Abstract

This paper describes a method for constructing a minimal deterministic finite automaton (DFA) from a regular expression. It is based on a set of graph grammar rules for combining many graphs (DFA) to obtain another desired graph (DFA). The graph grammar rules are presented in the form of a parsing algorithm that converts a regular expression $R$ into a minimal
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deterministic finite automaton M such that the language accepted by DFA M is same as the language described by regular expression R. The proposed algorithm removes the dependency over the necessity of lengthy chain of conversion, that is, regular expression --> NFA with ε-transitions --> NFA without ε-transitions --> DFA --> minimal DFA. Therefore the main advantage of our minimal DFA construction algorithm is its minimal intermediate memory requirements and hence, the reduced time complexity. The proposed algorithm converts a regular expression of size n in to its minimal equivalent DFA in $O(n \cdot \log 2n)$ time. In addition to the above, the time complexity is further shortened to $O(n \cdot \log n)$ for $n \geq 75$.

Reference

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Index Terms

Computer Science  Algorithms

Key words

Alphabet  Automaton Construction  Combined State Union

Concatenation

Kleene Closure

Minimization

Transition