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Finite turns and the regular closure of linear context-free languages. (English summary)

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A push-down automaton (PDA) is "k-turn" if in each computation it changes its direction on its push-down store (PDS) at most k times; it is "finite turn" if it is k-turn for some $k \geq 0$. These turn-bounded PDAs provided with additional restrictions for beginning a new turn are related to the closure of the linear context-free languages (LIN) under some of the regular operations.

PDAs with an unbounded number of turns that have to empty their PDS up to the initial symbol before starting a new turn characterize the regular closure of LIN. PDAs that also have to re-enter their initial state characterize the Kleene star closure of LIN, provided these PDAs are "C-restricted", i.e., they are (i) only allowed to remove the initial stack symbol in a special way, or (ii) forbidden to re-enter the initial state after the first ε-move.

Next the authors establish relationships (equality, proper inclusion or incomparability) between the language families under consideration, and numerous (non)closure properties under operations (regular operations, homomorphisms, inverse homomorphisms, and intersections with regular sets). Finally, they present an algorithm that parses languages from the regular closure of LIN in $O(n^2)$ time.

Reviewed by *Peter R. J. Asveld*

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