Joint positive A negative learning

$x \in \mathcal{X}$ (input)

$y, \bar{y} \in \mathcal{Y} = \{1, \dots c\}$

complementary label → x does not belong to.

original label

one hot encoding

Parametric function $f(x;\theta) : \mathcal{X} \to \mathbb{R}^c$

↳ output prob vector: $p \in \Delta^{c-1}$

$\boxed{\text{c-dimentional Simplex.}}$

positive learning

$$\mathcal{L}_{PL}(f, y) = -\sum_{k=1}^{c} y_k \log p_k \qquad (1)$$

$$\mathcal{L}_{NL}(f, \bar{y}) = -\sum_{k=1}^{c} \bar{y}_k \log(1 - p_k) \qquad (2)$$

Negative learning.

for NLNL paper : train NL if $\boxed{p_y > 1/c}$

SelNL, SelPL ...

gradient of ②

$$\nabla \mathcal{L}_{NL} = \frac{\partial \mathcal{L}_{NL}(f, \bar{y})}{\partial f_i} = \begin{cases} p_i & \text{if } i = p_i \\ -\dfrac{p_{\bar{y}}}{1 - p_{\bar{y}}} \, p_i & \text{if } i \neq \bar{y} \end{cases}$$

??

Everyclass receives it ??

For clean data $\begin{cases} \text{high } p_y \\ \text{low } p_{\bar{y}} \end{cases}$

NL+

$$\mathcal{L}_{NL+}(f, \bar{y}) = -(1 - p_{\bar{y}}) \sum_{k=1}^{C} \bar{y}_k \log(1 - p_k)$$