Few-Shot Adversarial Domain Adaptation

Saeid Motiian, Quinn Jones, Seyed Mehdi Iranmanesh, Gianfranco Doretto  
https://arxiv.org/pdf/1711.02536.pdf

Overcome covariate shift by feature extractor transferring train and test probability distributions which might be different to the same distribution in the feature space. Then there would only be one target classifier necessary, mapping from the shared latent space to the label space.

Using a descriminator D to distinguish between source and target latent representation to have a GAN like network generating the same latent space for source and target distribution.

Once the discriminator is learned, adversarial learning tries to update the target inference functiongtin order to confuse the discriminator. In other words, the adversarial training is looking for aninference functiongtthat is able to map a target sample to a feature space such thatthe discriminatorDwill no longer distinguish it from a source sample.

Downside: need many examples for source and target and also there is no guarantee for generalization. Samples from different domains but with the same class label can still be far apart in latent space.

Using a domain-class discriminator (DCD) in order to have different classes still be apart in latent space but different domains be close together.