PRANAV JAGADEESH   1BM18CS071

23/03/2020

1)

B	X							
C	X	X						
D		X	X					
E	X		X	X				
F	X	X		X	X			
G		X	X		X	X		
H	X		X	X		X	X	
I	X	X		X	X		X	X
	A	B	C	D	E	F	G	H

* Mark final and non final state pairs as X

x Consider G and H
$$\delta(G,0) = H \qquad \delta(G,1) = B$$
$$\delta(H,0) = I \qquad \delta(H,1) = C$$

x Consider E and H
$$\delta(E,0) = F \qquad \delta(E,1) = I$$
$$\delta(H,0) = I \qquad \delta(H,1) = C$$
$[E, H]$ are equivalent

x Consider (E and G)
$$\delta(E,0) = F \qquad \delta(E,1) = I$$
$$\delta(G,0) = H \qquad \delta(G,1) = B$$

E and F
$$\delta(E,0) = F \qquad \delta(E,1) = I$$
$$\delta(F,0) = G \qquad \delta(F,1) = B$$

(D and H) →
$$\delta(D,0) = E \qquad \delta(D,1) = H$$
$$\delta(H,0) = I \qquad \delta(H,1) = C$$

(D and G) ⟹
$$\delta(D,0) = E \qquad \delta(D,1) = H \quad equivalent$$
$$\delta(G,0) = H \qquad \delta(G,1) = B$$

(D and E) ⟹
$$\delta(D,0) = E \qquad \delta(D,1) = H$$
$$\delta(E,0) = F \qquad \delta(E,1) = I$$

(B and G) ⟹
$$\delta(B,0) = C \qquad \delta(B,1) = F$$
$$\delta(G,0) = H \qquad \delta(G,1) = B$$

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B and F : $\delta(B,0) = C$ $\delta(D,1) = F$
            $\delta(F,0) = G$ $\delta(F,1) = B$

B and E $\delta(B,0) = C$ $\delta(B,1) = F$ equivalent
            $\delta(E,0) = F$ $\delta(E,1) = I$

B and D $\delta(B,0) = C$ $\delta(B,1) = F$
            $\delta(D,0) = E$ $\delta(D,1) = H$

B and H $\delta(B,0) = C$ $\delta(B,1) = F$ equivalent
            $\delta(H,0) = I$ $\delta(H,1) = C$

A and H $\delta(A,0) = B$ $\delta(A,1) = E$
            $\delta(H,0) = I$ $\delta(H,1) = C$

A and G $\delta(A,0) = B$ $\delta(A,1) = E$ equivalent
            $\delta(G,0) = H$ $\delta(G,1) = B$

(A,E) $\delta(A,0) = B$ $\delta(A,1) = E$
            $\delta(E,0) = F$ $\delta(E,1) = I$

(A,D) = $\delta(A,0) = B$ $\delta(A,1) = E$
            $\delta(D,0) = E$ $\delta(D,1) = H$

(A,B) =) $\delta(A,0) = B$ $\delta(A,1) = E$
            $\delta(B,0) = C$ $\delta(B,1) = F$

Equivalent states are   A = G = D
                        B = H = E
                        C = I = F

δ	0	1
→ A	B	B
B	C	C
* C	A	B

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2)

δ	0	1
$\to q_1$	q_2	q_3
q_2	q_3	q_5
* q_3	q_4	q_3
q_4	q_3	q_5
* q_5	q_2	q_5
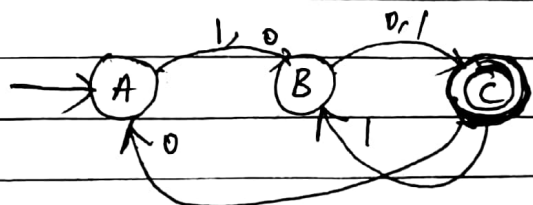
q_2	X			
* q_3	X	X		
q_4	X		X	
* q_5	X	X	X	X
	q_1	q_2	q_3	q_4

N.E $(q_1, q_2) \Rightarrow$ $\delta(q_1, 0) = q_2$ $\delta(q_1, 1) = q_3$
$\delta(q_2, 0) = q_3$ $\delta(q_2, 1) = q_5$

N.E $(q_1, q_3) \Rightarrow$ $\delta(q_1, 0) = q_2$ $\delta(q_1, 1) = q_3$
$\delta(q_3, 0) = q_4$ $\delta(q_3, 1) = q_3$

N.E $(q_1, q_4) \Rightarrow$ $\delta(q_1, 0) = q_2$ $\delta(q_2, 1) = q_3$
$\delta(q_4, 0) = q_3$ $\delta(q_4, 1) = q_5$

N.E $(q_1, q_5) \Rightarrow$ $\delta(q_1, 0) = q_2$ $\delta(q_1, 1) = q_3$
$\delta(q_5, 0) = q_2$ $\delta(q_5, 1) = q_5$

N.E $(q_2, q_3) \Rightarrow$ $\delta(q_2, 0) = q_3$ $\delta(q_2, 1) = q_5$
$\delta(q_3, 0) = q_4$ $\delta(q_3, 1) = q_3$

E $(q_2, q_4) \Rightarrow$ $\delta(q_2, 0) = q_3$ $\delta(q_2, 1) = q_5$
$\delta(q_4, 0) = q_3$ $\delta(q_4, 1) = q_5$

N.E $(q_2, q_5) \Rightarrow$ $\delta(q_2, 0) = q_3$ $\delta(q_2, 1) = q_5$
$\delta(q_5, 0) = q_2$ $\delta(q_5, 1) = q_5$

N.E $(q_3, q_4) \Rightarrow$ $\delta(q_3, 0) = q_4$ $\delta(q_3, 1) = q_3$
$\delta(q_4, 0) = q_3$ $\delta(q_4, 1) = q_5$

N.E $(q_3, q_5) \Rightarrow$ $\delta(q_3, 0) = q_4$ $\delta(q_3, 1) = q_3$
$\delta(q_5, 0) = q_2$ $\delta(q_5, 1) = q_5$

N.E $(q_4, q_5) \Rightarrow$ $\delta(q_4, 0) = q_3$ $\delta(q_4, 1) = q_5$
$\delta(q_5, 0) = q_2$ $\delta(q_5, 1) = q_5$

Equivalent States $q_2 = q_4$

δ	0	1
$\to q_1$	q_2	q_3
q_2	q_3	q_5
* q_3	q_2	q_3
* q_5	q_2	q_5

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3)

δ	0	1
q_1	q_2	q_6
q_2	q_1	q_3
* q_3	q_2	q_4
q_4	q_4	q_2
q_5	q_6	q_5
* q_6	q_5	q_4

q_2	X				
X q_3	X	X			
q_4	X	X			
q_5	X	X			
X q_6	X	X			
q_1	q_2	q_3	q_4	q_5

X

$(q_1, q_2) \Rightarrow \delta(q_1, 0) = q_2 \quad \delta(q_1,1)=q_6 \quad \delta(q_2,0)=q_1 \quad \delta(q_2,1)=q_3$

$(q_1, q_3) \Rightarrow \delta(q_1, 0)=q_2 \quad \delta(q_1,1)=q_6 \quad \delta(q_3,0)=q_2 \quad \delta(q_3,1)=q_4$

$(q_1, q_4) \Rightarrow \delta(q_1,0)=q_2 \quad \delta(q_1,1)=q_6 \quad \delta(q_4,0)=q_4 \quad \delta(q_4,1)=q_2$

$(q_1, q_5) \Rightarrow \delta(q_1,0)=q_2 \quad \delta(q_1,1)=q_6 \quad \delta(q_5,0)=q_4 \quad \delta(q_5,1)=q_5$

$(q_1, q_6) \Rightarrow \delta(q_1,0)=q_2 \quad \delta(q_1,1)=q_6 \quad \delta(q_6,0)=q_5 \quad \delta(q_6,1)=q_4$

$(q_2, q_3) \Rightarrow \delta(q_2,0)=q_1 \quad \delta(q_2,1)=q_3 \quad \delta(q_3,0)=q_2 \quad \delta(q_3,1)=q_4$

$(q_2, q_4) \Rightarrow \delta(q_2,0)=q_1 \quad \delta(q_2,1)=q_3 \quad \delta(q_4,0)=q_4 \quad \delta(q_4,1)=q_2$

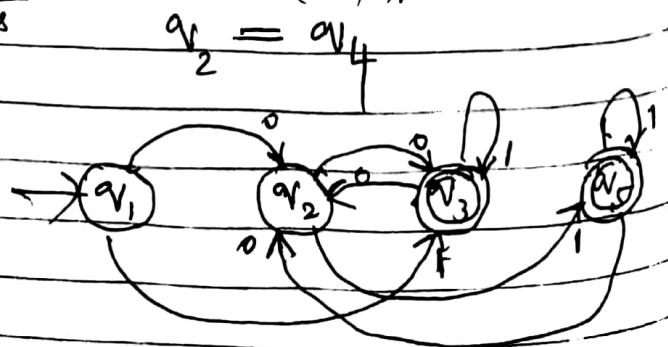$(q_2, q_5) \Rightarrow \delta(q_2,0)=q_1 \quad \delta(q_2,1)=q_3 \quad \delta(q_5,0)=q_4 \quad \delta(q_5,1)=q_5$

$(q_2, q_6) \Rightarrow \delta(q_2,0)=q_1 \quad \delta(q_2,1)=q_3 \quad \delta(q_6,0)=q_5 \quad \delta(q_6,1)=q_4$

E $(q_3, q_4) = \delta(q_3,0)=q_2 \quad \delta(q_3,1)=q_4 \quad \delta(q_4,0)=q_4 \quad \delta(q_4,1)=q_2$

E $(q_3, q_5) = \delta(q_3,0)=q_2 \quad \delta(q_3,1)=q_4 \quad \delta(q_5,0)=q_4 \quad \delta(q_5,1)=q_5$

E $(q_3, q_6) = \delta(q_3,0)=q_2 \quad \delta(q_3,1)=q_4 \quad \delta(q_6,0)=q_5 \quad \delta(q_6,1)=q_4$

E $(q_4, q_5) = \delta(q_4,0)=q_4 \quad \delta(q_4,1)=q_2 \quad \delta(q_5,0)=q_4 \quad \delta(q_5,1)=q_5$

E $(q_4, q_6) = \delta(q_4,0)=q_4 \quad \delta(q_6,1)=q_2 \quad \delta(q_6,0)=q_5 \quad \delta(q_6,1)=q_4$

E $(q_5, q_6) = \delta(q_5,0)=q_4 \quad \delta(q_5,1)=q_5 \quad \delta(q_6,0)=q_5 \quad \delta(q_6,1)=q_4$

$(q_4) = (q_5) = (q_6) = q_3$

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S\I	0	1
q_1	q_2	q_3
q_2	q_1	q_3
q_3	q_2	q_3