Task 1:

Show that:

$$\max_{\delta \in \Delta} \left(L(NN_\theta(x+\delta), y) - L(NN_\theta(x+\delta), y_{target}) \right) \quad (1)$$

is equal to:

$$\max_{\delta \in \Delta} \left(NN_\theta(x+\delta)_y - NN_\theta(x+\delta)_{y_{target}} \right) \quad (2)$$

with $NN_\theta(x)$ = pre softmax logits

and $$L(x) = \log\left(\sum_{j=1}^{k} \exp(NN_\theta(x)_j)\right) - NN_\theta(x)_y \quad (3)$$

$\overset{a}{\vdots}$!! ~~#tags~~

we just insert (1) into (3) and ignore the max

$$\Rightarrow a - NN_\theta(x+\delta)_y - a - NN_\theta(x+\delta)_{y_{target}}$$

a cancels we have $a - a$

$$\Rightarrow NN_\theta(x+\delta)_y - NN_\theta(x+\delta)_{y_{target}}$$

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