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 $\rightarrow$ NFA with $\varepsilon$-transitions $\rightarrow$ NFA without $\varepsilon$-transitions $\rightarrow$ DFA $\rightarrow$ 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 $n$ into its minimal equivalent DFA in $O(n \log 2n)$ time. In addition to the above, the time complexity is further shortened to $O(n \log n)$ 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