Adaptive Ensembling: Unsupervised Domain Adaptation for Political Document Analysis

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Problem

- We would like to study latent variables in political science (e.g., polarization) using a diachronic corpus consisting of multiple news sources.

What is our goal?

- We present adaptive ensembling—an unsupervised domain adaptation framework that uses supervision from a source domain (e.g., NYT) to provide labels for a target domain (e.g., COHA).

What are our challenges?

- COHA is a multi-source corpus spanning multiple decades, but it is unlabeled; in contrast, NYT is a single-source corpus spanning one decade, but it is labeled.

Solution: Domain Adaptation

1. Student model learns features from source domain; temporally order target domain samples from modern to old.
2. Both models maintain consistent predictions when given samples from the target domain; backprop on student.
3. Teacher model updated via exponential average of student model’s parameters over time (i.e., in each iteration).
4. The exponential averaging smoothing rates are adaptive; this leads to smoother training in comparison to previous methods.

Experiments

- We experiment with a binary task (Political, Non-Political) and a multi-label task (American Government, Political Economy, International Relations).

Analysis

- The adaptive constants in our framework sharply converge to different values, showing how different parameters need their own smoothing rates.

- Our framework (AE) is significantly than domain adversarial neural networks (DANN)—the training process highly unstable and fails to converge.