Минимизация автомата Мили

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | X1 | X2 | X3 | X4 | X5 | X6 | X7 | X8 | X9 | X10 | X11 | X12 | X13 | X14 | X15 |
| p1 | X8 | X1 | X13 | X3 | X10 | X1 | X11 | X7 | X2 | X11 | X2 | X7 | X3 | X15 | X13 |
| p2 | X5 | X6 | X9 | X4 | X9 | X12 | X10 | X13 | X10 | X14 | X7 | X15 | X9 | X14 | X4 |

Табл 1 – таблица переходов автомата Мили

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | X1 | X2 | X3 | X4 | X5 | X6 | X7 | X8 | X9 | X10 | X11 | X12 | X13 | X14 | X15 |
| p1 | λ1 | λ1 | λ2 | λ2 | λ1 | λ2 | λ1 | λ1 | λ2 | λ2 | λ1 | λ2 | λ1 | λ2 | λ2 |
| p2 | λ2 | λ1 | λ2 | λ1 | λ1 | λ2 | λ1 | λ2 | λ1 | λ2 | λ2 | λ1 | λ1 | λ1 | λ2 |

Табл 2 – таблица выходов автомата Мили

π1= {X1, X8, X11} B1,

{X2, X5, X7, X13} B2,

{X3, X6, X10, X15} B3,

{X4, X9, X12, X14) B4

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | X1 | X8 | X11 | X2 | X5 | X7 | X13 | X3 | X6 | X10 | X15 | X4 | X9 | X12 | X14 |
| p1 | B1 | B2 | B2 | B1 | B3 | B1 | B3 | B2 | B1 | B1 | B2 | B3 | B2 | B2 | B3 |
| p2 | B2 | B2 | B2 | B3 | B4 | B3 | B4 | B4 | B4 | B4 | B4 | B4 | B3 | B3 | B4 |

π2= {X1} C1,

{X8, X11} C2,

{X2, X7} C3,

{X5, X13} C4,

{X3, X15} C5,

{X6, X10} C6,

{X4, X14} C7,

{X9, X12} C8

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | X1 | X8 | X11 | X2 | X7 | X5 | X13 | X3 | X15 | X6 | X10 | X4 | X14 | X9 | X12 |
| p1 | С1 | C3 | С3 | С1 | С2 | С6 | С5 | С4 | С4 | С1 | С2 | С5 | С5 | С3 | С3 |
| p2 | C4 | C4 | С3 | С6 | С6 | С8 | С8 | С8 | С7 | С8 | С7 | С7 | С7 | С6 | С5 |

π3= {X1} D1,

{X8} D2

{X11} D3,

{X2} D4

{X7} D5

{X5} D6

{X13} D7

{X3} D8

{X15} D9

{X6} D10

{X10} D11

{X4, X14} D12

{X9} D13

{X12} D14

Получили разбиение, для которого дальнейшее разбиение невозможно.

X’ = {x1, x2, x3, x4, x5, x6, x7, x8, x9, x10, x11,x12, x13, x15}

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | X1 | X2 | X3 | X4 | X5 | X6 | X7 | X8 | X9 | X10 | X11 | X12 | X13 | X15 |
| p1 | X8 | X1 | X13 | X3 | X10 | X1 | X11 | X7 | X2 | X11 | X2 | X7 | X3 | X13 |
| p2 | X5 | X6 | X9 | X4 | X9 | X12 | X10 | X13 | X10 | X14 | X7 | X15 | X9 | X4 |

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | X1 | X2 | X3 | X4 | X5 | X6 | X7 | X8 | X9 | X10 | X11 | X12 | X13 | X15 |
| p1 | λ1 | λ1 | λ2 | λ2 | λ1 | λ2 | λ1 | λ1 | λ2 | λ2 | λ1 | λ2 | λ1 | λ2 |
| p2 | λ2 | λ1 | λ2 | λ1 | λ1 | λ2 | λ1 | λ2 | λ1 | λ2 | λ2 | λ1 | λ1 | λ2 |

Минимизация автомата Мура

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| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | λ3 | λ3 | λ2 | λ2 | λ2 | λ1 | λ2 | λ3 | λ1 | λ1 | λ1 | λ1 |
|  | X1 | X2 | X3 | X4 | X5 | X6 | X7 | X8 | X9 | X10 | X11 | X12 |
| p1 | X9 | X11 | X11 | X10 | X10 | X3 | X2 | X3 | X2 | X7 | X9 | X3 |
| p1 | X8 | X2 | X2 | X9 | X9 | X12 | X6 | X4 | X6 | X5 | X8 | X4 |

π0= {X1, X4, X5, X11, X12} A1

{X2, X3, X10} A2

{X6, X7, X8, X9} A3

|  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | X1 | X4 | X5 | X11 | X12 | X2 | X3 | X10 | X6 | X7 | X8 | X9 |
| p1 | A3 | A2 | A2 | A3 | A2 | A1 | A1 | A3 | A2 | A2 | A2 | A2 |
| p1 | A3 | A3 | A3 | A3 | A1 | A2 | A2 | A1 | A1 | A3 | A1 | A3 |

π1= {X1, X11} B1

{X4, X5} B2

{X12} B3

{X2, X3} B4

{X10} B5

{X6, X8} B6

{X7, X9} B7

|  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | X1 | X11 | X4 | X5 | X12 | X2 | X3 | X10 | X6 | X8 | X7 | X9 |
| p1 | B7 | B7 | B5 | B5 | B4 | B1 | B1 | B7 | B4 | B4 | B4 | B4 |
| p1 | B6 | B6 | B7 | B7 | B2 | B4 | B4 | B2 | B3 | B2 | B6 | B6 |

π2 = {X1, X11} C1

{X4, X5} C2

{X12} C3

{X2, X3} C4

{X10} C5

{X6} C6

{X8} C7

{X7, X9} C8

|  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | X1 | X11 | X4 | X5 | X12 | X2 | X3 | X10 | X6 | X8 | X7 | X9 |
| p1 | C8 | C8 | C5 | C5 | C4 | C1 | C1 | C8 | C4 | C4 | C4 | C4 |
| p1 | C7 | C7 | C8 | C8 | C2 | C4 | C4 | C2 | C3 | C2 | C6 | C6 |

π3 = {X1, X11} D1

{X4, X5} D2

{X12} D3

{X2, X3} D4

{X10} D5

{X6} D6

{X8} D7

{X7, X9} D8

π2=π3;

X’ = {X1, X4, X12, X2, X10, X6, X8, X7}

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | λ1 | λ2 | λ1 | λ3 | λ3 | λ3 | λ2 | λ1 |
|  | X1 | X2 | X4 | X6 | X7 | X8 | X10 | X12 |
| p1 | X7 | X1 | X10 | X2 | X2 | X2 | X7 | X2 |
| p1 | X8 | X2 | X7 | X12 | X6 | X4 | X4 | X4 |

Минимизация совмещенного автомата (С - автомата)

|  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | X1 | X2 | X3 | X4 | X5 | X6 | X7 | X8 | X9 | X10 | X11 | X12 |
| P1 | X10 | X9 | X5 | X9 | X8 | X5 | X9 | X10 | X8 | X1 | X1 | X10 |
| P2 | X1 | X2 | X8 | X2 | X3 | X7 | X2 | X6 | X3 | X8 | X3 | X6 |

Табл 3 – таблица переходов С – автомата

|  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | U2 | U2 | U1 | U1 | U3 | U2 | U1 | U1 | U3 | U3 | U3 | U2 |
|  | X1 | X2 | X3 | X4 | X5 | X6 | X7 | X8 | X9 | X10 | X11 | X12 |
| P1 | λ2/3 | λ2/3 | λ2/3 | λ1/3 | λ2/1 | λ2/3 | λ1/3 | λ1/3 | λ2/1 | λ2/2 | λ2/2 | λ1/3 |
| P2 | λ2/2 | λ2/2 | λ1/1 | λ2/2 | λ1/1 | λ1/1 | λ2/2 | λ2/2 | λ1/1 | λ1/1 | λ1/1 | λ2/2 |

Табл 4 – таблица выходов С – автомата

π1 = {X1, X2} B1

{X3, X6} B2

{X4, X7, X8, X12} B3

{X5, X9} B4

{X10, X11} B5

|  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | X1 | X2 | X3 | X6 | X4 | X7 | X8 | X12 | X5 | X9 | X10 | X11 |
| P1 | B5 | B4 | B4 | B4 | B4 | B4 | B5 | B5 | B3 | B3 | B1 | B1 |
| P2 | B1 | B1 | B3 | B3 | B1 | B1 | B2 | B2 | B2 | B2 | B3 | B2 |

π2 = {X1} C1

{X2} C2

{X3, X6} C3

{X4, X7} C4

{X8, X12} C5

{X5, X9} C6

{X10} C7

{X11} C8

|  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | X1 | X2 | X3 | X6 | X4 | X7 | X8 | X12 | X5 | X9 | X10 | X11 |
| P1 | C7 | C6 | C6 | C6 | C6 | C6 | C7 | C7 | C5 | C5 | C1 | C1 |
| P2 | C1 | C2 | C5 | C4 | C2 | C2 | C3 | C3 | C3 | C3 | C5 | C3 |

π3 = {X1} D1

{X2} D2

{X3} D3

{X6} D4

{X4, X7} D5

{X8, X12} D6

{X5, X9} D7

{X10} D8

{X11} D9

|  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | X1 | X2 | X3 | X6 | X4 | X7 | X8 | X12 | X5 | X9 | X10 | X11 |
| P1 | D8 | D7 | D7 | D7 | D7 | D7 | D8 | D8 | D6 | D6 | D1 | D1 |
| P2 | D1 | D2 | D6 | D5 | D2 | D2 | D4 | D4 | D3 | D3 | D6 | D3 |

π4 = {X1} E1

{X2} E2

{X3} E3

{X6} E4

{X4, X7} E5

{X8, X12} E6

{X5, X9} E7

{X10} E8

{X11} E9

π4= π3;

X’ = {X1, X2, X3, X6, X4, X8, X5, X10, X11}

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | X1 | X2 | X3 | X4 | X5 | X6 | X8 | X10 | X11 |
| P1 | X10 | X5 | X5 | X5 | X8 | X5 | X10 | X1 | X1 |
| P2 | X1 | X2 | X8 | X2 | X3 | X4 | X6 | X8 | X3 |

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | U2 | U2 | U1 | U1 | U3 | U2 | U1 | U3 | U3 |
|  | X1 | X2 | X3 | X4 | X5 | X6 | X8 | X10 | X11 |
| P1 | λ2 | λ2 | λ2 | λ1 | λ2 | λ2 | λ1 | λ2 | λ2 |
| P2 | λ2 | λ2 | λ1 | λ2 | λ1 | λ1 | λ2 | λ1 | λ1 |