Teoría de Autómatas y Lenguajes Formales

Práctica 2

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October 30, 2022

1 Actividades

1. Consider the language over the alphaber a,b that only contains the string a.

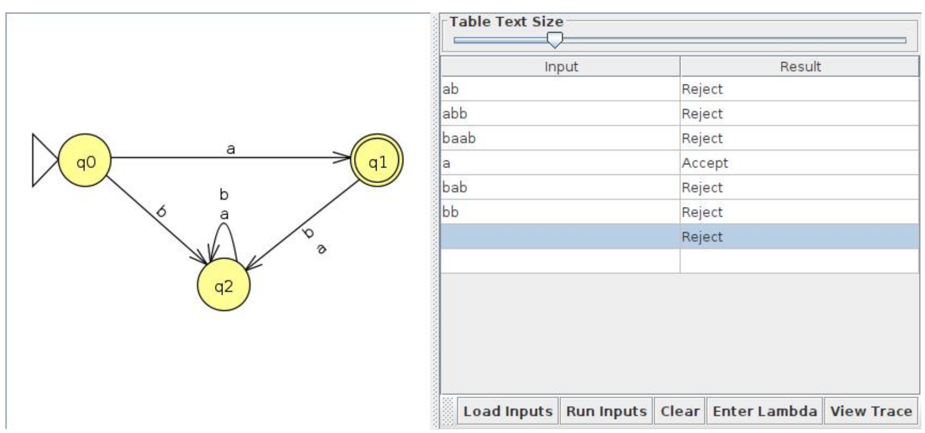
   a) Build a DFA that recognizes this language and rejects all those strings that do not belong to the language.

   b) Test the automaton that you have created by introducing 6 chains.

   First of all, we must describe the automata that we will be working with.

   $M = (\{q_0, q_1, q_2\}, \{a, b\}, \{(q_0, a, q_1), (q_0, b, q_2), (q_1, a, q_2), (q_1, b, q_2),$
$(q_2, a, q_2), (q_2, b, q_2)\}, q_0, \{q_1\})$

   Using JFLAP, I designed an automata that satisfies this description.



2. Finite automaton in Octave:

a) Open the Octave finiteautomata.m script and test it with the given example (see script help) in the GitHub repository.

b) Specify in finiteautomata.json the automaton created in Activity 1 and test it with the script!

We start by testing the automata given in the example.
>> finiteautomaton("aa*bb*","ab", "LaTeX")
$M = (\{q_0, q_1, q_2\}, \{a, b\}, \{(q_0, a, q_1), (q_1, a, q_1), (q_1, b, q_2), (q_2, b, q_2)\}, q_0, \{q_2\})$
$w = ab$
$(q_0, ab) \vdash (q_1, b) \vdash (q_2, \varepsilon)$
ans = 1

This means that this automata recognizes the string "ab". Other tests return the following results:
a -> ans = 0
abb -> ans = 1
aba -> ans = 0

We will now test the automata that we designed in exercise 1. First of all, we have to modifiy the finiteautomata.json file to include the description of our automata.

```
{
    "name" : "Exercise_1",
    "representation" : {
      "K" : ["q0", "q1", "q2"],
      "A" : ["a", "b"],
      "s" : "q0",
      "F" : ["q1"],
      "t" : [["q0", "a", "q1"],
             ["q0", "b", "q2"],
             ["q1", "a", "q2"],
             ["q1", "b", "q2"],
             ["q2", "a", "q2"],
             ["q2", "b", "q2"]]
      }
```

Now, we can use Octave to run this command:

>>finiteautomaton("Exercise1","a", "LaTeX")
$M = (\{q_0, q_1, q_2\}, \{a, b\}, \{(q_0, a, q_1), (q_0, b, q_2), (q_1, a, q_2), (q_1, b, q_2), (q_2, a, q_2), (q_2, b, q_2)\}, q_0, \{q_1\})$
$w = a$
$(q_0, a) \vdash (q_1, \varepsilon)$
ans = 1

The string "a" is accepted by this automata. After testing the strings that we used in exercise 1 section b, we obtain the following results:
ab -> ans = 0
abb -> ans = 0
baab -> ans = 0
a -> ans = 1
bab -> ans = 0
bb -> ans = 0
ε -> ans = 0

We can see that the automata defined in Octave behaves like the one designed in JFLAP.