Finite State Automatons

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Finite State Automaton

$M = (Q, \Sigma, \delta, q0, f)$ 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 q0.

$q0 \in Q$, $f \subset Q$

M always reads the entire input.

Accepting a string

Given a string, $S = c0,c1...cn$, M accepts S iff $\exists$ r0, r1, ... $rn+1 \in Q$, st 1. $r0 = q0$ 2. $ri + 1 = \delta(ri, ci)$ 3. $rn+1 \in f$

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

$r0 \rightarrow r1 \rightarrow ... \rightarrow ri \rightarrow ... \rightarrow rn$

Continued in next class...

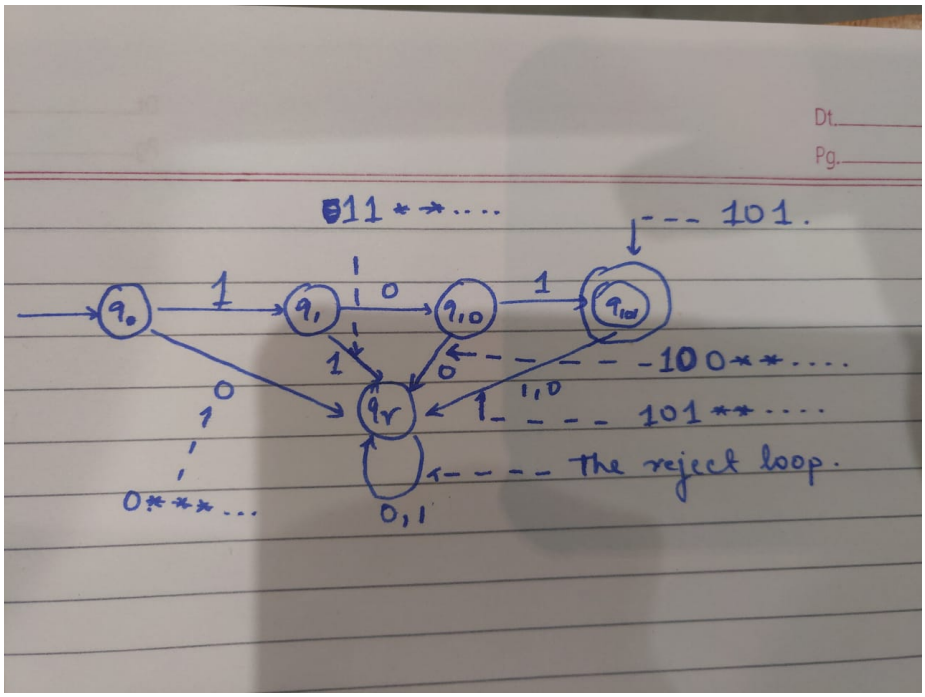

Figure 1: FSA