SemEval 2019 Task 1: Cross-lingual Semantic Parsing with UCCA

Daniel Hershcovitch, Leshem Choshen, Elior Sulem, Zohar Aizenbud, Ari Rappoport and Omri Abend

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Universal Conceptual Cognitive Annotation (UCCA)

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Applications

- Semantics-based evaluation of
  - Machine translation (Birch et al., 2016)
  - Text simplification (Sulem et al., 2018a)
  - Grammatical error correction (Choshen and Abend, 2018)
- Sentence splitting for text simplification (Sulem et al., 2018b).
Universal Conceptual Cognitive Annotation (UCCA)

Intuitive annotation interface and guidelines (Abend et al., 2017).
ucca-demo.cs.huji.ac.il
Universal Conceptual Cognitive Annotation (UCCA)

The Task: UCCA parsing in English, German and French in different domains.
Graph Structure

Labeled directed acyclic graphs (DAGs). Complex units are non-terminal nodes.
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Labeled directed acyclic graphs (DAGs). Complex units are non-terminal nodes. Phrases may be discontinuous. Remote edges enable reentrancy.

- Primary edge
- Remote edge

They thought about taking a short break.

A: Participant
C: Center
D: Adverbial
E: Elaborator
F: Function
G: Ground
H: Parallel scene
L: Linker
P: Process
R: Relator
S: State
U: Punctuation
Baseline

TUPA, a transition-based UCCA parser (Hershcovich et al., 2017).
bit.ly/tupademo
Data

- English Wikipedia articles (Wiki).
- English-French-German parallel corpus from *Twenty Thousand Leagues Under the Sea* (20K).

<table>
<thead>
<tr>
<th></th>
<th>sentences</th>
<th>tokens</th>
</tr>
</thead>
<tbody>
<tr>
<td>English-Wiki</td>
<td>5,142</td>
<td>158,573</td>
</tr>
<tr>
<td>English-20K</td>
<td>492</td>
<td>12,574</td>
</tr>
<tr>
<td>French-20K</td>
<td>492</td>
<td>12,954</td>
</tr>
<tr>
<td>German-20K</td>
<td>6,514</td>
<td>144,531</td>
</tr>
</tbody>
</table>
Tracks

- English \{in-domain/out-of-domain\} × \{open/closed\}
- German in-domain \{open/closed\}
- French *low-resource* (only 15 training sentences)
After graduation, John moved to Paris.
1. Match primary edges by terminal yield + label.
2. Calculate precision, recall and F1 scores.
3. Repeat for remote edges.
Evaluation

1. Match primary edges by terminal yield + label.
2. Calculate precision, recall and F1 scores.
3. Repeat for remote edges.

<table>
<thead>
<tr>
<th></th>
<th>P</th>
<th>R</th>
<th>F1</th>
</tr>
</thead>
<tbody>
<tr>
<td>Primary</td>
<td>$\frac{6}{9} = 67%$</td>
<td>$\frac{6}{10} = 60%$</td>
<td>64%</td>
</tr>
<tr>
<td>Remote</td>
<td>$\frac{1}{2} = 50%$</td>
<td>$\frac{1}{1} = 100%$</td>
<td>67%</td>
</tr>
</tbody>
</table>
Participating Systems

8 groups in total:

- **MaskParse@Deskiñ** Orange Labs, Aix-Marseille University
- **HLT@SUDA** Soochow University
- **TüPa** University of Tübingen
- **UC Davis** University of California, Davis
- **GCN-Sem** University of Wolverhampton
- **CUNY-PekingU** City University of New York, Peking University
- **DANGNT@UIT.VNU-HCM** University of Information Technology VNU-HCM
- **XLangMo** Zhejiang University
## Leaderboard

<table>
<thead>
<tr>
<th>Track</th>
<th>1st place</th>
<th>2nd place</th>
<th>3rd place</th>
<th>baseline</th>
</tr>
</thead>
<tbody>
<tr>
<td>English-Wiki closed</td>
<td>HLT@SUDA 0.774</td>
<td>baseline 0.728</td>
<td>Davis 0.722</td>
<td>0.728</td>
</tr>
<tr>
<td>English-Wiki open</td>
<td>HLT@SUDA 0.805</td>
<td>CUNY-PekingU 0.800</td>
<td>TüPa 0.735</td>
<td>0.735</td>
</tr>
<tr>
<td>English-20K closed</td>
<td>HLT@SUDA 0.727</td>
<td>baseline 0.672</td>
<td>CUNY-PekingU 0.669</td>
<td>0.672</td>
</tr>
<tr>
<td>English-20K open</td>
<td>HLT@SUDA 0.767</td>
<td>CUNY-PekingU 0.739</td>
<td>TüPa 0.709</td>
<td>0.684</td>
</tr>
<tr>
<td>German-20K closed</td>
<td>HLT@SUDA 0.832</td>
<td>CUNY-PekingU 0.797</td>
<td>baseline 0.731</td>
<td>0.731</td>
</tr>
<tr>
<td>German-20K open</td>
<td>HLT@SUDA 0.849</td>
<td>CUNY-PekingU 0.841</td>
<td>baseline 0.791</td>
<td>0.791</td>
</tr>
<tr>
<td>French-20K open</td>
<td>CUNY-PekingU 0.796</td>
<td>HLT@SUDA 0.752</td>
<td>XLangMo 0.656</td>
<td>0.487</td>
</tr>
</tbody>
</table>
Main Findings

- HLT@SUDA won 6/7 tracks:
  Neural constituency parser + multi-task + BERT
  French: trained on all languages, with language embedding

- Surprisingly, results in French were close to English and German

- Demonstrates viability of cross-lingual UCCA parsing

- Is this because of UCCA's stability in translation?
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Conclusion

- Substantial improvements to UCCA parsing
- High variety of methods
- Successful cross-lingual transfer
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Thanks!

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Thanks!

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Please participate in the CoNLL 2019 Shared Task:
Cross-Framework Meaning Representation Parsing
SDP, EDS, AMR and UCCA

Evaluation Period: July 8–22, 2019

mrp.nlpl.eu
References I

Universal Conceptual Cognitive Annotation (UCCA).
In *Proc. of ACL*, pages 228–238.

UCCApp: Web-application for syntactic and semantic phrase-based annotation.


Reference-less measure of faithfulness for grammatical error correction.
In *Proc. of NAACL (Short papers)*, pages 124–129.

A transition-based directed acyclic graph parser for UCCA.
In *Proc. of ACL*, pages 1127–1138.

Conceptual annotations preserve structure across translations: A French-English case study.
In *Proc. of S2MT*, pages 11–22.

Semantic structural annotation for text simplification.

Simple and effective text simplification using semantic and neural methods.