Tabulation Method Online Simulator USER MANUAL

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INTRODUCTION

This manual is a guide for the users of the online simulator of Quine – McCluskey's algorithm. It is divided into sections starting from an overview of what this system is about until the step-by-step explanation on how to use this simulator.

The Quine – McCluskey Method is also known as the Tabulation method or the method of prime implicants. It is developed by W.V. Quine and E.J. McCluskey in 1956. This method is used to minimize Boolean functions just like Karnaugh mapping; however, this method is more efficient to use in computer algorithms and it provides more accurate solutions to validate the simplified form of the Boolean function. The main goal is to find all prime implicants and use them to find the essential prime implicants that can be used in the possible simplified forms of the function.

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1.0 GENERAL INFORMATION

1.1 System Overview

The Tabulation Method Online Simulator is a web-based application for solving the minimized Boolean function based on the given input (considered as minterms) by the user. It is a major application which performs Quine – McCluskey's algorithm to solve the given problem. Using this algorithm, the binary conversion of the decimal numbers are searched if they are included in the prime implicants that may be used in the simplified form of the function. The maximum number of variables that this simulator can use is 10.

1.2 Points of Contact

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2.0 GETTING STARTED

2.1 First-time Access to the Webpage

Type "http://agila.upm.edu.ph:11008/MP1-TabulationMethod/index.html" in the browser's address box. When the user opens the webpage, the only thing he/she would see is a plain background with the title "*Quine – McCluskey Tabulation Method*," and one textbox for the user's input as shown below. An example is given on what the user may input and how he/she must input it, either separated by commas or by spaces.

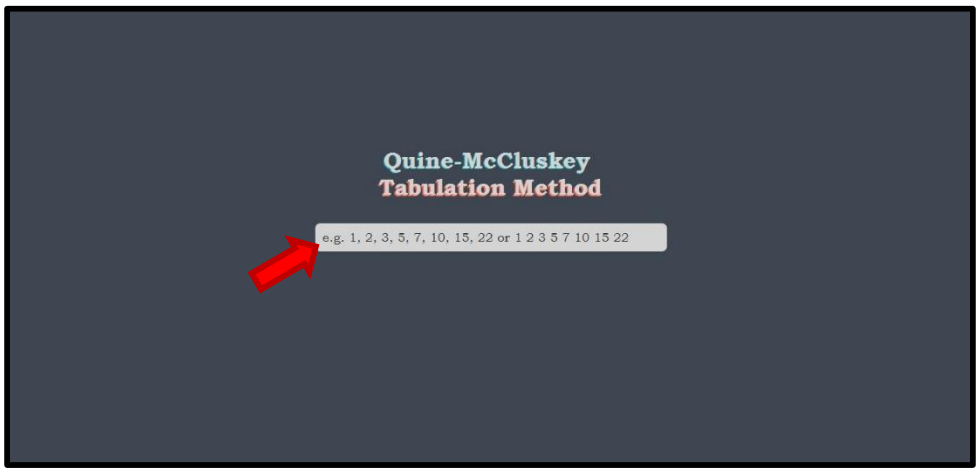

Figure 2.1

When done, the user only needs to press Enter and he/she will be redirected to a new page showing the solutions step-by-step based on Quine – McCluskey's algorithm as well as the simplified form or forms of the Boolean function. Tables are provided in each step for a more organized output and for better understanding of the algorithm as shown below.

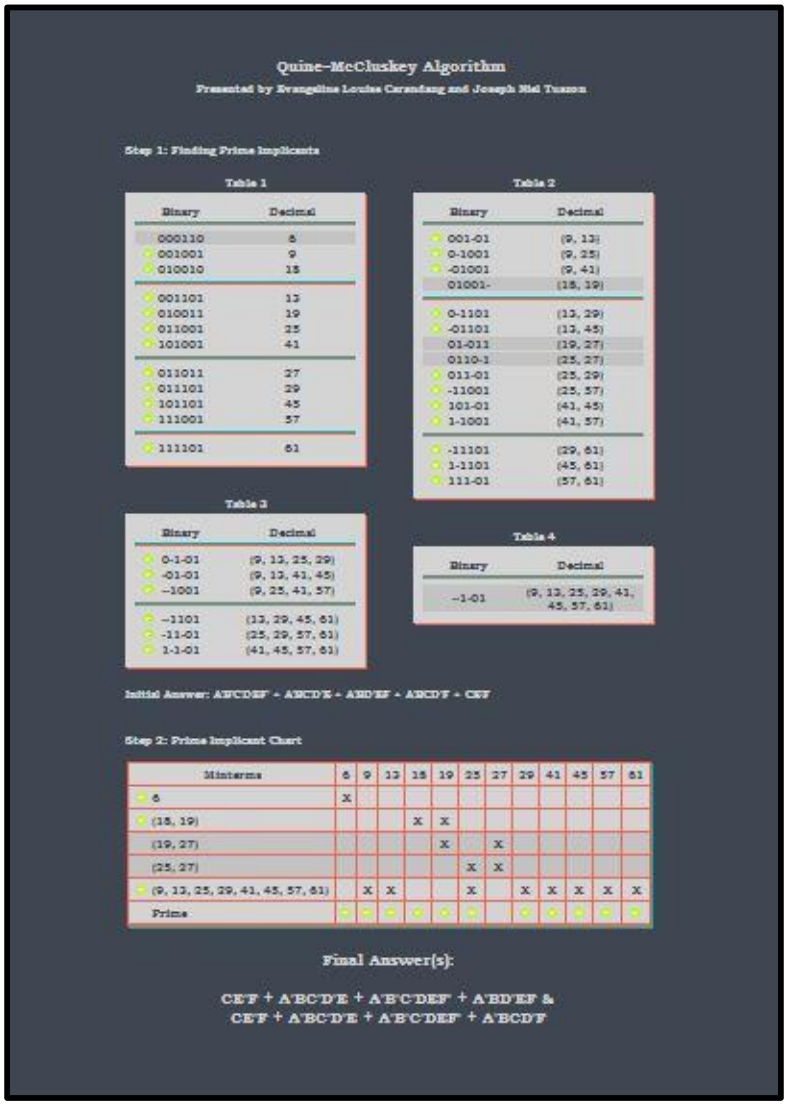
Quine–McCluskey Algorithm
Presented by Evangeline Louise Carandang and Joseph Niel Tuazon
Step 1: Finding Prime Implicants
Table 1
Binary Decimal
000110 6
001001 9
010010 18
001101 13
010011 19
011001 25
101001 41
011011 27
011101 29
101101 45
111001 57
111101 61
Table 2
Binary Decimal
001-01 (9, 13)
0-1001 (9, 25)
-01001 (9, 41)
01001- (18, 19)
0-1101 (13, 29)
-01101 (13, 45)
01-011 (19, 27)
0110-1 (25, 27)
011-01 (25, 29)
-11001 (25, 57)
101-01 (41, 45)
1-1001 (41, 57)
-11101 (29, 61)
1-1101 (45, 61)
111-01 (57, 61)
Table 3
Binary Decimal
0-1-01 (9, 13, 25, 29)
-01-01 (9, 13, 41, 45)
-1001 (9, 25, 41, 57)
-1101 (13, 29, 45, 61)
-11-01 (25, 29, 57, 61)
1-1-01 (41, 45, 57, 61)
Table 4
Binary Decimal
--1-01 (9, 13, 25, 29, 41, 45, 57, 61)
Initial Answer: A'B'C'DEF' + ABCD'E + ABD'EF + ABCD'F + CEF
Step 2: Prime Implicant Chart
Minterms 6 9 13 18 19 25 27 29 41 45 57 61
6 X
(18, 19) X X
(19, 27) X X
(25, 27) X X
(9, 13, 25, 29, 41, 45, 57, 61) X X X X X X X X
Prime
Final Answer(s):
CE'F + A'BC'D'E + A'B'C'DEF' + A'BD'EF &
CE'F + A'BC'D'E + A'B'C'DEF' + A'BCD'F

Figure 2.2

3.0 WEBPAGE INTERFACE

3.1 System Requirements

The webpage can run on any operating system and processor. It does not require any applications to be installed except for a browser (e.g. Google Chrome, Mozilla Firefox, Internet Explorer, etc.) and an internet connection.

3.2 Navigating the Webpage

The webpage was kept simple in both design and function; therefore, it is easy to use. Upon opening the webpage, the only thing you would see is a simple page that has a textbox where the user could type in his/her input (*see Figure 2.1*). The user will then be redirected to the page where the solution or presentation of Quine – McCluskey's algorithm, also known as the Tabulation Method, is shown with the final and simplified form or forms of the Boolean function (*see Figure 2.2*). To exit the simulator, just close the tab or the browser.

3.3 Input Procedures and Expected Output

The user is asked to input his/her numbers in the textbox (*see Figure 3.1*). If the input is not a decimal number (e.g. letters, characters, etc.) and is more than 1023 (since the maximum number of variables that this application uses is only 10: $2^{10} = 1024$), the user is prompted and asked to change and check his/her input (*see Figure 3.2*).

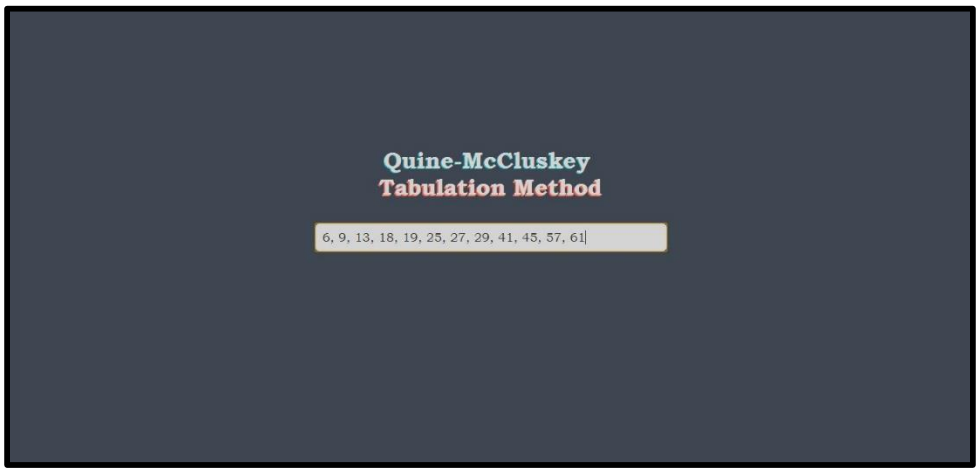

Figure 3.1

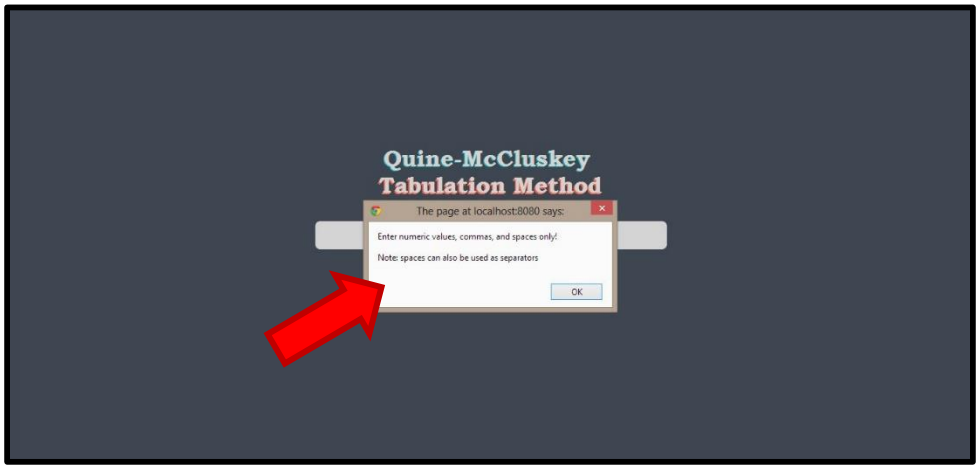

Figure 3.2

Pressing Enter, the user is redirected to the "solutions" page. There, the solutions are presented and organized in tables. The number of tables depends on how many comparisons and checking are needed to find the prime implicants of the function (*see Figure 3.3*). Those who have been used for comparison and found only one difference in its elements are marked or checked. Those terms which are not marked are considered as the prime implicants.

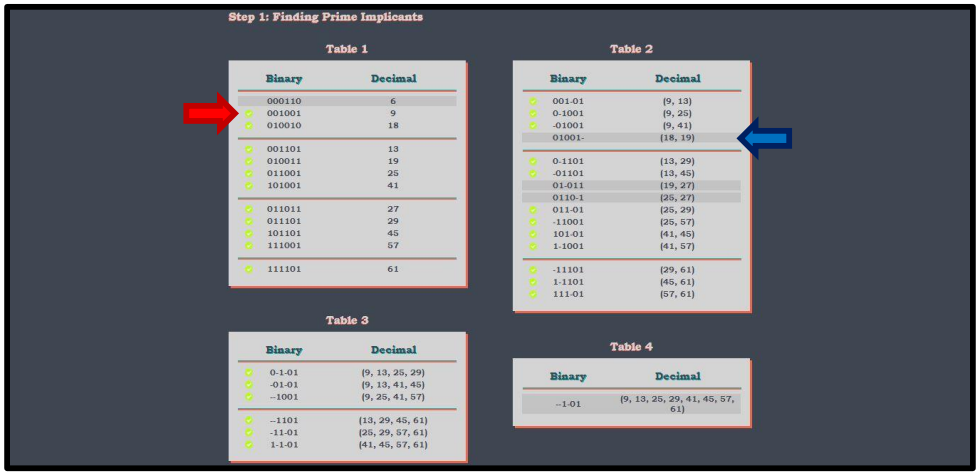

Figure 3.3

An initial answer is shown after Step 1. This includes all the prime implicants from the previous table. However, this may still not be the final answer, so another checking is needed to find the essential prime implicants. In Step 2, the Prime Implicant Chart is shown with the prime implicants in the rows, and the minterms from the user input in the columns. These minterms are called essential prime implicants. A check mark is marked in the in the table next to the essential prime implicant if it is selected. The same goes for the columns whose minterm is contained in the selected prime implicants. The possible final answers are displayed after the table (*see Figure 3.4*).

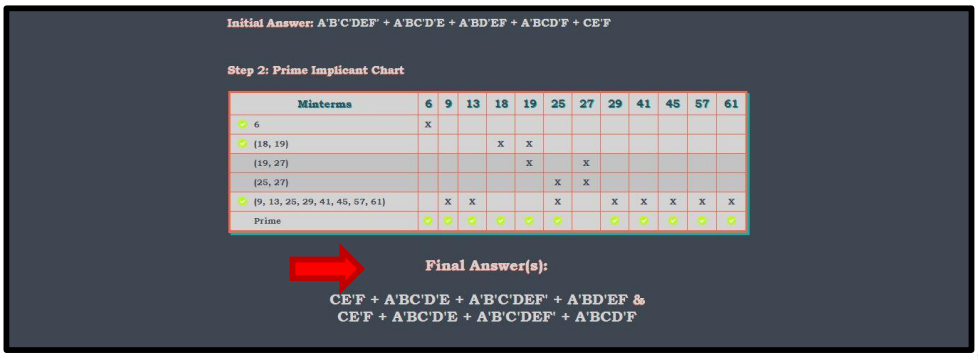

Figure 3.4