Quine–McCluskey algorithm

The function that is minimized can be entered via a truth table that represents the function $y = f(x_n,\ldots,x_1, x_0)$. You can manually edit this function by clicking on the gray elements in the y column. Alternatively, you can generate a random function by pressing the "Random example" button.

Random example

Number of input variables: 6 Allow Don't-Care: no

Truth table:

	x_5	x_4	x_3	x_2	x_1	x_0	y
0:	0	0	0	0	0	0	0
1:	0	0	0	0	0	1	0
2:	0	0	0	0	1	0	0
3:	0	0	0	0	1	1	0
4:	0	0	0	1	0	0	0
5:	0	0	0	1	0	1	0
6:	0	0	0	1	1	0	0
7:	0	0	0	1	1	1	1
8:	0	0	1	0	0	0	0
9:	0	0	1	0	0	1	0
10:	0	0	1	0	1	0	0
11:	0	0	1	0	1	1	0
12:	0	0	1	1	0	0	0
13:	0	0	1	1	0	1	0
14:	0	0	1	1	1	0	0
15:	0	0	1	1	1	1	0
16:	0	1	0	0	0	0	0
17:	0	1	0	0	0	1	1
18:	0	1	0	0	1	0	0
19:	0	1	0	0	1	1	0
20:	0	1	0	1	0	0	0
21:	0	1	0	1	0	1	0
22:	0	1	0	1	1	0	0
23:	0	1	0	1	1	1	1
24:	0	1	1	0	0	0	0
25:	0	1	1	0	0	1	0
26:	0	1	1	0	1	0	0
27:	0	1	1	0	1	1	0
28:	0	1	1	1	0	0	0
29:	0	1	1	1	0	1	0
30:	0	1	1	1	1	0	0
31:	0	1	1	1	1	1	1

Implicants (Order 0):

	x_5	x_4	x_3	x_2	x_1	x_0	
7:	0	0	0	1	1	1	→
17:	0	1	0	0	0	1	✓
23:	0	1	0	1	1	1	→
31:	0	1	1	1	1	1	→
42:	1	0	1	0	1	0	✓

32:	1	0	0	0	0	0	0
33:	1	0	0	0	0	1	0
34:	1	0	0	0	1	0	0
35:	1	0	0	0	1	1	0
36:	1	0	0	1	0	0	0
37:	1	0	0	1	0	1	0
38:	1	0	0	1	1	0	0
39:	1	0	0	1	1	1	0
40:	1	0	1	0	0	0	0
41:	1	0	1	0	0	1	0
42:	1	0	1	0	1	0	1
43:	1	0	1	0	1	1	0
44:	1	0	1	1	0	0	0
45:	1	0	1	1	0	1	0
46:	1	0	1	1	1	0	0
47:	1	0	1	1	1	1	0
48:	1	1	0	0	0	0	0
49:	1	1	0	0	0	1	0
50:	1	1	0	0	1	0	0
51:	1	1	0	0	1	1	0
52:	1	1	0	1	0	0	0
53:	1	1	0	1	0	1	0
54:	1	1	0	1	1	0	0
55:	1	1	0	1	1	1	0
56:	1	1	1	0	0	0	0
57:	1	1	1	0	0	1	0
58:	1	1	1	0	1	0	0
59:	1	1	1	0	1	1	0
60:	1	1	1	1	0	0	0
61:	1	1	1	1	0	1	0
62:	1	1	1	1	1	0	0
63:	1	1	1	1	1	1	0

Implicants (Order 1):

	x_5	x_4	x_3	x_2	x_1	x_0	
7, 23:	0	-	0	1	1	1	✓
23, 31:	0	1	-	1	1	1	✓

Prime implicant chart:

	x_5	x_4	x_3	x_2	x_1	x_0	7	17	23	31	42	
7, 23:	0	-	0	1	1	1	●		○			$(\bar{x}_5\bar{x}_3x_2x_1x_0)$
23, 31:	0	1	-	1	1	1			○	●		$(\bar{x}_5x_4x_2x_1x_0)$
17:	0	1	0	0	0	1		●				$(\bar{x}_5x_4\bar{x}_3\bar{x}_2\bar{x}_1x_0)$
42:	1	0	1	0	1	0					●	$(x_5\bar{x}_4x_3\bar{x}_2x_1\bar{x}_0)$

Extracted essential prime implicants: $(\bar{x}_5\bar{x}_3x_2x_1x_0)$, $(\bar{x}_5x_4\bar{x}_3\bar{x}_2\bar{x}_1x_0)$, $(\bar{x}_5x_4x_2x_1x_0)$, $(x_5\bar{x}_4x_3\bar{x}_2x_1\bar{x}_0)$

Minimal boolean expression:

$y = (\bar{x}_5\bar{x}_3x_2x_1x_0) \vee (\bar{x}_5x_4\bar{x}_3\bar{x}_2\bar{x}_1x_0) \vee (\bar{x}_5x_4x_2x_1x_0) \vee (x_5\bar{x}_4x_3\bar{x}_2x_1\bar{x}_0)$

Legend:
Don't-care: ×
Implicant (non prime): →
Prime implicant: ✓
Essential prime implicant: ●
Prime implicant but covers only don't-care: (×)

The JavaScript source code can be found here: qmc.js.

This website is part of the lecture Technical Computer Science.

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