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Memory bank

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Parametric Classifier:

n images x_1, \dots, x_n : n classes.

feature $v_j = f_\theta(x_j) // \text{NN}$

$$p(i|v) = \frac{\exp(\overbrace{w_i^T v}^{\text{weight vector for class } i})}{\sum_{i=1}^n \exp(w_i^T v)}$$

non Parametric classifier:

$$p(i|v) = \frac{\exp(\overbrace{v_i^T v}^{\text{the instances itself.!!}})}{\sum_{j=1}^n \exp(v_j^T v)}$$

Learning Objective:

$$J(\theta) = - \sum_{i=1}^n \log p(i | f_\theta(x_i)) // \text{minimize}$$

augment version to itself !! -

Equivalent to : $\prod_{i=1}^n p_\theta(i | f(x_i)) // \text{maximization}$

NCE : $p(i|v) = \frac{\exp(v^T f_i / \tau)}{Z_i}$

$$Z_i = \sum_{j=1}^n \exp(v_j^T f_i / \tau)$$

$$h(i, v) := P(D=1 | i, v) = \frac{P(i|v)}{P(i|v) + m P_d(i)}; P_d = \frac{1}{n}$$

$$J_{NCE}(v) = -E_i [\log h(i, v)]$$

$$-m E_{f_n} [\log (1 - h(i, v))]$$

m times more
noise sample

other image feature

$$z = z_i = n E_j [\exp(v_j^T f_i / \tau)] = \frac{n}{m} \sum_{k=1}^m \exp(v_j^T f_i / \tau)$$

Added for regularization

Proximal Regularization:

$$\text{Loss function: } -\log h(i, v_i^{t-1}) + \lambda \|v_i^{(t)} - v_i^{(t-1)}\|_2^2$$