Domain-Specific Feature Elimination: Multi-Source Domain Adaptation for Image Classification

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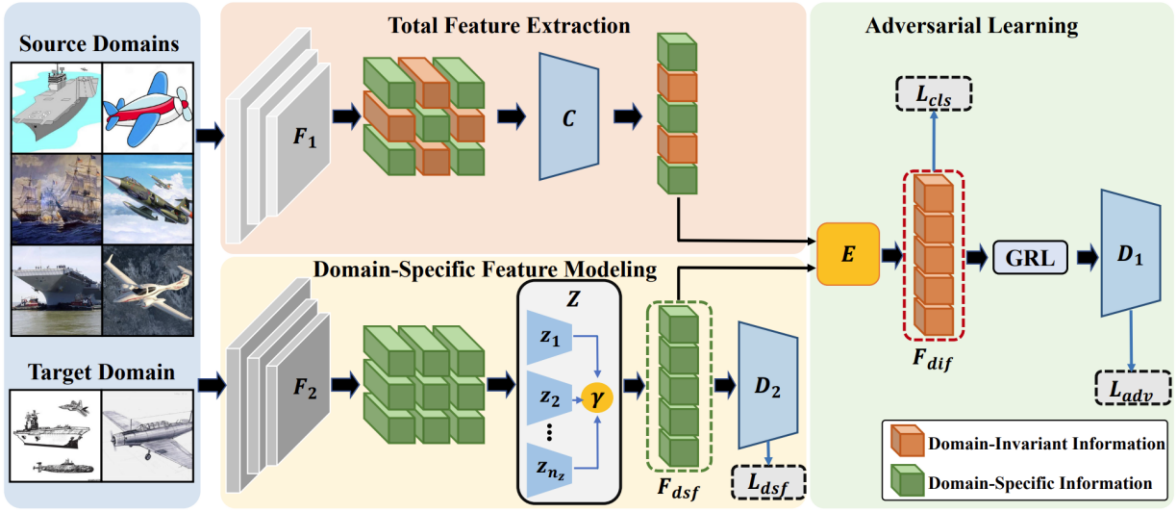
Problems & Ideas

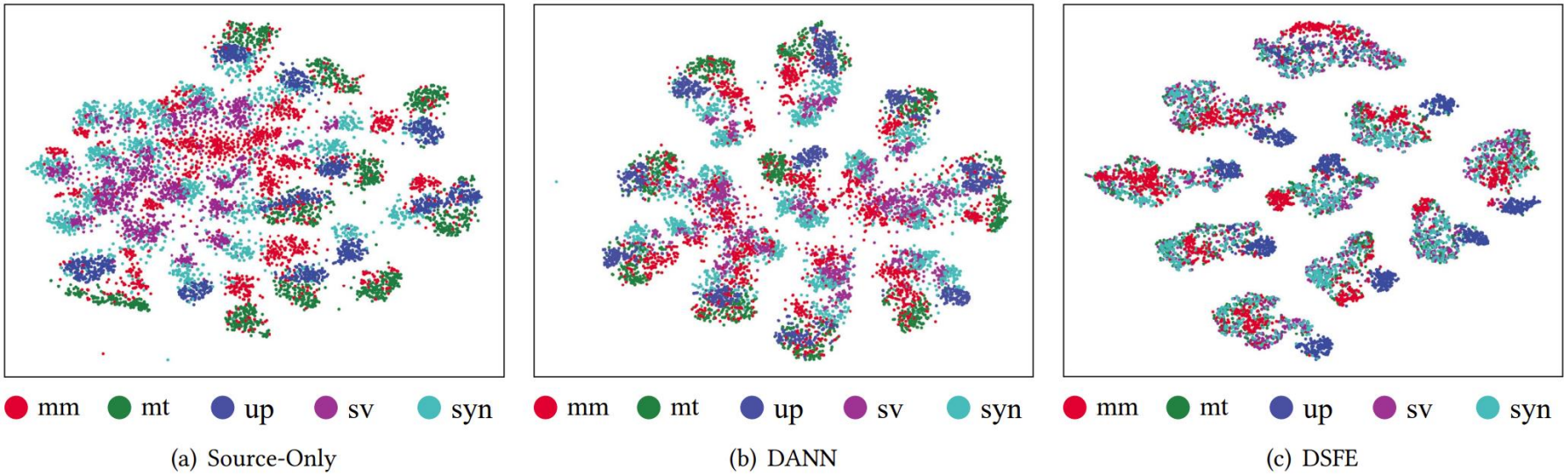
- Problems of conventional multi-source DA approaches:
  - Previous works can not guarantee that the domain-invariant features contain domain-specific information as few as possible without modeling the domain-specific features explicitly.
- Ideas: Modeling the domain-specific features and total features explicitly and construct the domain-invariant representations by eliminating domain-specific features from total features.



The structure of our domain-specific feature elimination method in the training phase. Module E indicates the feature elimination operation. In the domain-specific feature modeling stage, we do not use the gradient reversal layer (GRL), because the discriminator and feature extractor are expected to be optimized in the same direction. Our method performs feature elimination at the highest level, mapping domain-specific features on the category dimension.

Main Contributions

- Contributions:
  - We use two ways to extract domain-specific features and total features respectively, and improve the generalization ability of model by eliminating domain-specific features;
  - We model domain-specific features explicitly and construct domain-invariant features by eliminating domain-specific features from the total features;
  - Superior performance on the benchmarks and related tasks.



Visualization for feature distributions. Different colored dots represent data in different domains. Model trained for '→syn' task on Digits-five is used for visualization.