Supplementary Material for Unsupervised Visible-Infrared Person Re-Identification via Progressive Graph Matching and Alternate Learning

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1. Details of CA Assisted Learning in DCL

Channel augmentation \cite{1} is a common and powerful data augmentation to bridge the gap between visible and infrared images, and thus channel augmented (CA) images are used to assist in the learning process of visible streams. CA dataset is denoted as $T^a = \{x^a_i | i = 1, 2, \ldots, N\}$ with the same number of images as the visible dataset. In the DCL framework, visible images have their augmented CA images to assist the training process, which uses the following equations:

$$L_{\text{vis}} = -\frac{N_B}{2} \sum_{i=1}^{N_B/2} \log\left( \frac{\exp(K^v[\hat{y}^v_i]^T \cdot f(x^v_i)/\tau)}{\sum_{k=1}^{Y^v} \exp(K^v[k]^T \cdot f(x^v_i)/\tau)} \right),$$

(1)

$$L_{\text{ca}} = -\frac{N_B}{2} \sum_{i=1}^{N_B/2} \log\left( \frac{\exp(K^v[\hat{\tilde{y}}^v_i]^T \cdot f(x^a_i)/\tau)}{\sum_{k=1}^{Y^v} \exp(K^v[k]^T \cdot f(x^a_i)/\tau)} \right),$$

(2)

where $\hat{\tilde{y}}^v_i$ is the class (pseudo label) for image $x^v_i$ and its channel augmented image $x^a_i$. Besides, $\tau$ is a temperature factor.

2. Details of CA Assisted Learning in ACCL

Visible to infrared learning exhibits a similar form like infrared to visible learning described in main text of the paper. The difference is that half of the $N_B$ images are visible images and the other half are their corresponding CA images. It consists of visible and CA learning, denoted as $L_{v2r}$ and $L_{a2r}$, respectively. The equations are:

$$L_{V2R} = L_{v2r} + L_{a2r},$$

$$L_{v2r} = -\frac{N_B}{2} \sum_{i=1}^{N_B/2} \log\left( \frac{\exp(K^r[y^r_i]^T \cdot f(x^v_i)/\tau)}{\sum_{k=1}^{Y^v} \exp(K^r[k]^T \cdot f(x^v_i)/\tau)} \right),$$

(3)

$$L_{a2r} = -\frac{N_B}{2} \sum_{i=1}^{N_B/2} \log\left( \frac{\exp(K^r[\hat{\tilde{y}}^v_i]^T \cdot f(x^a_i)/\tau)}{\sum_{k=1}^{Y^v} \exp(K^r[k]^T \cdot f(x^a_i)/\tau)} \right),$$

where $y^r_i = V2R[y^v_i]$, $\hat{\tilde{y}}^v_i$ is the pseudo label for the infrared image $x^v_i$, and $y^a_i$ is the cross-modality correspondence for $y^v_i$, also the cross-modality label for image $x^v_i$ and $x^a_i$. $\tau$ is a temperature factor. The visible to infrared aims to bridge modality gap by gathering the given visible (CA) sample to its corresponding cross-modality proxy while scattering other proxies.

References


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