Deterministic Pushdown Automata and Unary Languages

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In this talk we focus our attention on *deterministic* pushdown automata with a one-letter input alphabet. Since each unary context-free language is regular, these devices are equivalent to finite automata.

We discuss the simulation of unary determistic pushdown automata by deterministic finite automata, from a descriptional point of view. We present an upper bound stating that each unary deterministic pushdown automaton of size s can be simulated by a deterministic finite automaton with a number of states which is exponential in s. We also show that this bound is optimal, even if the simulation is performed by a two-way nondeterministic automaton.

We also prove that there are unary languages for which deterministic pushdown automata cannot be exponentially more succinct than finite automata.

References:

G. Pighizzini. Deterministic pushdown automata and unary languages. *Proc. CIAA 2008*, LNCS 5148, 232-241, 2008.