

<https://github.com/CatalinaArba/LFTC/tree/main/Lab4>

<https://github.com/CatalinaArba/LFTC/tree/main/Lab5>

Documentation

Finite Automaton (FA) Project Documentation

Overview

This project implements a Finite Automaton (FA) in Java, allowing users to define, manipulate, and analyze finite automata. The FA is loaded from a file in a specific format, and various operations can be performed on it.

Project Components

1. FiniteAutomaton Class

The FiniteAutomaton class represents the FA and has the following attributes:

setOfStates: List of states in the FA.

alphabet: List of symbols in the alphabet.

transitionsList: List of transitions between states.

finalStates: List of final states.

initialState: The initial state.

fileName: The path to the file containing FA details.

Methods:

readFromFile(): Reads FA details from the specified file.

getSetOfStates(): Returns the list of states.

getAlphabet(): Returns the list of symbols in the alphabet.

getTransitionsList(): Returns the list of transitions.

getFinalStates(): Returns the list of final states.

getInitialState(): Returns the initial state.

isDFA(): Checks if the FA is a Deterministic Finite Automaton (DFA).

isAccepted(String seq): Verifies if a sequence is accepted by the FA.

nextState(String startState, String value): Returns the next state given the current state and input symbol.

2. Transition Class

The Transition class represents a transition in the FA and has the following attributes:

startState: The starting state of the transition.

value: The input symbol triggering the transition.

endState: List of possible states after the transition.

Methods:

Getter and setter methods for each attribute.

toString(): Returns a string representation of the transition.

3. Main Class

The Main class contains the main method and serves as the entry point for the program.

Methods:

display_menu(): Displays the menu of operations that can be performed on the FA.

main(String[] args): Executes the program, allowing users to interact with the FA.

Usage

Set of States Section:

States are specified on the second line after the "SET OF STATES" header.

States are separated by commas.

Alphabet Section:

The alphabet is specified on the second line after the "ALPHABET" header.

Symbols in the alphabet are separated by commas.

Transitions Section:

Transitions are specified on the line after the "TRANSITIONS" header.

Each transition is specified on a separate line and follows the format: startState, value, endState1, endState2,

Transitions are read until the "FINAL STATES" header is encountered.

Final States Section:

Final states are specified on the line after the "FINAL STATES" header.

Final states are separated by commas.

Initial State Section:

The initial state is specified on the line after the "INITIAL STATE" header.

Menu Operations:

Users can choose operations by entering the corresponding option number.

Options include displaying states, alphabet, transitions, final states, checking if the FA is a DFA, and verifying if a sequence is accepted.

File Format Example (finite_automata.txt)

SET OF 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