

Finite automata documentation

<https://github.com/MirceaDragosVlad917/FLCD/tree/main/Lab4>

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, verify if a sequence is accepted by the FA

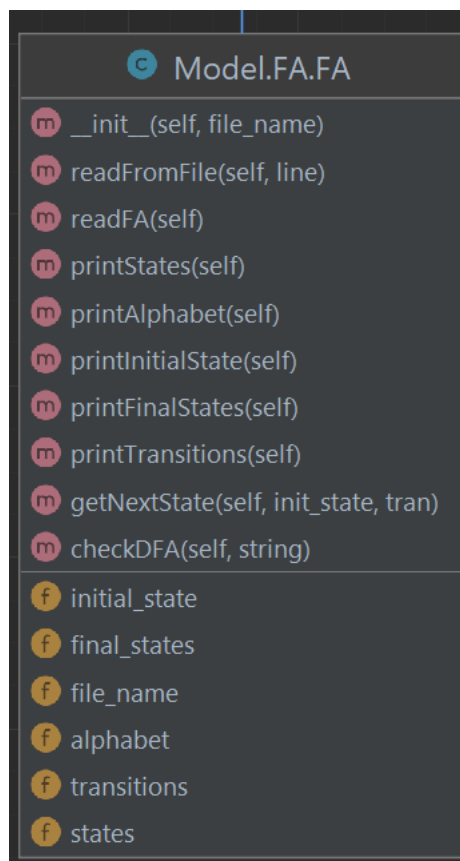
Deliverables:

- 1.FA.in - input file (on Github)
- 2.Source code (on Github)
- 3.Documentation. It should also include in BNF or EBNF format the form in which the FA.in file should be written (on Moodle and Github)

Max grade = 9

Max grade = 10: Use FA to detect tokens <identifier> and <integer constant> in the scanner program

Class diagram



The program reads a finite automata from a file and interprets its set of states, alphabet, initial state, final states and transitions, which are all represented as lists of strings. The checkDFA function receives as parameter a sequence, starts in the initial state, and for every letter in the sequence, it checks if a transition from the current state to another with the letter as label exists. If the final letter is not in the list of final states, or there is not such transition, the word is not accepted by the finite automata. Otherwise, it is accepted.

Tests:

FA.in:

```
States = {q0,q1,q2,q3}
```

```
Alphabet = {a,b,c}
```

```
InitialState = q0
```

```
FinalStates = {q1,q2,q3}
```

```
sigma:
```

```
(q0,a) -> {q1}
```

```
(q1,b) -> {q2}
```

```
(q2,c) -> {q3}
```

This is the result of a run of the program on the file:

```
Main X
0. Exit
1. Print the states
2. Print the alphabet
3. Print the initial state
4. Print the final states
5. Print the transitions
6. Check DFA sequence

What is your choice? -> 1
The states are: ['q0', 'q1', 'q2', 'q3']

0. Exit
1. Print the states
2. Print the alphabet
3. Print the initial state
4. Print the final states
5. Print the transitions
6. Check DFA sequence

What is your choice? -> 2
The alphabet is: ['a', 'b', 'c']
```

```
What is your choice? -> 5
The transitions are: [('q0', 'a', ['q1']), ('q1', 'b', ['q2']), ('q2', 'c', ['q3']), ('q3', 'a', ['q1']), ('q3', 'b', ['q2']), ('q3', 'c', ['q3'])]
```

```
What is your choice? -> 6
Please enter a sequence to be checked: abc
The DFA sequence is not accepted by the DFA
```

```
What is your choice? -> 6
Please enter a sequence to be checked: abcb
The DFA sequence is accepted by the DFA
```

$\text{nzdigit} := 1 \mid 2 \mid \dots \mid 9$
 $\text{digit} := 0 \mid 1 \mid 2 \mid \dots \mid 9$
 $\text{sign} := + \mid -$

```
Main X
0. Exit
1. Print the states
2. Print the alphabet
3. Print the initial state
4. Print the final states
5. Print the transitions
6. Check DFA sequence

What is your choice? -> 3
The initial state is: q0

0. Exit
1. Print the states
2. Print the alphabet
3. Print the initial state
4. Print the final states
5. Print the transitions
6. Check DFA sequence

What is your choice? -> 4
The final states are: ['q1', 'q2', 'q3']
```

```

integer:= [sign]nzdigit{digit} | 0
letter:= a | b | ... | z | A | B | ... | C
identifier:= letter{(letter | digit | _)}
character:= letter | digit
characterList:= {character} {"," character}
states:= "States" "=" "{" characterList "}"
alphabet:= "Alphabet" "=" "{" characterList "}"
initialState:= "InitialState" "=" characterList
finalStates:= "FinalStates" "=" "{" characterList "}"
transition:= "(" characterList "," characterList ")" "->" "{" characterList "}"
transitions:= "Transitions" "=" {transition} "\n" {transition}
FA.in:= states "\n" alphabet "\n" initialState "\n" finalStates "\n" "sigma:"
"\n" transitions

```