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Translation



Pushdown Automata in Statistical Machine Translation

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This article describes the use of pushdown automata (PDA) in the context of statistical machine translation and alignment under a synchronous context-free grammar. We use PDAs to compactly represent the space of candidate translations generated by the grammar when applied to an input sentence.

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General-purpose PDA algorithms for replacement, composition, shortest path, and expansion are presented. We describe HiPDT, a hierarchical phrase-based decoder using the PDA representation and these algorithms. We contrast the complexity of this decoder with a decoder based on a finite state automata representation, showing that PDAs provide a more suitable framework to achieve exact decoding for larger synchronous context-free grammars and smaller language models. We assess this experimentally on a large-scale Chinese-to-English alignment and translation task. In translation, we propose a two-pass decoding strategy involving a weaker language model in the first-pass to address the results of PDA complexity analysis. We study in depth the experimental conditions and tradeoffs in which HiPDT can achieve state-of-the-art performance for large-scale SMT.


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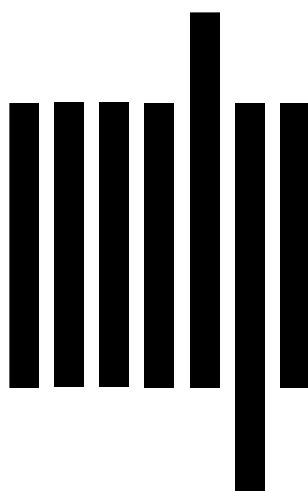
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