Python Programming and Practice

Boolean Function

Simplifier Program

Proposal

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1. Introduction

1) Background

In my logic circuits course, I was working on a problem to simplify a Boolean function, and when my answer and the answer sheet were incorrect, I had a hard time figuring out where I went wrong. So to make it easier for me and my future students, I wrote a program to draw a k-map of the input Boolean function and simplify it using the sum of products (SOP) and the product of sums (POS).

2) Project goal

Write a program that draws a k-map for a given Boolean function and simplifies it using the sum of products (SOP) and product of sums (POS).

3) Differences from existing programs

Existing programs that simplify Boolean functions often don't know what rules they use or just give you the answer, but the program I'm going to build will draw and use K-maps to simplify, making it easy to understand visually.

2. Functional Requirement

1) Function 1 (Draw a K-map)

- Description (Ability to represent an input Boolean function as a K-map)

(1) Detailed function 1 (Draw a table based on the number of variables)

- Description (If the number of variables entered is two, draw a table of the form 2*2, three 4*2, and four 4*4.)

(2) Detailed function 2 (Populating a table 1)

- Description (In each column of the table, write down the term that the column represents. ($m0=x'y'$)

(3) Detailed function 3 (Populating a table 2)

- Description (Display the values of the Boolean function you entered as 0s and 1s in the table you created in Detailed function 2.)

2) Function 2 (Using K-maps to simplify Boolean functions)

- Description (Output the result of simplifying the input Boolean function to (sum of products) sop and (sum of products) pos using K-maps, respectively.)

(1) Detailed function 1 (Group adjacent cells with the same value together.)

- Description (For example, if the value of the cell is 1, then the cells around it are bound in a rectangular shape. This should be as large as you can make it, with only 1s and even numbers across and down. The same goes for 0)

(2) Detailed function 2 (Make the enclosed result a Boolean function)

- Description (A set of 1's is represented as a sum of products by expressing one set as a product and adding them together, and a set of 0's is represented as a sum of products by expressing one set as a sum and adding them together, and (1) output with the K-map of Detailed function 3.)

3. Schedule

works	11/03	11/15	11/29	12/5	12/15	12/22
proposal	▬					
Function 1 / Detailed function 1,2		▬▬				
Function 1 / Detailed function 3		▬▬▬				
Function 2 / Detailed function 1			▬▬▬			
Function 2 / Detailed function 2			▬▬▬	▬▬		
code cleanup				▬▬		
report					▬▬	