Abstract

Recent studies on fuzzy automata are influenced by algebraic techniques to tackle issues like reduction, minimization and their languages. Fuzzy automaton homomorphism is one such majorally discussed technique. This paper is concerned with the group of (weak) fuzzy automaton automorphisms and constructions of all (weak) fuzzy automaton automorphisms over arbitrary fuzzy automaton. It is shown that (1) every arbitrary fuzzy automaton is decomposed into distinct primaries, (2) primaries are maximal singly generated fuzzy automata and (3) every weak fuzzy automaton homomorphism on an arbitrary fuzzy automaton is uniquely determined into weak fuzzy automaton homomorphisms on all its primaries. Therefore, the discussion begun over strongly connected fuzzy automaton and continue constructions as well as characterizations of (weak) fuzzy automaton homomorphisms, isomorphisms, endomorphisms and automorphisms sequentially over perfect fuzzy automaton, singly generated fuzzy automaton and primaries of fuzzy automaton. Finally, it is obtained that the group of weak fuzzy automaton automorphisms and its cardinality over arbitrary fuzzy automaton.

**Index Terms**

Computer Science  
Applied Mathematics
Keywords
Fuzzy function  fuzzy automaton (strongly connected  perfect and  singly generated)
(Weak) fuzzy automaton automorphism (homomorphism  isomorphism)
primaries and basis of a fuzzy automaton.