Accurate SHRG-Based Semantic Parsing

Yufei Chen, Weiwei Sun and Xiaojun Wan

Institute of Computer Science and Technology
Peking University

Graph-Structured Semantic Representations

- Use graphs to represent semantic information.
- Abstract Meaning Representation, Elementary Dependency Structure, Dependency-based Minimal Recursion Semantics

Synchronous Hyperedge Replacement Grammar

- A mathematically sound framework to construct semantic graphs
- Context-free rewriting system that rewrites one hyperedge into a graph in a step
- A hyperedge is an extension of a normal edge which can connect to more than two nodes or only one node.

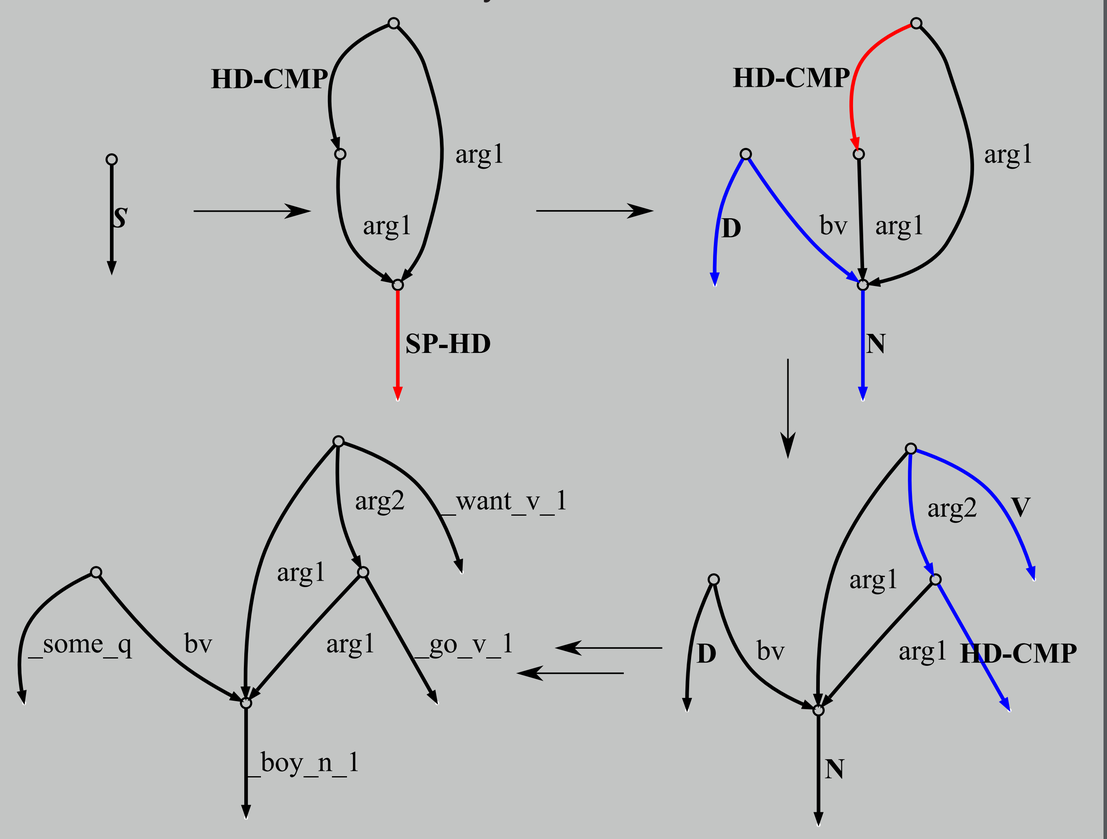
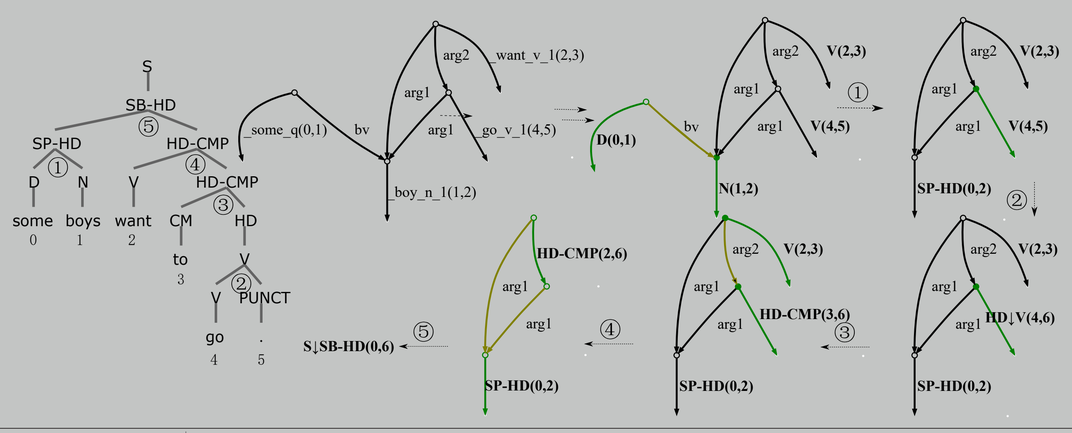


Figure 1: A partial rewriting process of HRG on the semantic graph associated with “Some boys want to go.”

Grammar Extraction

- Data: English Resource Semantics (ERS), which follows the principle of compositionality
- We propose an SHRG extraction algorithm that requires and only requires alignments between edges and surface strings.



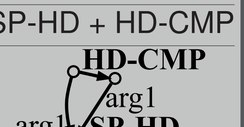
	①	②	③	④	⑤
Shared LHS	SP-HD	HD↓V	HD-CMP	HD-CMP	S↓SP-HD
RHS (syntax)	D + N	V + PUNCT	CM + HD↓V	V + HD-CMP	SP-HD + HD-CMP
RHS (semantics)					

Figure 2: The grammar extraction process of the running example.

Neural SHRG-Based Semantic Parsing

A two-step architecture:

- Syntactic parsing: to obtain the shared derivation
- Semantic interpretation: to map the syntactic derivation to the corresponding semantic derivation

Syntactic Parsing

- Span-based parser with LSTM-Minus feature
- CKY decoder to ensure that the output agrees with the known rules

Semantic Interpretation

- Three model: Count Based, Greedy Search and Beam Search
- Scoring correspondents using span embedding and rule embedding

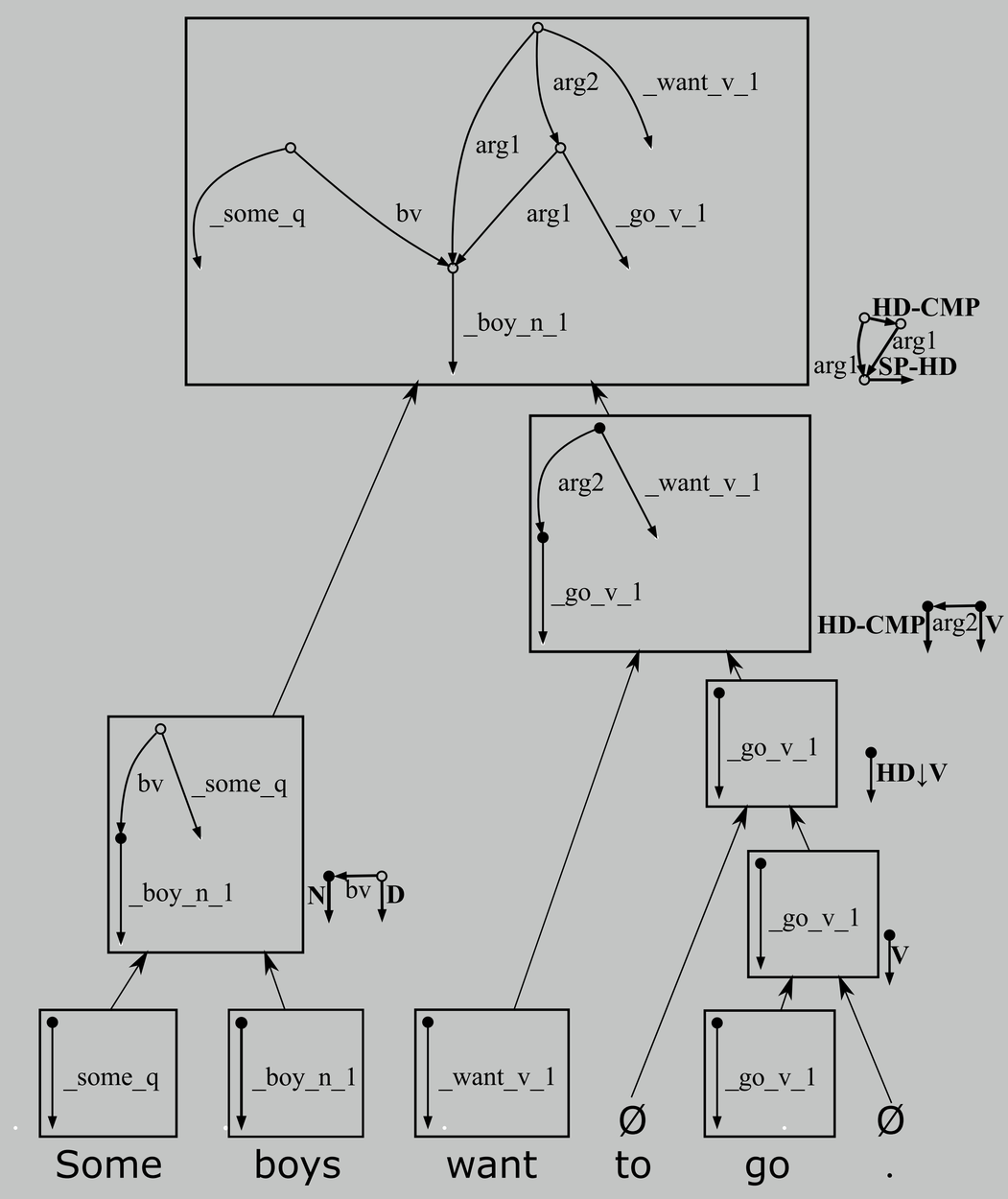


Figure 3: The semantic interpretation process.

Practical Parsing

	Model	$\mathbf{EDM}_P$	$\mathbf{EDM}_A$	EDM
EDS	Buys and Blunsom, 2017	88.14	82.20	85.48
	ACE	91.82	86.92	89.58
	Ours	93.15	87.59	90.35
DMRS	Buys and Blunsom, 2017	87.54	80.10	84.16
	ACE	92.08	86.77	89.64
	Ours	93.11	86.01	89.51

Table 1: Accuracy on the test set of DeepBank.

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Contact Information

{yufei.chen,ws,wanxiaojun}@pku.edu.cn