Motivation & Background

In the wild, we find a great variety of preposition and case usages. We can use meaning representations (MRs) to categorize these

- by similar and diverging senses and structures,
- comprehensively,
- and with a level of abstraction that can be applied to many genres and languages.

This can benefit linguistic analysis, as well as downstream NLP tasks like paraphrasing or MT.

**UCCA** (Abend and Rappoport, 2013)
- predicate-argument structure
- typologically-motivated
- 15 coarse categories (no semantic roles)

**SNACS** (Schneider et al., 2018)
- token-based sense disambiguation of a wide range of adpositional expressions
- incl. certain infinitivals and conjunctions
- 50 hierarchical categories, incl. semantic roles

Both meaning representations are comprehensive, abstract, and language-agnostic.

Data

English Web Treebank
Genre: online reviews ★★★★★
Previously annotated with SNACS and UCCA, independently (Hershcovitch et al., 2019)
4k sentences, 56k tokens, 8:1:1 train:dev:test
We release a new version of this corpus, annotated with our integrated representation.

Learning Architectures

**Baseline**: Transition-based UCCA parser with BLSTM + MLP action classifier (Hershcovitch et al., 2018);
SVM-based SNACS classifier (Schneider et al., 2018)

**Pipeline**: SNACS labels obtained from separate classifier and used as features in the UCCA parser

**Independent MTL**: A SNACS tagger and an UCCA parser are optimized using Multitask Learning (sharing part of their hidden layers)

**Dependent MTL**: The SNACS classifier is integrated into the UCCA parser, and the two are trained together, again under the MTL paradigm

**Joint**: A single parser with a tag set that consists of concatenated UCCA+SNACS categories

We brought together two MRs...

...using 6 classes of heuristic rules based on SNACS, UCCA and UD

...with high coverage: 98% (train) – 99% (dev, test)

We test this by running combined UCCA and SNACS prediction experiments, varying the degree and form of interaction between the two schemes.

Our methods outperform the baseline in terms of UCCA F1 on units that are refined with SNACS labels.

Jointly optimizing for both representations yields the biggest performance boost.

We observe slight increases in overall F1-score not only for the combined parsing task, but even for the UCCA and SNACS prediction tasks individually.

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