Formal Languages and Compiler Design

Lab 4 – Documentation

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Link to the repository:

https://github.com/UO270119/Formal-Languages-and-Compiler-Design

Problem statement:

Write a program that:

1. Reads the elements of a FA (from file).

2. Displays its elements, using a menu: the set of states, the alphabet, all the transitions, the initial state and the set of final states.

3. For a DFA, verifies if a sequence is accepted by the FA.

Deliverables:

1. FA.in - input file (on Github)
2. Source code (on Github)
3. Documentation.

For this project we use two classes: *FiniteAutomata.java* and *Transition.java.*

FiniteAutomata: In this class we define five private fields, which correspond to the set of states, the alphabet, the initial state, the transition list and the list of final states. We also have an additional field used to read the input file (*fa.in*).

Its most important methods are:

- *public void readFromFile():* It will process the given file and identify its initial and final states, its alphabet and its transitions.
- *public boolean isDFA():* It will check if the automata passed as an input is a Deterministic Finite Automata (DFA).
- *public boolean isAccepted():* It will prompt the user to write a sequence that will be processed by the automata, and it will return true if it's accepted, false otherwise.
- *private String nextState():* Given a state and a transition value, it will compute and return the following state.

Transition: In this class we have three private fields corresponding to the starting state, the ending state and the value. We also have the corresponding setters and getters for those fields, and a *toString()* method to visually represent them.

We also have a *Main.java* class that when executed, it displays a menu containing the available options (showing states, alphabet and transitions, check if the automata in *fa.in* is a DFA, and verify accepted sequences).

We have defined the input file *fa.in* in the following way, and its corresponding automata.

```
STATES
p, q, r
ALPHABET
a,b
TRANSITIONS
p,a,q
q,a,q
q,b,r
p,b,r
FINAL STATES
r
INITIAL STATE
p
```