Hierarchical Low-Rank Tensors for Multilingual Transfer Parsing
Yuan Zhang, Regina Barzilay
CSAIL, MIT

Motivation
• Multilingual transfer improves unsupervised parsing performance even in the absence of parallel data
• Automatize feature engineering with tensor scoring

Traditional Multi-way Tensors:
• Directly capture all feature combinations

Hierarchical Tensors:
• Operation: element-wise sum
• Avoid invalid interactions

Example of Prior Knowledge
• The weight of typology=Adj-N, head_POS=Verb, mod_POS=Noun should be zero
• The weight of typology=Subj-Verb, head_POS=Verb, label=Obj should be zero

Features
• Typological features [5]
  • Inspired by [2] and [3]
  • Include arc labels
• Traditional features
  • Linear scoring features: following MST Parser
  • Tensor scoring features: POS tags, labels, directions and distances etc.

Experiments
• Dataset: multilingual universal dependency treebank v2.0 [6]
  • 10 languages
• Results:
  • Unsupervised: no sentence in target language
  • Semi-supervised: 50 sentences in target language
• Findings:
  • Our model achieves best UAS and LAS on 7 out of 10 languages
  • On average, our model outperforms variants of baselines

References