Supervised Deep Learning with Auxiliary Networks

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Motivation: Huge data, but few labeled

1. Labeling Data is Very Expensive
   - ✧ Sample-specific annotations
   - ✧ Side information (similarity/dissimilarity constraints)
     - ➢ More flexible
     - ➢ Greatly mitigates the workload of annotators
2. Existing Deep Learning Schemes
   - ✧ Unsupervised Pre-training + Supervised Fine-turning
     - ➢ DBN, Stacked Autoencoders
   - ✧ Semi-supervised or Guided Autoencoder
3. Problems and Shortcoming
   - ✧ Ineffectively handle sparse side information
   - ✧ Sample-specific annotations are always required

Solution: SUGAR

- ○ Effectively Handle Side Information
- ○ More Robust, Flexible, Easily Extendible
- ○ General Model for **Feature Learning** from both unlabeled and labeled data
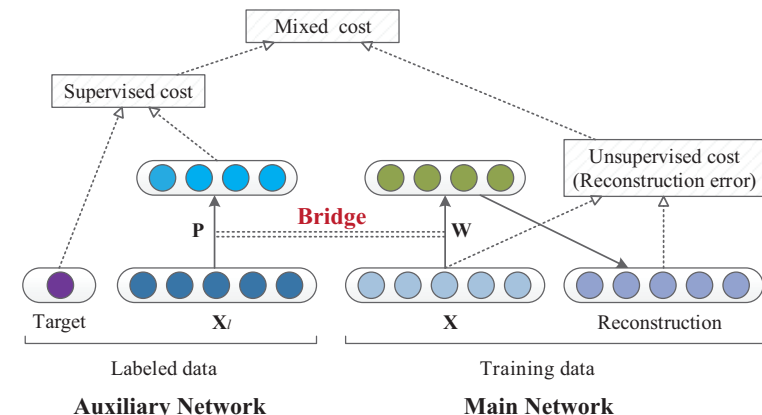
Potential Application Areas

1. Handwriting Recognition
2. Domain Adaptation
3. Telecommunication Data Mining
4. Others
   - ✧ Multi-source data
   - ✧ Few Labeled data

Experiments