The Emptiness Problem of $k$-Counting Automata

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Master thesis in Computer Science

$k$-counting automata (introduced by J. Allred and U. Ultes-Nitsche) extend the class of regular $\omega$-languages, and are proven to be closed under Boolean operations (union, intersection and complement). It is believed that the emptiness check for $k$-counting automata is decidable (i.e. there exists a computable algorithm to determine whether or not the described $\omega$-language represents the empty set).

Testing whether a language is a subset of another language is very important in linear time-temporal verification and is used to check the correctness of a program with respect to a given specification. Since this language containment test can be done by checking if the intersection of the program with the complement of the specification is empty, deciding emptiness of a given language (efficiently) is desirable.

The goal of this master thesis is to prove that the emptiness test for $k$-counting automata is in fact decidable. In particular this consists of finding a suitable procedure.

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