\sum_j w_{kj}$

$$\text{“} Q(\bar\gamma, \bar\gamma^{(t)}) \text{”} \xrightarrow[\bar\gamma]{} \max$$

$$\frac{\partial Q}{\partial \gamma_k} = \frac{\sum_j w_{kj}}{\gamma_k} - \sum_j \frac{w_{kj}}{\gamma_k^{(t)} + \gamma_j^{(t)}} - \sum_i \frac{w_{ik}}{\gamma_k^{(t)} + \gamma_j^{(t)}} = 0$$

$$\boxed{\gamma_k^{(t+1)} := \left(\sum_j w_{kj}\right) \Big/ \left(\sum_i \frac{w_{ki} + w_{ik}}{\gamma_k^{(t)} + \gamma_i^{(t)}}\right)}$$

$$= \sum_i \frac{w_{ki} + w_{ik}}{\gamma_k^{(t)} + \gamma_j^{(t)}}$$

$$p(i>j) = \frac{\gamma_i}{\gamma_i + \underline{\theta}\gamma_j}, \quad p(j>i) = \frac{\gamma_j}{\gamma_j + \theta\gamma_i}, \quad p(i=j) = 1 - \_\_ - \_\_$$

Рейтинг спортивного **ЧГК**

$\boxed{\text{2011 – TrueSkill}}$

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2
4-8

Турнир 36

1 – 32
2 – 31
3-6 — 29

2015/16

	1	2	3	4
1	+	−	−	+
2	−	+	−	+
3	+	+	+	+