N-pair loss objective

⑧ N-pair loss objective

Incorporate multiple Negatives $\{x, x^+, \underbrace{x_1, \cdots x_{N-1}}_{\text{negs}}\}$ (x^+: pos, x: query)

$$L(\{x, x^+, \{x_i\}_{i=1}^{N-1}\}; f) = \log\left(1 + \sum_{i=1}^{N-1} \exp\left(f^T f_i - f^T f^+\right)\right)$$

($f^T f_i$: neg, $f^T f^+$: pos)

↑ as neg as possible ! ↑ minimize it

$$= -\log\left[\frac{\exp(f^T f^+)}{\exp(f^T f^+) + \sum_{i=1}^{N-1} \exp(f^T f_i)}\right]$$

!! multi-class logistic loss !!

N-pair loss efficient deep metric learning:

$$L_{\text{N-pair-mc}}\left(\{(x_i, x_i^+)\}_{i=1}^{N}; f\right) = \frac{1}{N} \sum_{i=1}^{N} \log\left(1 + \exp\left(f_i^+ f_j^+ - f_i^T f_i^+\right)\right)$$

⇓ maximizing what we have.

// new Hicks

$$L_{\text{N-pair-ovo}}\left(\{x_i, x_i^+\}_{i=1}^{N}; f\right) = \frac{1}{N} \sum_{j=1}^{N} \sum_{j \neq i} \log\left(1 + \exp\left(f_i^T f_j^+ - f_i^T f_i^+\right)\right)$$

// one-vs-one