VYPa: Deterministic Set Automata

Daniel Vosáhlo (xvosah00), Matúš Bútora (xbutor01)

November 7, 2018

Abstract

Deterministic set automata (DSA) are basically deterministic finite automata (DFA) with the added storage medium of a set. As operations, on the set it is possible to add elements, remove elements and test whether some element is in the set. To prepare a set operation the DSA can write on a one-way write-only tape. For the set operation, the contents of that tape are taken and added to the set, removed from the set, or tested. After the operation is done, the writing tape is erased and a new set operation may be prepared. We will be talking about computational power and closure properties under Boolean operations. It turns out that language class accepted by DSA is closed under complement and union with regular languages as well as the intersection with regular languages. However, it is not closed under general union and general intersection. Later we will compare DSA with pushdown automata, quasi-real-time queue automata, and queue automata with finite turns with regard to their computational power. As a result, we will find out that DSA can accept languages which are not accepted by the other modules. Finally, we show that emptiness is decidable for DSA which is a pleasant property from a theoretical as well as from a practical point of view.