25 September 2023 14:06

Minimization of FA

Ex:

	0	1
$\rightarrow q_0$	q_1	q_5
q_1	q_6	q_2
(q_2)	q_0	q_2
q_3	q_2	q_6
q_4	q_7	q_5
q_5	q_2	q_6
q_6	q_6	q_4
q_7	q_6	q_2

Def": Two states q_1 & q_2 are equivalent if both $\delta(q_1, x)$ & $\delta(q_2, x)$ are final states or both of them are non-final states for all $x \in \Sigma^*$.

$\Rightarrow$ Two states are k-equivalent ($k \geq 0$) if both $\delta(q_1, x)$ & $\delta(q_2, x)$ are final or non-final states for all strings x of length k or less.

$\Rightarrow$ 0 equivalent: Any two final states are equivalent and any two non-final are equivalent.

Properties:

1. The rel" defined is Equivalence rel" $\rightarrow$ prove it,

Properties

1. The rel^n defined is Equivalence rel^n → prove it!
2. These induces partition of Q, represent as Π_k.
   Elements of Π_k are k-equivalent classes.
3. If q_1 & q_2 are (k+1) equivalent, they are k-equivalent.
4. If q_1 & q_2 are k-equivalent $\forall k \geq 0$ they they are equivalent.
5. $\Pi_K = \Pi_{K+1}$ then no new partition is created.

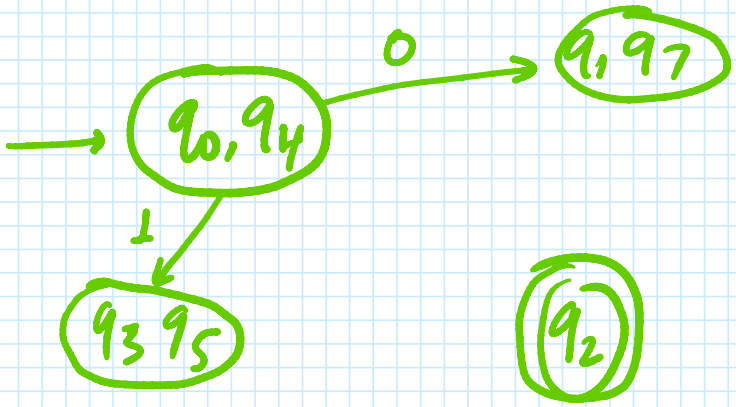
$$\Pi_0 = \{\{q_2\}, \{q_0, q_1, q_3, q_4, q_5, q_6, q_7\}\}$$

$$\Pi_1 = \{\{q_2\}\{q_0, q_4, q_6\}\{q_1, q_7\}\{q_3, q_5\}\}$$

$$\Pi_2 = \{\{q_2\}\{q_0, q_4\}, \{q_6\}\{q_1, q_7\}\{q_3, q_5\}\}$$

$$\Pi_3 = \Pi_2$$ stop

↓ 1 ↓ 2 3 4 5



2

	a	b
→ q_0	q_1	q_2

2

	a	b
→ q_0	q_1	q_0
q_1	q_0	q_2
q_2	q_3	q_1
(q_3)	q_3	q_0
q_4	q_3	q_5
q_5	q_6	q_4
q_6	q_5	q_6
q_7	q_6	q_3

$\pi_0 = \{ \{q_3\} \{ \quad \} \}$

$\pi_1 = \{ \{q_3\} \{q_0, q_1, q_5, q_6\} \{q_2, q_4\} \{q_7\} \}$

$\pi_2 = \{ \{q_3\}, \{q_0, q_6\} \{q_1, q_5\} \{q_2, q_4\} \{q_7\} \}$

$\pi_3 = \pi_2$.

Quiz - 1

1) Design DFA for language

$L = \{ w = \{a, b, c\}^+ \mid w$ starts & end with same symbols $\}$