Supplementary Materials:

Algorithm 1 SMGN-Based Person Re-identification

1. Training

Input: Training images $X_{train}=\{(x_t,l_t)|t=1,...,N\}$, m : the margin parameter in Equation (5), λ : the balance coefficient in Equation.(9).

Output: The backbone CNN Ω of SMGN.

Parameter settings: batch_size = 16, Epoches = 1000, batch_per_epoch = *N*/16.

For epoch **in** Epoches:

For batch **in** batch_per_epoch:

①Using the current batch of person images, 16 image pairs are randomly constructed and recorded as $B_i=(x_i^1,x_i^2,l_i^1,l_i^2,L_i)$ $(i=1,...,16)$;

②Initializing the MCWF loss: $Loss_{fusion}=0$;

For $i=1\rightarrow 16$ **do**

③Extracting global features G_i^1, G_i^2 and local features L_i^1, L_i^2 of *i*-th pair B_i, and Concatenating all features to obtain LMMG features F_1, F_2 via Equation (1);

④Utilizing all the features mentioned above to calculate the *i*-th MCWF loss $Loss_{fusion}^i$ via Equation (9);

⑤Accumulating losses: $Loss_{fusion}=Loss_{fusion}+Loss_{fusion}^i$;

end For

⑥MCWF is propagated backward by BP algorithm to further optimize SMGN model parameter.

end For

end For

return Ω

2. Testing

Input: A query image set $X_{query}=\{(x_j^q,l_j^q)|j=1,...,Q\}$ and gallery images set $X_{gal}=\{(x_i^g,l_i^g)|i=1,2,...,M\}$, parameter *K*.

Output: The top-*K* precision P_K.

① Extracting LMMG features of each image x_i^g in X_{gal} using Ω, which is recorded as $F_{gal}=\{F_i^g|i=1,2,...,M\}$;

② Initializing the correct matching number $b=0$;

For $j=1\rightarrow Q$ **do**

③Extracting LMMG features F_j^q of *j*-th image in X_{query} using Ω ;

④Computing the distance between F_j^g and each feature vector in F_{gal} using Equation (10), which is recorded as $D_j=\{d_1^j,d_2^j,...,d_M^j\}$;

⑤Sorting D_j in ascending order to obtain the rank results S_j ;

⑥Comparing the labels l_j^q with the first *K* l_i^g in S_j, if there exits $l_j^q=l_i^g(i=1,2,...,K)$, then $b=b+1$;

end For

⑦Computing the average precision: $P_K=b/Q$.

return P_K