Quine–McCluskey algorithm

The function that is minimized can be entered via a truth table that represents the function $y = f(x_n,...,x_1, x_0)$. 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: 4 Allow Don't-Care: no

Truth table:

	x_3	x_2	x_1	x_0	y
0:	0	0	0	0	0
1:	0	0	0	1	1
2:	0	0	1	0	0
3:	0	0	1	1	1
4:	0	1	0	0	0
5:	0	1	0	1	1
6:	0	1	1	0	0
7:	0	1	1	1	0
8:	1	0	0	0	1
9:	1	0	0	1	0
10:	1	0	1	0	1
11:	1	0	1	1	1
12:	1	1	0	0	0
13:	1	1	0	1	1
14:	1	1	1	0	0
15:	1	1	1	1	0

Implicants (Order 0):

	x_3	x_2	x_1	x_0	
1:	0	0	0	1	→
3:	0	0	1	1	→
5:	0	1	0	1	→
8:	1	0	0	0	→
10:	1	0	1	0	→
11:	1	0	1	1	→
13:	1	1	0	1	→

Implicants (Order 1):

	x_3	x_2	x_1	x_0	
1, 3:	0	0	-	1	✓
1, 5:	0	-	0	1	✓
3, 11:	-	0	1	1	✓
5, 13:	-	1	0	1	✓
8, 10:	1	0	-	0	✓
10, 11:	1	0	1	-	✓

Prime implicant chart:

	x_3	x_2	x_1	x_0	1	3	5	8	10	11	13	
1, 3:	0	0	-	1	○	○						$(\bar{x}_3\bar{x}_2x_0)$
1, 5:	0	-	0	1	○		○					$(\bar{x}_3\bar{x}_1x_0)$
3, 11:	-	0	1	1		○				○		$(\bar{x}_2x_1x_0)$
5, 13:	-	1	0	1			○				●	$(x_2\bar{x}_1x_0)$
8, 10:	1	0	-	0				●	○			$(x_3\bar{x}_2\bar{x}_0)$
10, 11:	1	0	1	-					○	○		$(x_3\bar{x}_2x_1)$

Extracted essential prime implicants: $(x_3\bar{x}_2\bar{x}_0)$, $(x_2\bar{x}_1x_0)$

Reduced prime implicant chart (Iteration 0):

	x_3	x_2	x_1	x_0	1	3	11	
1, 3:	0	0	-	1	●	○		$(\bar{x}_3\bar{x}_2x_0)$
3, 11:	-	0	1	1		○	●	$(\bar{x}_2x_1x_0)$

Extracted essential prime implicants: $(\bar{x}_3\bar{x}_2x_0)$, $(\bar{x}_2x_1x_0)$

Minimal boolean expression:

$y = (x_3\bar{x}_2\bar{x}_0) \vee (x_2\bar{x}_1x_0) \vee (\bar{x}_3\bar{x}_2x_0) \vee (\bar{x}_2x_1x_0)$

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.

Keywords: interactive Quine–McCluskey algorithm, method of prime implicants, Quine–McCluskey method, Petrick's method for cyclic covering problems, prime implicant chart, html5, javascript