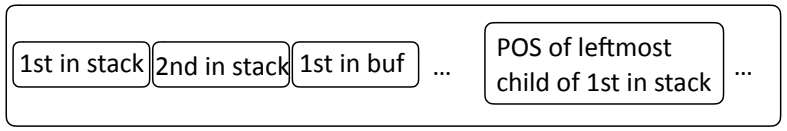
State-of-the-art Dependency Parsing

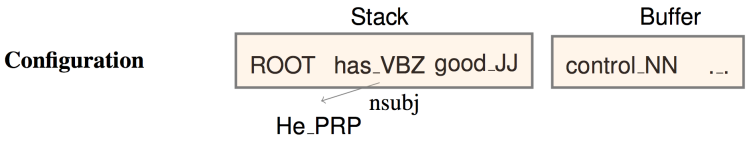
State-of-the-art Parsers

- Unlabeled attachment score: fraction of words with correct parent
- Labeled attachment score: have to label each edge correctly (but this isn't that hard — noun before verb -> `nsubj` in most contexts)
- 2005: Eisner algorithm graph-based parser was SOTA (~91 UAS)
- 2010: Better graph-based parsers using "parent annotation" (~93 UAS)
- 2012: Transition-based Maltparser achieved good results (~90 UAS)
- 2014: Stanford neural dependency parser (Chen and Manning) got 92 UAS with transition-based neural model
- 2016: Improvements to Chen and Manning

Stanford Dependency Parser

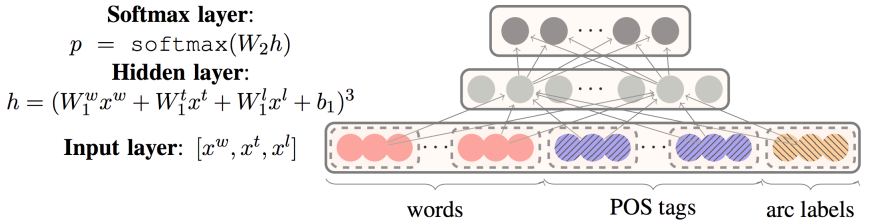
- Feedforward neural network on top of feature vector extracted from stack and buffer





Chen and Manning (2014)

Stanford Dependency Parser



Chen and Manning (2014)

Stanford Dependency Parser

Parser	Dev UAS	Dev LAS	Test UAS	Test LAS	Speed (sent/s)
standard	90.2	87.8	89.4	87.3	26
eager	89.8	87.4	89.6	87.4	34
Malt:sp	89.8	87.2	89.3	86.9	469
Malt:eager	89.6	86.9	89.4	86.8	448
MSTParser	91.4	88.1	90.7	87.6	10
Our parser	**92.0**	**89.7**	**91.8**	**89.6**	**654**

- MSTParser: "graph-based" parser (like CKY) from 2005 — so Chen+Manning's parser isn't much better but is much faster!

Chen and Manning (2014)

Parsey McParseFace (a.k.a. SyntaxNet)

- Close to state-of-the-art, released by Google publicly
- 94.61 UAS on the Penn Treebank using a transition-based system
  - Additional data harvested via "tri-training", form of self-training
- Same feature set as Chen and Manning (2014), Google fine-tuned it

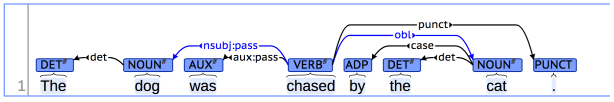
https://github.com/tensorflow/models/tree/master/research/syntaxnet

Andor et al. (2016)

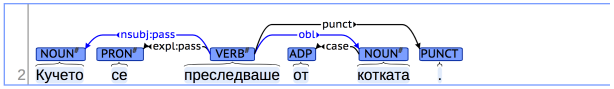
Other languages

- Annotate dependencies with the same representation in many languages

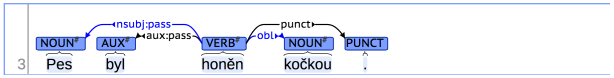
English



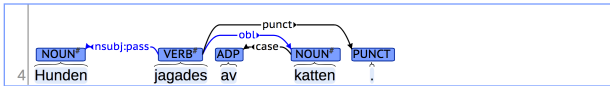
Bulgarian



Czech



Swiss



http://universaldependencies.org/