Qeios

Peer Review

Review of: "Anti-Forgetting Adaptation for Unsupervised Person Re-identification"

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Summary:

This paper proposes a novel Dual-level Joint Adaptation and Anti-forgetting (DJAA) framework for unsupervised domain adaptive person re-identification (ReID). It addresses critical challenges in lifelong person ReID, including catastrophic forgetting, generalization to unseen domains, and backward compatibility. By combining prototype-level and instance-level contrastive learning, the framework optimizes both global class structure and fine-grained sample relationships. Additionally, the introduction of a hybrid memory buffer and consistency regularization preserves knowledge across domains while enhancing representation stability. Extensive experiments demonstrate the effectiveness of DJAA on multiple ReID datasets, showing significant improvements in anti-forgetting, generalization, and compatibility.

Strengths:

1. The DJAA framework effectively tackles the challenge of lifelong person ReID with domain adaptation, backward compatibility, and anti-forgetting.
2. The combination of prototype-level and instance-level contrastive learning ensures both global class separation and local representation refinement, enhancing both domain-specific and domain-agnostic features.
3. The use of image-to-prototype and image-to-image similarity regularization ensures stable representation learning and mitigates catastrophic forgetting during domain adaptation.
4. The paper evaluates its method on a wide range of datasets and scenarios. It convincingly demonstrates the superiority of the proposed method over existing approaches.

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Concerns:

1. The paper empirically shows that combining prototype-level and instance-level contrastive learning improves performance but lacks a theoretical explanation. Why does prototype-level contrastive learning effectively capture global structures? For example, can it be linked to theoretical bounds on intra-cluster compactness or inter-cluster separability?
2. The hybrid memory buffer stores samples and prototypes, but its size grows with the number of domains and classes, which might become infeasible for large-scale datasets. I would suggest that the authors propose strategies to dynamically prune or compress the memory buffer, such as sample selection algorithms based on informativeness or diversity.
3. The paper does not provide sufficient analysis of the sensitivity of hyperparameters (e.g., memory buffer size, consistency regularization weights, and temperature parameters). Including a detailed ablation study would help practitioners better understand and implement the method.

Declarations

Potential competing interests: No potential competing interests to declare.