Training Deterministic Parsers Using Non-Deterministic Oracles

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Greedy transition-based dependency parsers are among the fastest available systems for natural language parsing but tend to suffer from search errors and subsequent error propagation. This problem is aggravated by the fact that they are normally trained using oracles that are deterministic and incomplete in the sense that they assume a unique canonical derivation and are only valid as long as the parser does not stray from this path. In this talk, I will introduce oracles that are nondeterministic and complete in the sense that they allow different derivations of the same parse tree and make optimal predictions for all parser states, including states from which the gold parse is no longer reachable. Experimental evaluation on a wide range of data sets shows that using these oracles to train greedy parsers gives substantial improvements in accuracy because of reduced error propagation. Moreover, this improvement comes at no cost in terms of efficiency, unlike other techniques like beam search.