

REGEX TO DFA VISUALIZER – REPORT

Project Title

Regex to DFA Visualizer using Python

Team Members

Heba Youssef – 231000723

Nourhan Elsheikh – 231000853

Reem Ali – 231000165

Omar Magdy – 231000967

Project Description

This project provides a fully interactive tool that converts a Regular Expression (Regex) into a deterministic finite automaton (DFA).

The system helps users understand the behavior of automata step-by-step by allowing them to convert, and test input strings directly on the generated DFA.

The input to the system is a valid regular expression, and upon conversion, the user can enter a string to check whether it is accepted or rejected by the resulting DFA.

Input Format

User enters a valid regular expression such as: aabb

Output Format

- Acceptance or rejection of a test input string

Inside Mechanism

The system performs the full theoretical process of constructing finite automata:

1. Converts a given Regex into postfix form using operator precedence.
2. Builds an NFA using Thompson's Construction algorithm.
3. Applies Subset Construction to convert the NFA to DFA.
4. Simulates input strings through the DFA and determines acceptance.

Programming Languages, Tools & Libraries

- Python
- Collections & Math Libraries

Screenshots & Output Samples

The screenshot shows the Visual Studio Code (VS Code) interface. The title bar says "Regex-to-DFA-Converter". The left sidebar has "SOURCE CONTROL" and "CHANGES" sections. The "CHANGES" section shows a commit message: "Initial commit: DFA simulator". The main code editor shows "finalversion.py" with the following code:

```
def epsilon_closure(states):
    closure = set()
    stack = [states]
    while stack:
        s = stack.pop()
        if s not in closure:
            closure.add(s)
            for next_state in s.transitions:
                if next_state not in closure:
                    stack.append(next_state)
    return closure

def move(states, symbol):
    result = set()
    for s in states:
        if symbol in s.transitions:
            result.add(s.transitions[symbol])
    return result
```

The terminal at the bottom shows the application's output:

```
PS D:\Regex-to-DFA-Converter> & C:/Users/omar/AppData/Local/Programs/Python/Python313/python.exe d:/Regex-to-DFA-Converter/finalversion.py
Welcome to the Regex + DFA Converter & Simulator 🎉
Please enter your regular expression: aabb
Processing your regex...
Regex accepted successfully! 🎉
Postfix form: a.a.b.b.

Your DFA is ready! Now you can test any string below:
Enter a string to test (or type 'exit' to quit): abab
Rejected! 💔
Enter a string to test (or type 'exit' to quit): aabb
Accepted! 🎉
Enter a string to test (or type 'exit' to quit): aab
Rejected! 💔
Enter a string to test (or type 'exit' to quit): exit
👋 Thanks for using the Regex + DFA Converter! goodbye! 🌟
PS D:\Regex-to-DFA-Converter>
```

The status bar at the bottom right shows "Mora2822 (5 hours ago)" and "3.13.7".