DatZ 1037 – Practical Assignment 2
Autumn 2019
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- *Due date is* ***Monday, November 04, 2019***
- *Please send your program including the source code by e-mail to 'abuzer@lu.lv'*
- ***Demo session*** *is during the class on Tuesday, November 05, 2019.*
- *Your submission is considered as* ***incomplete*** *if you do not make a demo of your program.*
- *You can work as a group of two people.*

Task: Write a computer program that takes

- *the description of a binary deterministic finite automaton* and
- *a list of binary strings*,

and then

- outputs the decision of the automaton on each input.

Details:

1) You can use *C++* or *Javascript with HTML*.

If you use *C++*, then the input of your program are received from a text file or console (copy-paste from the text file).

If you use *Javascript with HTML*, then the input of your program are received from the text boxes on the HTML file (copy-paste from the text file).

The output of your program can be written on a text file or written on the screen (console or visual environment).

2) The input alphabet is fixed as $\Sigma = \{a, b\}$.

3) The description of an automaton will be in the following format:

$$m\#A\#T0\#T1,$$

where

- m is the number of states and it is always assumed that the states are labelled as s1,s2,...,sm and s1 is the starting state;
- A is the list of the accepting state(s), e.g., s3 or s5,s7,s13;
- $T0$ is the list of transitions rules when reading symbol a, e.g., s1->s3,s2->s7,...,sm->s2; and,
- $T1$ is the list of transitions rules when reading symbol b, e.g., s1->s1,s2->sm,...,sm->s3.

4.a) Example 1: The description of an automaton recognizing the language

$$\mathtt{L_1} = \{w \mid w \text{ contains at least 3 } b\text{s}\}$$

is given below:

4#s4#s1->s1,s2->s2,s3->s3,s4->s4#s1->s2,s2->s3,s3->s4,s4->s4

If the inputs are as follow:
a
aab
bbb
baaab
ababab
aaaaabaaa
bbaaaabbbb

then, the outputs should be as follows:
a REJECTED
aab REJECTED
bbb ACCEPTED
baaab REJECTED
ababab ACCEPTED
aaaaabaaa REJECTED
bbaaaabbbb ACCEPTED

4.b) Example 2: The description of an automaton recognizing the language

$$\mathtt{L_2} = \{w \mid \text{the length of } w \text{ is odd and every odd position of } w \text{ is a } a\}$$

is given below:

3#s2#s1->s2,s2->s1,s3->s3#s1->s3,s2->s1,s3->s3

If the inputs are as follow:
a
b

aa
ab
ba
aab
aba
abbaab
ababab
aaaabaa
aaaaabaaa

then, the outputs should be as follows:
a ACCEPTED
b REJECTED
aa REJECTED
ab REJECTED
ba REJECTED
aab REJECTED
aba ACCEPTED
ababa ACCEPTED
abbaab REJECTED
aaaabaa REJECTED
aaaaabaaa ACCEPTED

4.c) Example 3: The description of an automaton recognizing the language

$$\mathtt{L_3} = \{w \mid w \text{ contains the substring aab}\}$$

is given below:

4#s4#s1->s2,s2->s3,s3->s3, s4->s4#s1->s1,s2->s1,s3->s4,s4->s4

If the inputs are as follow:
a
b
aa
aab
aba
baab
bbab
bababa
bbaabb
baaaab
aaaaaaa
babbaaa
bbbbbaab

bbabbabbaa
bbabbabbaab

then, the outputs should be as follows:
a REJECTED
b REJECTED
aa REJECTED
aab ACCEPTED
aba REJECTED
baab ACCEPTED
bbab REJECTED
bababa REJECTED
bbaabb ACCEPTED
baaaab ACCEPTED
aaaaaaa REJECTED
babbaaa REJECTED
bbbbbaab ACCEPTED
bbabbabbaa REJECTED
bbabbabbaab ACCEPTED