

DFA Minimization Example -2

Minimization of DFA - Examples (Part-2)

Construct a minimum DFA equivalent to the DFA described by

	0	1
→ 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



Minimization of DFA - Examples (Part-2)

Construct a minimum DFA equivalent to the DFA described by

	0	1
$\rightarrow q_0$	q_1	q_5
q_1	q_6	q_2
$\textcircled{q_2}$	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

○ Equivalence

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



Minimization of DFA - Examples (Part-2)

Construct a minimum DFA equivalent to the DFA described by

	0	1
→ 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

○ Equivalence

{ q₀, q₁, q₃, q₄, q₅, q₆, q₇ } { q₂ }

|- Equivalence

{ q₀, q₄,

{ q₁

{ q₃, q₅ }



Minimization of DFA - Examples (Part-2)

Construct a minimum DFA equivalent to the DFA described by

	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


○ Equivalence

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

|- Equivalence

$\{q_0, q_4, q_6\}$

$\{q_1, q_7\}$

$\{q_3, q_5\}$ 



Minimization of DFA - Examples (Part-2)

Construct a minimum DFA equivalent to the DFA described by

	0	1
→ 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

○ Equivalence

{q₀, q₁, q₃, q₄, q₅, q₆, q₇} {q₂}

1- Equivalence

{q₀, q₄, q₆}

{q₁, q₇}

{q₃, q₅} {q₂}

2- Equivalence



Minimization of DFA - Examples (Part-2)

Construct a minimum DFA equivalent to the DFA described by

	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

○ Equivalence

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

1- Equivalence

$\{q_0, q_4, q_6\}$

$\{q_1, q_7\}$

$\{q_3, q_5\}$ $\{q_2\}$

2- Equivalence

$\{q_0, q_4\}$



Minimization of DFA - Examples (Part-2)

Construct a minimum DFA equivalent to the DFA described by

	0	1
→ 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

○ Equivalence

{q₀, q₁, q₃, q₄, q₅, q₆, q₇} {q₂}

1- Equivalence

{q₀, q₄, q₆}

{q₁, q₇}

{q₃, q₅} {q₂}

2- Equivalence

{q₀, q₄} {q₆}



→ q_0
 q_1
 q_2
 q_3
 q_4
 q_5
 q_6
 q_7

q_1 q_5
 q_6 q_2
 q_0 q_2
 q_2 q_6
 q_7 q_5
 q_2 q_6
 q_6 q_4
 q_6 q_2

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

1- Equivalence

$\{q_0, q_4, q_6\}$

$\{q_1, q_7\}$

$\{q_3, q_5\}$ $\{q_2\}$

2- Equivalence

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



→ q_0
 q_1
 q_2
 q_3
 q_4
 q_5
 q_6
 q_7

q_1 q_5
 q_6 q_2
 q_0 q_2
 q_2 q_6
 q_7 q_5
 q_2 q_6
 q_6 q_4
 q_6 q_2

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

1- Equivalence

$\{q_0, q_4, q_6\}$

$\{q_1, q_7\}$

$\{q_3, q_5\}$ $\{q_2\}$

2- Equivalence

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

3- Equivalence

$\{q_0, q_2\}$



→ q_0
 q_1
 q_2
 q_3
 q_4
 q_5
 q_6
 q_7

q_1 q_5
 q_6 q_2
 q_0 q_2
 q_2 q_6
 q_7 q_5
 q_2 q_6
 q_6 q_4
 q_6 q_2

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

1- Equivalence

$\{q_0, q_4, q_6\}$

$\{q_1, q_7\}$

$\{q_3, q_5\}$ $\{q_2\}$

2- Equivalence

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

3- Equivalence

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



q7

q6

q2

q = 2, 0, 1, 3, 5, 7

{q0, q4} {q6} {q1, q7} {q3, q5} {q2}

3. Equivalence

{q0, q4} {q6} {q1, q7} {q3, q5} {q2}



q7

q6

q2

q = 2, 0, 1, 3, 5, 7

{q0, q4} {q6} {q1, q7} {q3, q5} {q2}

3. Equivalence

{q0, q4} {q6} {q1, q7} {q3, q5} {q2}

	0	1
→ {q0, q4}		
{q6}		
{q1, q7}		
{q3, q5}		
{q2}		

	0	1
→ q0	q1	q5
q1	q6	q2
q2	q0	q2
q3	q2	q6
q4	q7	q5
q5	q2	q6
q6	q6	q4
q7	q6	q2



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3. Equivalence

{q0, q4} {q6} {q1, q7} {q3, q5} {q2}

	0	1
→ {q0, q4}		
{q6}		
{q1, q7}		
{q3, q5}		
{q2}		

	0	1
→ q0	q1	q5
q1	q6	q2
q2	q0	q2
q3	q2	q6
q4	q7	q5
q5	q2	q6
q6	q6	q4
q7	q6	q2



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3. Equivalence

{q0, q4} {q6} {q1, q7} {q3, q5} {q2}

	0	1
→ {q0, q4}		
{q6}		
{q1, q7}		
{q3, q5}		
{q2}		

	0	1
→ q0	q1	q5
q1	q6	q2
q2	q0	q2
q3	q2	q6
q4	q7	q5
q5	q2	q6
q6	q6	q4
q7	q6	q2



q7

q6

q2

q = 2, 0, 1, 3, 5, 7

{q0, q4} {q6} {q1, q7} {q3, q5} {q2}

3. Equivalence

{q0, q4} {q6} {q1, q7} {q3, q5} {q2}

	0	1
→ {q0, q4}	{q1, q7}	{q3, q5}
{q6}		
{q1, q7}		
{q3, q5}		
{q2}		

	0	1
→ q0	q1	q5
q1	q6	q2
q2	q0	q2
q3	q2	q6
q4	q7	q5
q5	q2	q6
q6	q6	q4
q7	q6	q2



q_7 | q_6 q_2

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

3. Equivalence

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

	0	1
$\rightarrow \{q_0, q_4\}$	$\{q_1, q_7\}$	$\{q_3, q_5\}$
$\{q_6\}$	$\{q_6\}$	$\{q_0, q_4\}$
$\{q_1, q_7\}$	$\{q_6\}$	$\{q_2\}$
$\{q_3, q_5\}$		
$\{q_2\}$		

	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



q7

q6

q2

q = 2, 0, 1, 3, 5, 7

{q0, q4} {q6} {q1, q7} {q3, q5} {q2}

3. Equivalence

{q0, q4} {q6} {q1, q7} {q3, q5} {q2}

	0	1
→ {q0, q4}	{q1, q7}	{q3, q5}
{q6}	{q6}	{q0, q4}
{q1, q7}	{q6}	{q2}
{q3, q5}	{q2}	{q6}
{q2}		

	0	1
→ q0	q1	q5
q1	q6	q2
q2	q0	q2
q3	q2	q6
q4	q7	q5
q5	q2	q6
q6	q6	q4
q7	q6	q2



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

3. Equivalence

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

	0	1
$\{q_0, q_4\}$	$\{q_1, q_7\}$	$\{q_3, q_5\}$
$\{q_6\}$	$\{q_6\}$	$\{q_0, q_4\}$
$\{q_1, q_7\}$	$\{q_6\}$	$\{q_2\}$
$\{q_3, q_5\}$	$\{q_2\}$	$\{q_6\}$
$\{q_2\}$	$\{q_0, q_4\}$	$\{q_2\}$

	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



• **Questions????**