Lecture #6: Equivalence of Deterministic Finite Automata and Nondeterministic Finite Automata

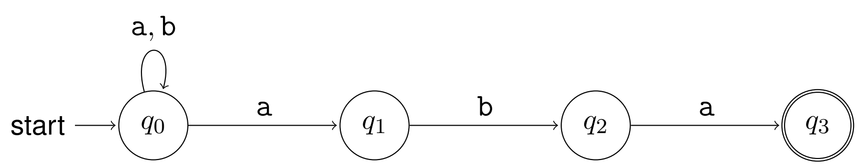
Lecture Presentation

Problem To Be Solved

Let $\Sigma = \{\mathtt{a}, \mathtt{b}\}$. Let $L \subseteq \Sigma^\star$ be the following language:

$$L = \{w \in \Sigma^\star \mid \omega \text{ ends with } \mathtt{aba}\}.$$

Consider, the following ***nondeterministic*** finite automaton $M = (Q, \Sigma, \delta, q_0, F)$ with the above alphabet Σ and the following transition diagram.



The goal for this presentation will be to use material from the lecture to produce a deterministic finite automaton with the same language as this nondeterministic finite automaton.

Solution

Computation of λ-Closures

Initialization

Our DFA, So Far:

First Execution of the Body of the Main Loop

Selecting a State For Which Transitions Should Be Identified

Computation of the Transition for the Symbol "`a`"

Computation of the Transition for the Symbol "`b`"

Our DFA, So Far:

Reflections — What Have We Done? Which Strings Can Now Be Processed?

Second Execution of the Body of the Main Loop

Later Execution(s) of the Body of the Main Loop

Choosing the Accepting States

The DFA That Has Been Produced

What Have We Accomplished?