

Finite State Automatons

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Finite State Automaton

$M = (Q, \Sigma, \delta, q_0, f)$ There is a set of states Q which M manipulates by δ over Σ and the string is accepted if it lies in $f \subset Q$, starting from q_0 .

$q_0 \in Q, f \subset Q$

M always reads the entire input.

Accepting a string

Given a string, $S = c_0c_1...c_n$, M accepts S iff $\exists r_0, r_1, \dots, r_{n+1} \in Q$, st 1. $r_0 = q_0$ 2. $r_{i+1} = \delta(r_i, c_i)$ 3. $r_{n+1} \in f$

A language is recognized by M , iff $L = \{s \mid M \text{ accepts } s\}$.

Example

1. Define a Finite State Automaton that recognizes the language $L = 101, \Sigma = \{0,1\}$. Look at Fig 1 for implementation.

Side note

FSAs can be implemented in more than one ways. Is there a minimal implementation?

2. Define a Finite State Automaton that recognizes the language $L = \{s \mid s \text{ has equal 0s and 1s}\}$, $\Sigma = \{0,1\}$

Pigeonhole Principle

$r_0 \rightarrow r_1 \rightarrow \dots \rightarrow r_i \rightarrow \dots \rightarrow r_n$

Continued in next class...

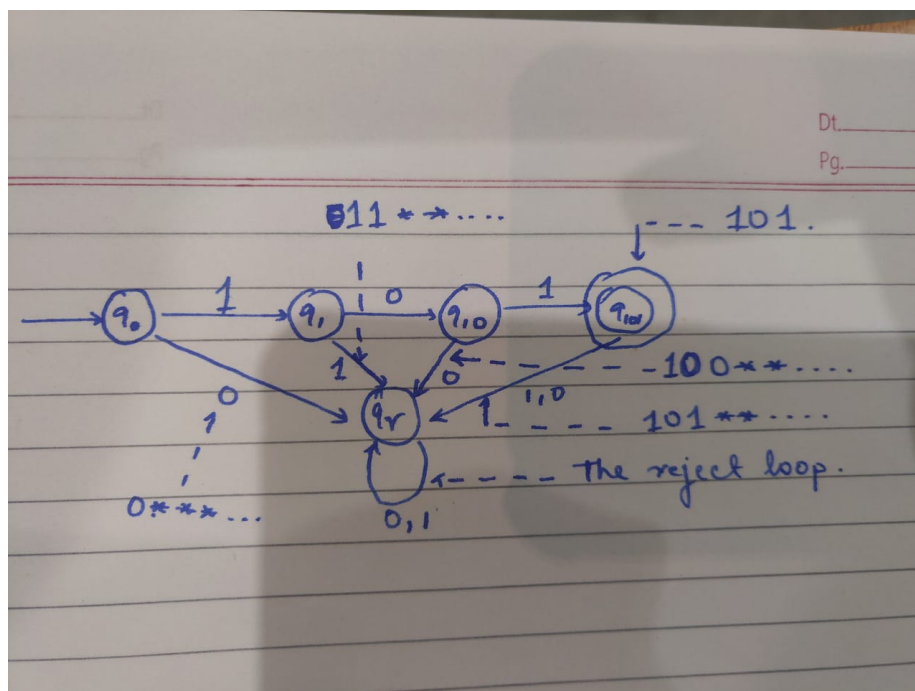


Figure 1: FSA