



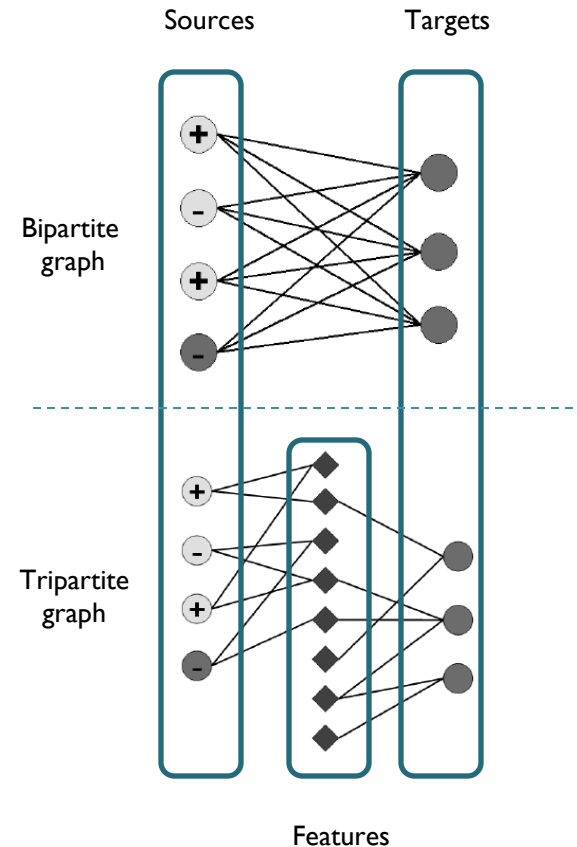
Graph-Based Transfer Learning

Jingrui He, Yan Liu & Richard Lawrence
CIKM 2009

Presentation by Mingzhen Mo

Motivation

- Additional Relationship – through features
- Features are sensitive to domain knowledge
 - Movie Review



Model: Basic

- Basic Graph Model

$$Q_1 = \frac{1}{2} \left(\sum_{i,j=1}^n A_{i,j} \left(\frac{F_i}{\sqrt{D_{ii}}} - \frac{F_j}{\sqrt{D_{jj}}} \right)^2 + \mu \sum_{i=1}^n (F_i - Y_i)^2 \right)$$

- A: affinity matrix, D: diagonal matrix $D_{ii} = \sum_{j=1}^n A_{i,j}$


- F: predict result, Y: real result

- Let $S = D^{-1/2} A D^{-1/2}$

$$Q_1 = F^T (I - S) F + \mu \|F - Y\|^2$$

Model: Framework

- Combine Tripartite & Bipartite Graph


$$Q_2 = \gamma F^T (I - S^{(3)}) F + \tau F^T (I - S^{(2)}) F + \mu \|F - Y\|^2$$

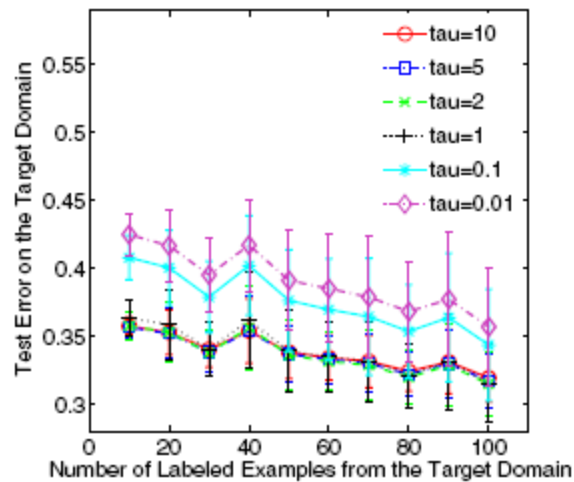
- Closed Form
- Iterative Algorithm (for large-scale)

Experiments

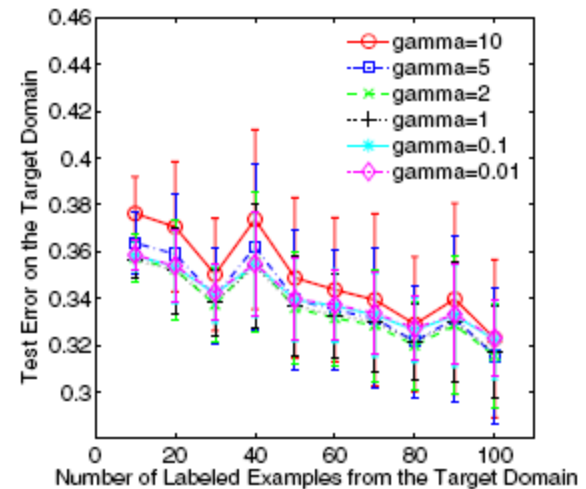
- Parameters Tuning
- Methods Comparison

Experiments

- Parameters Tuning



(a) $\gamma = 1$



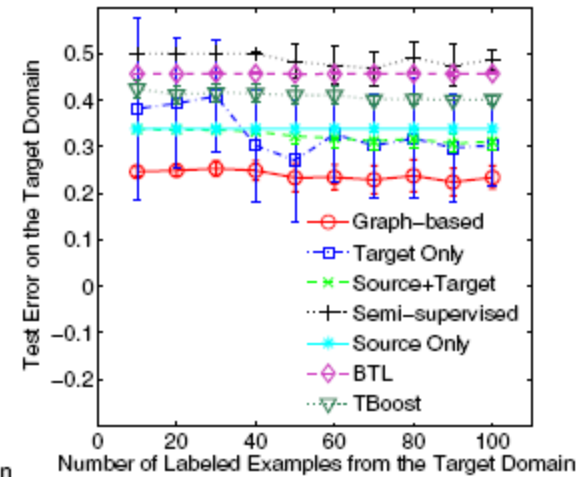
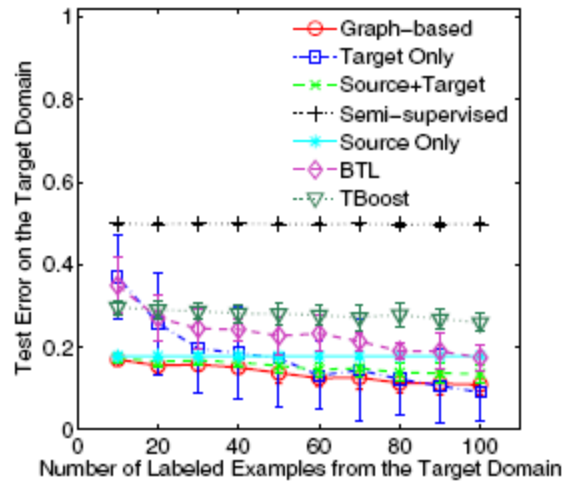
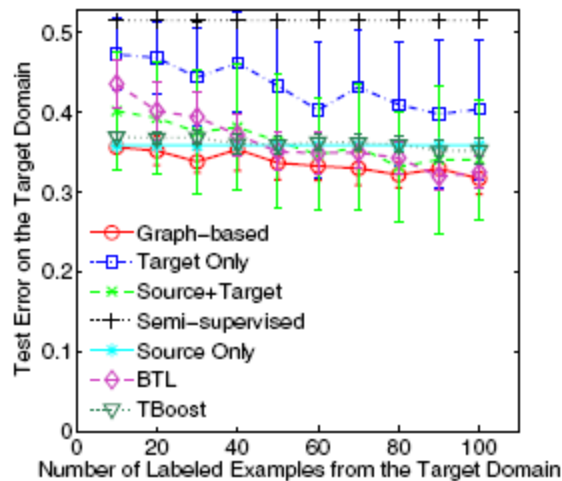
(b) $\tau = 5$

Experiments

- **Methods Comparison**
 - **3 Tasks:**
 - Sentiment classification (SC)
 - Document classification (DC)
 - Intrusion detection (ID)
 - **6 Methods:**
 - BLT
 - TBoost
 - SSL
 - New Method (source, target, source+target)

Experiments

- Some Results of SC, DC & ID



My Comment

- Graph-based Framework (GF) is not new
 - But it is firstly applied on transfer learning
- GF can also be applied on ranking (label ranking), recommender system & QA (Baichuan's doing) etc.