Discourse Representation Structure Parsing
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**Discourse Representation Structure (DRS)**
- The basic meaning-carrying unit in Discourse Representation Theory (DRT; Kamp and Reyle, 1993).
- Extended to Segmented Discourse Representation Theory (SDRT; Asher and Lascarides, 2003).
- Recursive formal meaning structures, with model-theoretic interpretation, can be translated into first-order logic.

**DRSs as Boxes**
The statement says each of the dead men wore magazine vests and carried two hand grenades.

**DRSs as Trees**

**DRS Parsing Models**
1. **Sequence decoder (Neural Machine Translation)**
   - Bidirectional LSTM as encoder coupled with three decoders:
     - The state
     - <SOS> DRS(state(x1) j say(π1)) ...
     - ... π1 SDRS(κ1)

2. **Shallow structure decoder (Copy strategy)**
   - Scoring component
   - <SOS> DRS(state(x1) j say(π1)) ...
   - ... π1 SDRS(k1)

3. **Deep structure decoder (Structure-sensitive)**
   - <SOS> DRS(state(x1) j say(π1)) ...
   - ... π1 SDRS(k1)

**Groningen Meaning Bank (GMB; Bos et al., 2017)**
- GMB is a large collection of English texts annotated with Discourse Representation Structures.
- 52,268/5,172/5,440 sentences for training/development/testing.

**DRS Evaluation**
Based on comparison between Discourse Representation Graphs:

Variable matches are obtained by D-match; red arcs are correctly predicted, so recall (R) is 57.7, precision (P) is 52.4, and F1 is 54.8.

Results: Performance across Different Settings

Results: Performance across Different Sentence Lengths

- Deep performance is stable across various sentence lengths.
- Deep good at copying (83.22 F1) and inserting conditions (80.63 F1).
- Deep predicts SDRS reasonably well (e.g. Continuation, Parallel).

**Conclusions**
- We transform DRSs to tree-based representations which can be further linearized to bracketed string format.
- We Introduce a new end-to-end model for open-domain scoped discourse representation structure parsing.
- Results on the GMB show that our decoder is able to recover DRSs to a good degree (77.54 F1).
- **Code/Data**: https://github.com/RikVN/D-match

**Acknowledgments**
We gratefully acknowledge the support of the European Research Council (681760) and the EU H2020 project SUMMA (688139).