Hybrid Multilingual Parsing
with HPSG
for Semantic Role Labeling

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Motivations

• The extension of Zhang et al. (2008)
  • From English to multiple languages
  • Both syntactic and semantic features

• Road-test the hand-written DELPH-IN HPSG grammars being developed in the past two decades
Architecture

Syntactic Dependency Parsing
  MST Parser
  Syn.Dep.

Argument Identification
  Argument Classification
  Predicate Classification

Semantic Role Labeling

HPSG Syn.

PET
  [incr tsdb[]]
  ERG
  GG
  JaCY
  SRG

HPSG Parsing

MRS
Deep Linguistic Grammars

- ERG (en)
  - Dan Flickinger
  - Coverage: 80.4%

- GG (de)
  - Berthold Crysmann, Peter Adolphs
  - Coverage: 28.6%

- JaCY (ja)
  - Francis Bond
  - Coverage: 42.7%

- SRG (es)
  - Montserrat Marimon
  - Coverage: 7.5%

http://www.delph-in.net/
Dependency Backbone Extraction
HPSG Parsing

- **PET: Efficient HPSG Parser**
  - Chart-mapping-based re-tokenization
  - Unknown word handling with POS mapping rules
  - Efficient best-first parsing with ambiguity packing

- **Retraining Parse Disambiguation Models**
  - Original models trained with manually disambiguated HPSG treebanks
  - Retrained to maximize the agreement between HPSG dependency backbone and CoNLL unlabeled syntactic dependencies
MRS Features

- P MRS ep-name: lose_v_1_rel
- P MRS-args labels: ARG1 ARG2
- P MRS-args POSes: PRP PRP
- A MRS ep-name: pron_rel
- A MRS-preds labels: ARG1
- A MRS-preds POSes: VBZ
Experiment Settings

- **Syntactic Parsing**
  - MST Parser

- **Semantic Role Labeling**
  - MaxEnt-based pipeline of classifiers, with parameters estimated with the open source TADM system; open systems include extra MRS and HPSG DB features

- **Parameter tuning**

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<td>+</td>
<td>+</td>
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# Results

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<tr>
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<td>78.13 (↑0.28)</td>
<td>64.31 (↑1.36)</td>
<td>65.95 (↑1.24)</td>
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<tr>
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<td>-</td>
<td>68.11 (↑1.04)</td>
<td>58.42 (↑3.55)</td>
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</table>

![Graph](image.png)
Conclusion and Future Work

- The results clearly show that the integration of HPSG parsing results in the semantic role labeling task brings substantial performance improvement, even where grammar coverage is low.

- The gain is more significant on out-of-domain tests, indicating that the hybrid system is more robust to cross-domain variation.

- The closed SRL system needs to be improved in the future.
Thank You!

Welcome to our poster!