Finite automata synchronization

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In the fault tolerance systems are often used some form of redundancy. In this systems are the important components duplicated or triplicated. In practice we may need bring one from redundant components to specific known state or synchronize one component with others. We can model such system as finite automaton which responds to inputs and in the specific states it responds to external events or produces outputs.

This paper focuses on synchronization of the deterministic finite automata (DFA) which is performed by bringing synchronizing word. Each from group of DFA is in different state then others and after processing synchronizing word (with same speed) they will reach the same state. Finding of the optimal synchronizing word is NP-complete[1] problem.

There should be described algorithms for finding shortest or optimal synchronizing word and methods for synchronization of the DFA automata.

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[1] Walker P. J., Synchronizing automata and a Conjecture of Černý, Faculty of Engineering and Physical Sciences, University of Manchester, 2008