The Dilemma of TriHard Loss and an Element-Weighted TriHard Loss for Person Re-Identification

Yihao Lv, Youzhi Gu and Xinggao Liu

State Key Laboratory of Industry Control Technology
College of Control Science and Engineering
Zhejiang University
Hangzhou 310027, P.R. China
{lvyihao,gu_youzhi,lxg}@zju.edu.cn

Supplementary materials

A. Distortion of feature normalization on Euclidean distance

As is shown in Fig.1, we take 2-dimensioal space as an example. $\vec{a}$, $\vec{p}$, $\vec{n}$ and $\vec{a'}$, $\vec{p'}$, $\vec{n'}$ are origin and normalized feature vectors of anchors, positive and negative samples. Therefore, $|\vec{a} - \vec{p}| \in [|\vec{a}|\sin\theta_1, +\infty)$, $|\vec{a} - \vec{n}| \in [|\vec{a}|\sin\theta_2, +\infty)$ while $\left|\vec{a'} - \vec{p'}\right| = 2\gamma\sin\frac{\theta_1}{2}$, $\left|\vec{a'} - \vec{n'}\right| = 2\gamma\sin\frac{\theta_2}{2}$ $(\theta_1,\theta_2 \in [0,\pi])$. The relationship between $\left|\vec{a'} - \vec{p'}\right|$ and $\left|\vec{a'} - \vec{n'}\right|$ is determined by θ_1 and θ_2 but the relationship between $|\vec{a} - \vec{p}|$ and $|\vec{a} - \vec{n}|$ is unsure in the original space. Feature normalization distorts the real relative Euclidean distance between feature vectors which is very important in triplet loss of metric learning.
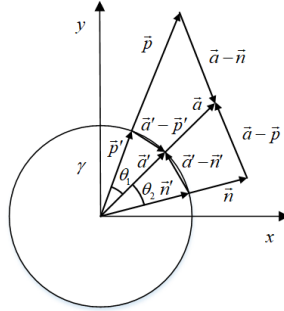

Figure 1: Graphical representation of feature normalization

B. The results of series of EWTH losses with different value of t

Nulls in Table 1, 2, 3, 4 indicates the experiments under those values of t are not conducted. Therefore, there are 5 different values of t tested of each loss.

Table 1: Results of series of EWTH loss in BoT with different values of t on Market1501

Method	Values of t									
	0.1		0.2		0.3		0.4		0.5	
	mAP	rank-1	mAP	rank-1	mAP	rank-1	mAP	rank-1	mAP	rank-1
BoT+EWTH	**87.7%**	94.9%	**87.7%**	**95.0%**	87.3%	94.6%	87.1%	94.7%	86.9%	**95.0%**
BoT+NEWTH	88.3%	95.0%	**88.4%**	94.9%	88.2%	94.7%	88.1%	**95.1%**	88.0%	95.0%

Table 2: Results of series of EWTH loss in BoT with different values of t on MSMT17

Method	Values of t									
	0.1		0.2		0.3		0.4		0.5	
	mAP	rank-1	mAP	rank-1	mAP	rank-1	mAP	rank-1	mAP	rank-1
BoT+EWTH	48.5%	**67.8%**	**48.7%**	67.7%	48.1%	67.1%	47.3%	66.6%	47.1%	66.1%
BoT+NEWTH	**49.7%**	67.8%	49.5%	**68.1%**	**49.7%**	**68.1%**	49.4%	67.4%	49.0%	67.1%

Table 3: Results of series of EWTH loss in AGW with different values of t on Market1501

Method	Values of t									
	0.1		0.2		0.3		0.4		0.5	
	mAP	rank-1	mAP	rank-1	mAP	rank-1	mAP	rank-1	mAP	rank-1
AGW+EWTH	**88.5%**	**95.4%**	88.4%	95.0%	**88.5%**	95.3%	88.0%	95.3%	87.8%	95.2%
AGW+NEWTH	89.0%	**95.6%**	89.1%	95.1%	**89.4%**	**95.6%**	89.1%	95.5%	88.7%	95.2%

Table 4: Results of series of EWTH loss in AGW with different values of t on MSMT17

Method	Values of t									
	0.1		0.2		0.3		0.4		0.5	
	mAP	rank-1	mAP	rank-1	mAP	rank-1	mAP	rank-1	mAP	rank-1
AGW+EWTH	49.9%	**69.7%**	50.0%	69.4%	49.6%	68.9%	**50.4%**	69.4%	49.1%	68.5%
AGW+NEWTH	**53.1%**	**71.5%**	51.8%	70.1%	52.8%	71.0%	52.2%	70.6%	50.4%	69.7%