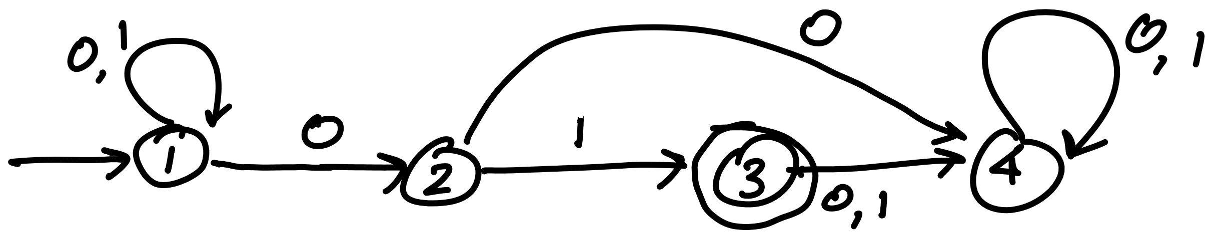
COL 352 Lecture 8 Jan 21

Suppose $L_{01} = \{ w \in \{0,1\}^* \mid$ the last two symbols are $01 \}$

possible NFA

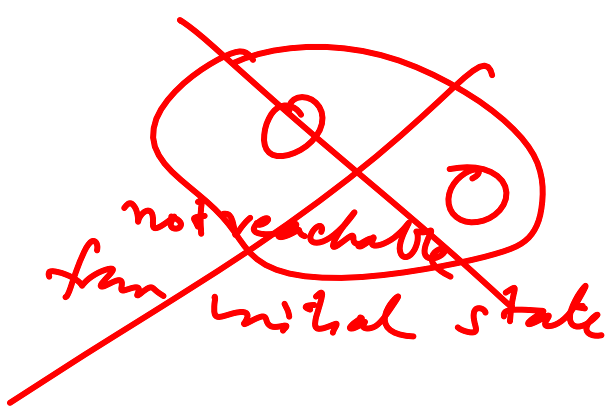


DFA construction

{1}

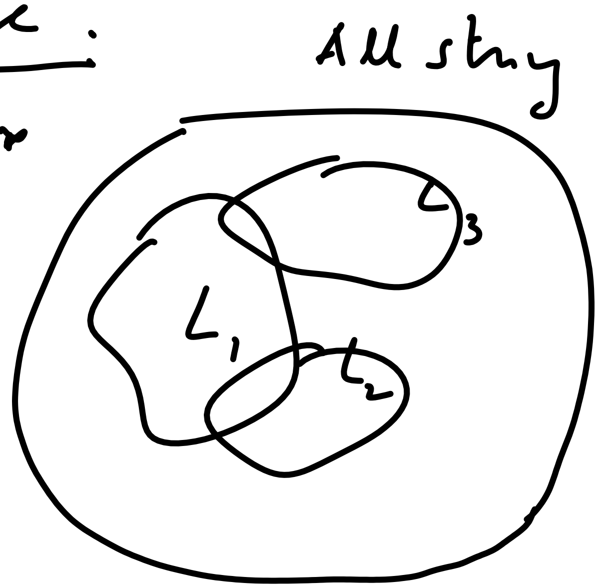
	0	1
→ [1]	[1, 2]	[1]
[2]	[4]	[3]*
[3]*	[4]	[4]
[4]	[4]	[4]
[1, 2]	[1, 2, 4]	[1, 3]
[1, 3*]	[1, 2, 4]	[1, 4]
[1, 4]	[1, 2, 4]	[1, 4]
[2, 3]	[4]	[3, 4]

	0	1
[2, 4]	[4]	[3, 4]
[3, 4]	[4]	[4]
[1, 2, 3*]	[1, 2, 4]	[1, 3*, 4]
[2, 3 4]	[4]	[3, 4]
[1, 3*, 4]	[1, 2, 4]	[1, 4]
[1, 2, 4]	[1, 2, 4]	[1, 3, 4]
~~[1, 2, 3*, 4]~~	~~[1, 2, 4]~~	~~[1, 3, 4]~~



The class of languages accepted by a DFA (same as NFA) is called <u>regular language</u>:

$\{0,1\}$: $\{0,1\}^*$



Patterns

$L_1 = \{ 01, \; 0101, \; 010101, \cdots (01)^i \}$

$\cancel{(01)^*}$ $\quad 01(01)^*$

repeated i times

$L_2 : \{ 00, 0000, (00)^i \}$ $\quad 00(00)^*$

<u>Syntax of regular expression</u> for Σ

1. $a \in \Sigma$ is r.e. defining $\{a\}$
2. ϕ, ϵ are r.e. defining $\phi, \{\epsilon\}$
3. If r, s are r.e. then $r+s$ is regular exp. denoting $R \cup S$

where R, S are sets corresponding to r, s

4. If r, s are r.e. then $r \cdot s$ is r.e.
concatenation
denoting $R \cdot S$

Kleene star
5. If r is regular then r^* is regular
denoting R^*

Comment: If r is r.e., putting parenthesis is also allowed (r)

Examples:

$L_1 = (01)^*$

$(0+1)^*$: all possible strings over 0,1 including ϵ

$(0+1)^* 1 (00+01+10+11)$. 3rd symb from right is 1

$\cancel{*0}$ not r.e.

The class of Languages that can be represented using regular expressions are equivalent to regular languages (which can be accepted by DFA)