Pointwise Approach

 Although it seems the loss functions can bound (1-NDCG), the constants before the losses seem too large.

$$Z_{m} \approx 21.4 \qquad X_{i}, f(x_{i})$$

$$\begin{pmatrix} x_{1}, 4 \\ x_{2}, 3 \\ x_{3}, 2 \\ x_{4}, 1 \end{pmatrix} \qquad DCG(f) \approx 21.4 \qquad \begin{pmatrix} x_{1}, 3 \\ x_{2}, 2 \\ x_{3}, 1 \\ x_{4}, 0 \end{pmatrix}$$

$$\frac{15}{Z_{m}} \sqrt{2 \left(\sum_{j=1}^{m} \left(\frac{1}{\log(j+1)} \right)^{2} - m \sum_{j=1}^{m} \left(\frac{1}{\log(j+1)} \right)^{\frac{2}{m}} \right) \cdot \sum_{j=1}^{m} I_{\{y_{j} \neq f(x_{j})\}} \approx 1.15 > 1}$$