

Starting from the Minorization-Maximization Formula

$$\gamma_i = \frac{W_i}{\sum_{j=1}^N \frac{C_{ij}}{E_j}} ,$$

we get

$$\gamma_i \cdot \sum_{j=1}^N \frac{C_{ij}}{E_j} = W_i .$$

We add an additional game $M = N + 1$ with W_i^M beeing the number of wins of player i in this game. In the standard game this can be 1 or 0, as we usually only take one winner and a number of losers. With this definition

$$\gamma_i^M = \frac{W_i + W_i^M}{\sum_{j=1}^N \frac{C_{ij}}{E_j} + \frac{C_{iM}}{E_M}} ,$$

with the definition $A_i = \sum_{j=1}^N \frac{C_{ij}}{E_j}$ the result is

$$\gamma_i^M = \frac{A_i \gamma_i + W_i^M}{A_i + \frac{C_{iM}}{E_M}} ,$$

calling $r = W_i^M$ and $x = \frac{C_{iM}}{E_M}$

$$\gamma_i^M = \frac{A_i \gamma_i + r}{A_i + x} ,$$

we can argue that after a number of games $r \ll A_i \gamma_i$ and $x \ll A_i$. Therefor a Taylor series gives

$$\gamma_i^M = \gamma_i - \frac{\gamma_i}{A_i} x + \frac{1}{A_i} r .$$

The value of A_i depends on how many games allready played. As it is proportional to typical values of x it might be a good approach if one introduces

$$Bx = A_i ,$$

with B being constant, if one has no way to get exact values of A_i :

$$\gamma_i^M = \gamma_i - \frac{\gamma_i}{B} + \frac{1}{B} \frac{r}{x} ,$$

or written differently

$$\gamma_i^M = \gamma_i + \frac{1}{B} \left(\frac{r}{x} - \gamma_i \right) .$$

In the program

$$\frac{1}{B} = \text{params-} > \text{learn_delta} .$$