Collective Domain Adversarial Learning for Unsupervised Domain Adaptation

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Problems & Ideas

- Problems of conventional stereo matching approaches:
  - Existing adversarial domain adaptation approaches neglect higher-order relationships and interactions among samples.
  - Traditional methods face significant challenges under domain ambiguity and noisy data, often resulting in negative transfer.
- Ideas: Introduce a set-level adversarial learning approach (ColDA) leveraging the collective assumption to capture complex intra-domain and inter-domain interactions.

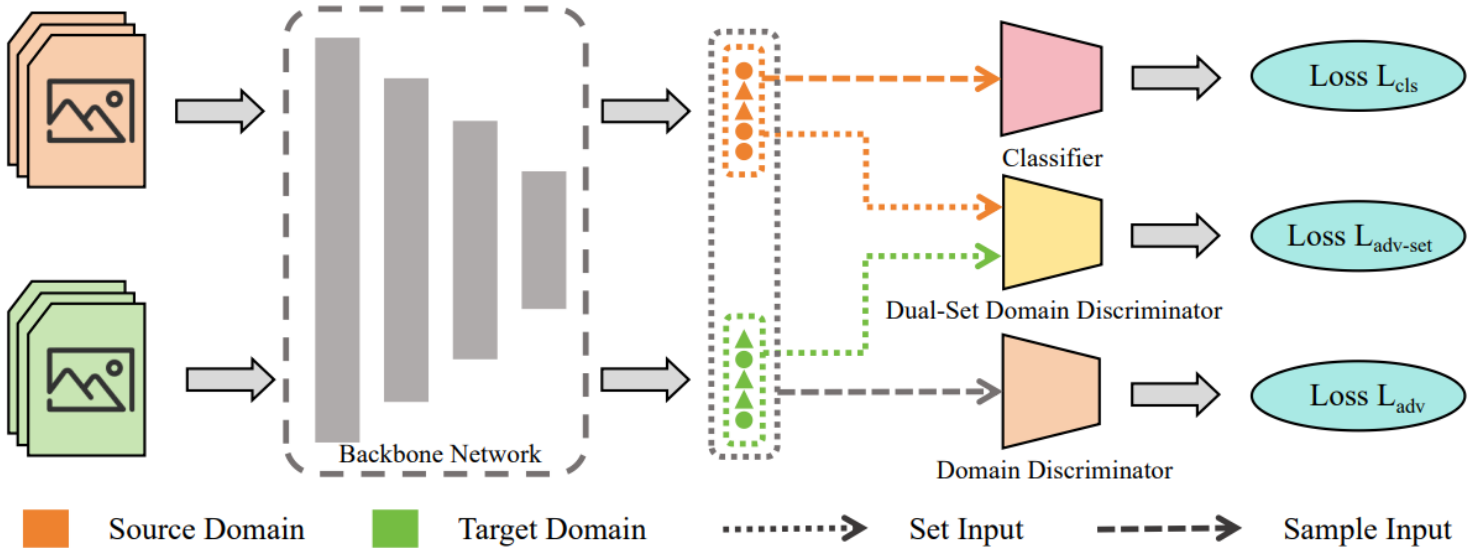

Fig. 1 An overview of the proposed collective domain adversarial learning framework, which aligns domain features at both the sample level and the set level using a dual-set domain discriminator, and a domain discriminator with their respective losses.

Main Contributions

- Contributions:
  - A novel collective domain adversarial learning (ColDA) framework that explicitly leverages collective sample interactions for robust domain adaptation;
  - Introduction of the Dual-Set Domain Discriminator, an innovative module simultaneously modeling intra-domain and inter-domain relationships, effectively handling domain ambiguity and noise;
  - A combined set-level and sample-level adversarial training strategy, which balances local instance-wise discrimination and global set-wise alignment.

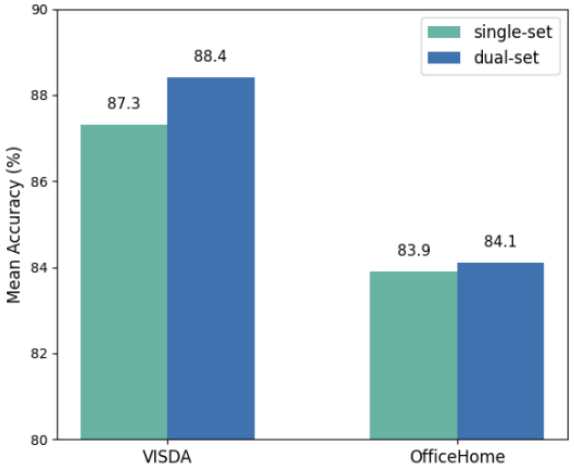

Fig. 4 Comparison of Single-set vs Dual-set Methods

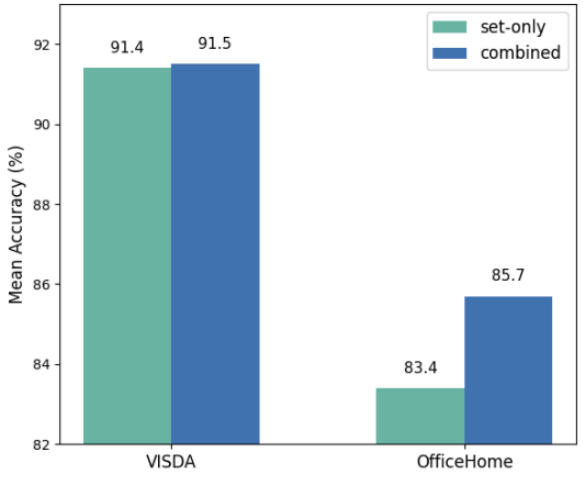

Fig. 5 Comparison of Set-Only vs Combined Adversarial Training Methods