Formal Models SS 2012: Assignment 2

Institute for Formal Models and Verification, JKU Linz

Due 22.03.2012

Exercise 5

Draw an FA A with input-alphabet $\Sigma := \{a,b\}$ having *exactly* 3 states such that...

1. ...A is non-deterministic and incomplete.
2. ...A is deterministic and incomplete.
3. ...A is non-deterministic and complete.
4. ...A is deterministic and complete.

Justify each of your solutions.

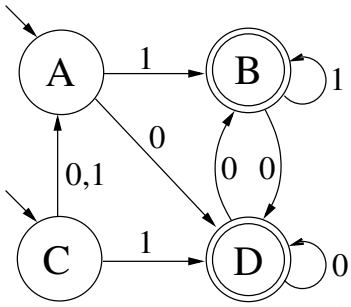
Exercise 6

Let A_1 be an *arbitrary* FA and $\mathbb{P}(A_1) := (S, I, \Sigma, T, F)$ be the power automaton of A_1. Describe in your own words the formal definition of $\mathbb{P}(A_1)$, including all of its components. Is the following proposition true? Justify your answer.

$|S' \xrightarrow{a}| = 1$ for all $S' \in S$ and for all $a \in \Sigma$.

Exercise 7

Draw the power automaton $\mathbb{P}(A)$ for FA A as shown on the right. What is the maximum number of states $\mathbb{P}(A)$ can have in theory? Justify your answer.



Exercise 8

Draw a *deterministic* FA A with $\Sigma := \{a,b\}$ having *at least* 3 states such that $L(C(A)) \neq \overline{L(A)}$, where $C(A)$ denotes the complement-automaton of A. Explain your solution.

Bonus Exercise

Reimplement the program available at

`http://fmv.jku.at/fm/faimpl.zip`

in your favorite object-oriented language (Java, C#, C++, ...) using the ”objects for states”-pattern. Please ensure that you bring it in electronic form (USB stick, laptop) for the presentation.