MURAER: Mapping Unlabeled Real Data for Label AUstERity

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Motivation

- Learning accurate models requires a large amount of labeled data
- Accurate labeling vital
- Synthetic data can help
  - But: domain gap
- Mitigated using corresponding real ↔ synthetic data [1,2]
  - But: using correspondence required labeling

Implementation

- Overall loss:
  \[ \ell = \ell_\text{pose} + \lambda \ell_\text{match} + \ell_\text{dist} \]

- Enforce pose specificity (by learning to predict/reconstruct other view [3]):
  \[ \ell_\text{pose} = \sum_{x} \| f(x) - f(x') \|_2 \]

- Enforce feature distribution alignment (adversarial; LS-GAN [4]):
  \[ \ell_\text{dist} = \sum_{x} \| f(x) - f(x') \|_2 \]

Idea

- Map features real to synthetic without labels/correspondence
- Using two auxiliary objectives computed from unlabeled data:
  (i) enforcing pose specificity [3]
    (use 2 views, predict one from the other)
  (ii) enforcing to align real and synthetic samples
    (make distributions indistinguishable)

Findings

- Comp. to state-of-the-art
- Ablation
- Qualitative results

References


Finding aggregated graphs not well aligned real and synthetic samples trained with only 100 labeled real & unlabeled & synthetic samples

Baseline trained with real & synth.
Ours trained with real & synth. & unlabeled

References