Coordination Structures in Dependency Treebanks

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Introduction

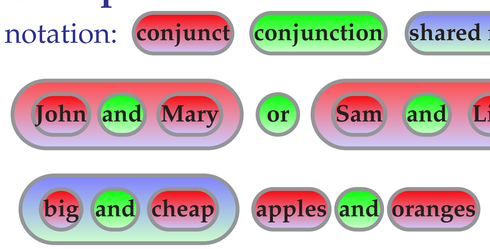
Coordination structures (CS)

are difficult to represent in dependency treebanks:

- coordination vs. dependency are fundamentally different relations
- nested coordination
- shared vs. private modifiers
- multiconjunct CS, punctuation, etc.

Examples:

notation: conjunct conjunction shared modifier



Problem

- large inter-treebank variation
- obstacle for multi-lingual parsing

Our Goal

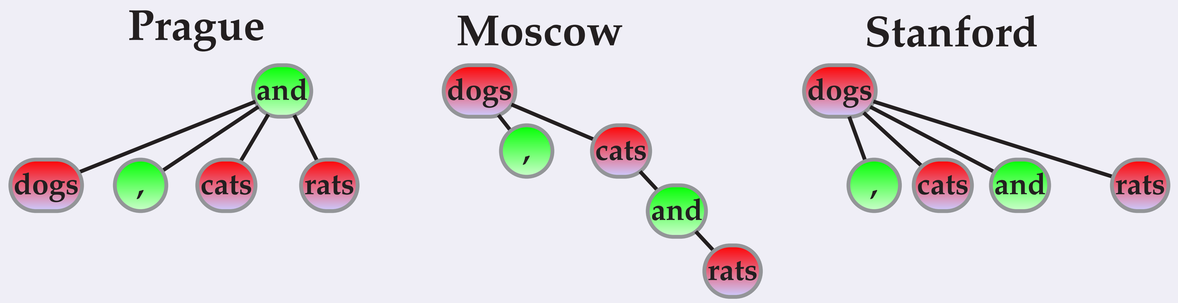
- explore the CS variations in a systematic way
- convert the treebanks into a common CS style

Novel taxonomy of CS styles

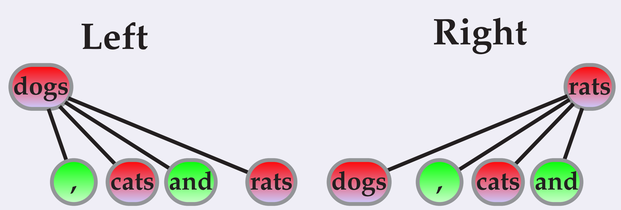
We identified

- 5 dimensions in CS tree shape variations
- 3 dimensions in CS labeling
- a few additional subtle variations
- in theory over one thousand possible styles
- 16 styles found in the real treebanks

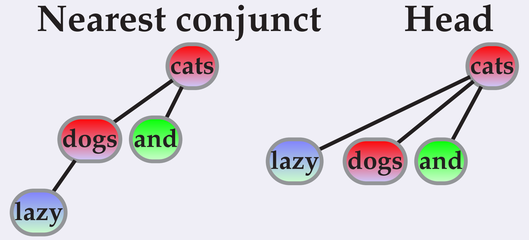
Family – configuration of conjuncts



Choice of head



Shared modifiers below



Convertibility

Different CS styles do not have equivalent expressive power ⇒ no chance for a lossless conversion.

- We developed an algorithm that decomposes a CS in one style and assembles it in another style.
- Empirical roundtrip accuracy: usually > 99%

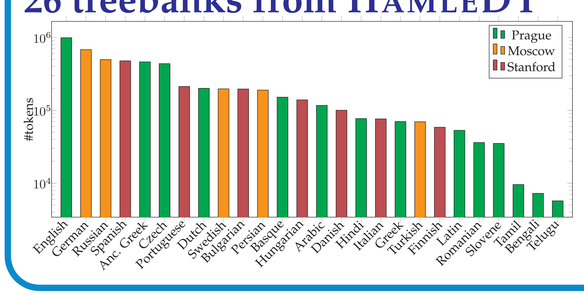
Roundtrip means e.g.
Prague → Moscow → Prague
evaluated by unlabeled attachment score.

Conclusions

- a survey of coordination styles in 26 treebanks
- a general taxonomy which covers most of the variations
- 26 treebanks converted into a common style available at http://ufal.ms.mff.cuni.cz/hamledt/
- relatively high convertibility accuracy should allow future experiments with learnability of CS by parsers

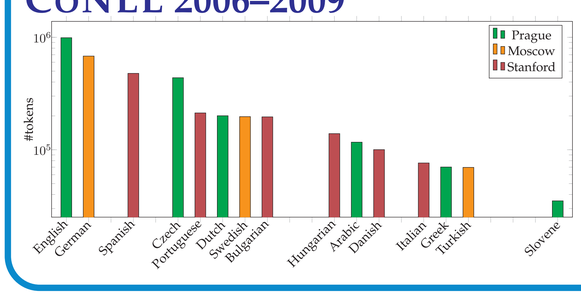
Analyzed Treebanks

26 treebanks from HamleDT



Similar collections of treebanks

CoNLL 2006–2009



Google Universal Treebanks v1.0