Introduction to Theoretical Computer Science

Laboratory Exercises

Students work individually on two separate assignments.

The deadline for **Assignment 1** is **April 11th, 2023**.

The deadline for **Assignment 2** is **May 31th, 2023**.

When you are done with an assignment, you should send your solution (source code with several input examples) as an e-mail to the course teachers (ittcs@fer.hr). Afterwards, the course teachers will organize a meeting in which you will describe your solution and be awarded points.

Each assignment is worth 15 points. At least 50% (15/30) points in total is required to pass the course.

Assignment 1

In a programming language of your choice, implement a DFA minimization algorithm (described in e.g. Sect. 4.4.3 in [1]).

The input to your program should be a textual definition of a deterministic finite automaton (DFA), given in a format of your choice. The output should be the minimized DFA in the same format.

Example of a textual DFA definition (the format can be different in your solution):

States: p1,p2,p3,p4,p5,p6,p7
Symbols: c,d
Accepting states: p5,p6,p7
Initial state: p1
Transitions:
p1,c->p6
p1,d->p3
p2,c->p7
p2,d->p3
p3,c->p1
p3,d->p5
p4,c->p4
p4,d->p6
p5,c->p7
p5,d->p3
p6,c->p4
p6,d->p1
p7,c->p4
p7,d->p2

Assignment 2

In a programming language of your choice, implement a simulator of a Deterministic Pushdown Automaton (DPDA).

The input to your program should be a textual definition of a DPDA, given in a format of your choice (it could be similar to the DFA definition format above), along with an input string which should be processed by the DPDA.

The simulator should output, for each input symbol, the correponding active state of the DPDA. At the end, it should output whether the input string is accepted.

Literature

[1] **Introduction to automata theory, languages, and computation** / John E. Hopcroft, Rajeev Motwani, Jeffrey D. Ullman—3rd edition, Addison Wesley, 2006