Unsupervised Domain Adaptation

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Abstract

1 Introduction

Unsupervised domain adaptation (UDA) is a type of domain adaptation in machine learning where a model is trained on a source domain with labelled data, and then adapted to a target domain with unlabelled data. In UDA, the source domain and target domain have different distributions, but the goal is to leverage the labelled data in the source domain to improve performance on the target domain.

This report is product of our exploration of state of the art UDA algorithms and their applications in various fields like computer vision, natural language processing, etc. We have reproduced the results of these key papers [] in this research area of machine learning.

2 Methodology

2.1 Algorithms

We have implemented the following algorithms for our experiments:

- **MMD (Maximum Mean Discrepancy)**[]:

- **CORAL (Correlation Alignment), DeepCORAL**[][]: CORAL aligns the second-order statistics (covariances) of source and target features. Accordingly, DeepCORAL is an extension of CORAL that integrates correlation alignment into deep neural networks.

- **DANN (Domain-Adversarial Neural Network)**[]: Uses adversarial training to learn domain-invariant features.

- **DSN (Domain Separation Network)**[]: Separates domain-specific and domain-invariant features for better adaptation. A state of the art method for domain invariant feature learning.

- **ATT (Adversarial Training with Triplet loss)**[]:

2.2 Datasets

We have used the following datasets for our experiments:

Table 1: Benchmark datasets used in our experiments.

Dataset Category	Datasets
Computer Vision (Numbers)	MNIST, MNIST-M, SVHN
Computer Vision (Categorical)	Office31, Amazon, DSLR, Webcam
Sentiment Analysis (Classification)	Amazon Review Sentiment

3 Experiments

4 Conclusion

Appendix