Modified Subset Construction Algorithm for Finite Automata

Mirzakhmet Syzdykov

mspmail598@gmail.com

Satbayev University, Almaty, Kazakhstan

ABSTRACT
We propose the evolutionary algorithm for subset construction which superceeds previous known result due to Rabin and Scott.

ALGORITHM
We estimate the complexity of our algorithm as \(O(2^n / \log(n))\) and prove that it's most optimal rather than the algorithm proposed by Rabin and Scott which is \(O(2^n)\) in complexity and other known algorithms.

APPLICATION OF PQI-MODEL
In we have developed the overridden model for the modified subset construction which is relevant to the reduced cost of computation, thus, giving better results.

We have also developed the Java application package “Regex+” for the extended regular expressions.

The PQI-model in this package is successfully implemented via overridden PQI-operator and tagging rules giving the correct results for all the test cases provided within.

The implemented solution isn't, thus, recursive and combinatorially measured resulting to the class of effective algorithms where NP-completeness is avoided – this fact conventionally holds true for better evaluation, as we can represent the typical finite state machine as a neural network for the type of graph structures.

However, this graph structure is specific and, as described before, has the different and complex notation rather than typical finite state automatons – we will call these state of automatons as PQI, or PQI-automata along the provided and evaluated empirical results.

In turn, the product construction machines, which where studied in modern works, give not quadratic, but exponential growth for the number of states in the resulting deterministic automaton however, with our introduction and concept of PQI-operator we obtain results which are minimalistic which can be proven from the facts provided in the equilibria (1)–(14).

More facts about the evaluation of this empirical and proved model show our interest in developing even mobile-aware applications which can be obtained from author of this work by request.

For better discussion of the presented PQI-model we can state that P versus NP problem, which is still an open question, can be reduced to the empirical PQI-model and give the linear growth reduction of the exponentially growing complexity.

IN-DEPTH STUDY
In this section the graphical plot of PQI-operator for the variety of combinatorial functions which are not limited to factorial and power-set.
These graphical plots from the initial values show that, the PQI-operator still is less relevant to the combinatorial function derivatives – thus, to be more proper, it's non-convergent and is equally convergent along the size of input data when they are limited to infinity.

Figure 1 – Graphical plot of PQI-functions

From figure (1) it's seen that PQI-operator is expanding slower than exponential function and, thus, it's reducing to almost linear function $O(n)$.

Figure 2 – Graphical plot of PQI-function
REFERENCES


