Towards Parsing Unscoped Episodic Logical Forms with a Cache Transition Parser

Gene Kim
University of Rochester

What is ULF?
Underspecified (Episodic) Logical Forms

"She wants to eat the cake"

- Closely matches surface form of language
- Grounded in Episodic Logic Types
  - sentence - entity
  - noun predicate ($D \rightarrow \text{v}^*$)
  - action reifier ($D \rightarrow \text{v} \rightarrow \text{d}^*$)
- Resolves predicate-argument structure
  - Brackets!

What is a Cache Transition Parser?
A transition system for parsing graphs using a fixed-sized cache. It’s been used to parse abstract meaning representations.

Stack | Cache | Buffer | Graph
--- | --- | --- | ---
Pop: pops the top element from stack to its indexed position in cache
Shift: moves the front of the buffer by one and adds a vertex to the graph for the front element
Push: moves the front of the buffer to the cache and pushes the old cache value to the stack
Arc: forms an arc between a given index of the cache and the rightmost element of the cache

Experimental Details
- Gold generation (step 1 is known)
- 725/90/90 sentence train/dev/test split
- Tested on cache sizes 2, 4, and 6

<table>
<thead>
<tr>
<th>Cache Size</th>
<th>Dev Action Acc</th>
<th>Dev EL-smatch</th>
<th>Test Action Acc</th>
<th>Test EL-smatch</th>
</tr>
</thead>
<tbody>
<tr>
<td>2</td>
<td>0.92</td>
<td>0.73</td>
<td></td>
<td>0.738</td>
</tr>
<tr>
<td>4</td>
<td>0.90</td>
<td>0.74</td>
<td></td>
<td>0.736</td>
</tr>
<tr>
<td>6</td>
<td>0.92</td>
<td>0.72</td>
<td></td>
<td>0.716</td>
</tr>
</tbody>
</table>

What Next? (Lots!)
1. Evaluating performance with the generator (step 1)
2. Fixing ULF Atom Ordering
   - The curious oracle failure is likely due to poor atom ordering
3. Integrating the ULF Type System
   - The ULF type system restricts the available interpretations and combinations
     - New action for introducing type shifters
     - Type-based composition constraints
4. Categorization
   - Foreign languages, dates, currency, etc. are likely better handled procedurally.

Best model: 0.738 EL-smatch score

So how do we do?

Ask me for details!