

HW1 report

0. Puzzle

The given puzzle is "Number Cross". (1) This puzzle consists of a $M \times N$ grid. M is not greater than 50, and so is N . Each square is labeled with a positive number. The goal of the game is to determine the color of each square as either Black or White. (2) The label of each column is the sum of the numbers in black squares of the column. (3) The label of each row is the sum of the numbers in white squares of the row. The number of a label is greater than or equal to 1, and not greater than 9.

1. Define

Variable $p_{y,x,c}$, ($y = \text{row}$, $x = \text{column}$, $c = \text{color}$)

$c = 1$ is case for black. $c = 0$ is case for white. M is a number of rows. N is a number of columns.

If $p_{y,x,c} = n$, then the square which is in position (y, x) , the color c (0 or 1), and labeled with n (1~9) is *true*.

If $p_{y,x,c} = 0$, then the square which is in position (y, x) , and the color c (0 or 1) is *false*.

For (1), I got input by two-dimensional array, `input[51][52]`. The label of each column is `input[0][1~N]`. The label of each row is `input[1~M][N]`. The actual board is `input[1~M][1~N]`.

2. Logic

Q1) $p_{y,x,c} = 0$ or $p_{y,x,c} = n$, (only two case)

$$\bigwedge_{y=1}^M \bigwedge_{x=1}^N \bigwedge_{c=0}^1 ((p_{y,x,c} = 0) \vee (p_{y,x,c} = n))$$

Q2) If there are two variables $p_{a,b,1}$, $p_{a,b,0}$, in same position, then the one variable should have 0 and the other variable should have $n = \text{input}[a][b]$. That is, $p_{y,x,0} + p_{y,x,1} = \text{input}[y][x]$.

$$\bigwedge_{y=1}^M \bigwedge_{x=1}^N \left(\bigvee_{c=0}^1 p_{y,x,c} \right)$$

Q3) To satisfy (2)

$$\bigwedge_{x=1}^N \left(\bigvee_{y=1}^M p_{y,x,1} \right)$$

Q4) To satisfy (3)

$$\bigwedge_{y=1}^M \left(\bigvee_{x=1}^N p_{y,x,0} \right)$$

$$Q1 \wedge Q2 \wedge Q3 \wedge Q4$$

3. Test

First, I tested receiving input. I was confused about how to distinguish between space and number from the text. Then, I found 'strtok' function which return the address of Separation point. Second, I tested my code in my computer terminal. There were no problems but, when I tried it in the peace server, there were a lot of problems. The cause was in 'input file'. When I copy a file to peace server, in my computer, it automatically adds blank line right after the actual line. So, I remove that blank line in input file. Finally, I tried to input another file that is 18*18. There was an error too. It was because of the writing function. I fixed up the index of receiving string like `y = s[2]`, but if input file board is larger than 9*9 than there will be change of index, so I use `scanf` function.

4. Discussion

When I tried 18*18 input, there was a short waiting time. I think that is because of the lost of for loop. I used for loop tripled, doubled, and single. I think tripled for loop is too heavy to run big size input. Also, it was difficult to decide type of variables. I also thought about making variables that have color value (1 or 0) but, in that case, it will be difficult to call variables, I think. I am curious how other students make the logic. I didn't take the OSS class, so I have no common sense of the Linux. Through this homework, I learned about Linux a little bit.