Code / Project : CME1251 / 2
Year / Semester : 2020-2021 Fall Semester
Duration : 4.5 weeks

Project: Binary Sudoku

The aim of the project is to develop a single-player
Sudoku-like game called Binary Sudoku.

General Information

The game is played on a 9*9 board. The board will be filled with 10 different game elements by the player. The aim of the game is to fill a row, a column or a 3*3 block with the game elements and reaching the highest score.

Board Elements

There are ten game elements. Each has a 1/10 probability of occurrence. The game elements are given below. (Each X represents 0 or 1, randomly generated)

Number of squares in game piece	Pieces					
	1	2	3	4	5	6
1	X					
2	XX	X X				
3	XXX	X X X	XX X	XX X	X XX	X XX
4	XX XX					

Game Playing Rules

- The game starts with a 9*9 empty board.
- A new piece is generated randomly and displayed on the right of the board.
- The user can place the game element in an empty part of the board without overlaying. Game elements cannot be rotated. Placement operation does not have a time limit.
- If the located element:
  - fills a full row(s) (and/or)
  - fills a column(s) completely (and/or)
  - fully fills a 3*3 block(s),
  the fully filled row(s)/column(s)/block(s) are treated as a binary number. The decimal equivalent of binary numbers are calculated.
- If the currently placed game element fills more than one row(s)/column(s)/block(s), the decimal equivalent of binary numbers are added and this sum is multiplied by the number completed parts (row(s)/column(s)/block(s)). This result is added to the score.
- Completed parts are removed from the board.

Game Ending

If there is no suitable space left to place the new piece on the board, a notice appears saying "game is over".

Sample Game Screens

```
    1 2 3 4 5 6 7 8 9        New Piece           Score:    134
   +-----+-----+-----+
 1 |0 . .|. . .|. 1 .|       1 0                 Piece:     15
   |     |     |     |
 2 |. 1 0|. . .|. 1 .|       1
   |     |     |     |
 3 |. . .|. . .|. 1 .|
   +-----+-----+-----+
 4 |0 0 .|. 1 0|0 0 1|
   |     |     |     |
 5 |1 0 .|. . .|. . .|
   |     |     |     |
 6 |0 0 0|. . .|. . .|
   +-----+-----+-----+
 7 |. . .|. . .|. 1 .|
   |     |     |     |
 8 |. 0 .|0 . .|. 1 .|
   |     |     |     |
 9 |. . .|. 1 0|. 0 .|
   +-----+-----+-----+


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    1 2 3 4 5 6 7 8 9        New Piece           Score:    504
   +-----+-----+-----+
 1 |0 . .|. . .|. 1 .|       1                   Piece:     16
   |     |     |     |
 2 |. 1 0|. . .|. 1 .|       0
   |     |     |     |
 3 |. . .|. . .|. 1 .|       1
   +-----+-----+-----+
 4 |0 0 1|0 1 0|0 0 1|
   |     |     |     |
 5 |1 0 1|. . .|. . .|       Calculations:
   |     |     |     |       (001010001)2 = (81)10
 6 |0 0 0|. . .|. . .|       (001101000)2 = (104)10
   +-----+-----+-----+       104 + 81 = 185
 7 |. . .|. . .|. 1 .|       185 * 2 = 370
   |     |     |     |
 8 |. 0 .|0 . .|. 1 .|
   |     |     |     |
 9 |. . .|. 1 0|. 0 .|
   +-----+-----+-----+


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    1 2 3 4 5 6 7 8 9        New Piece           Score:    998
   +-----+-----+-----+
 1 |0 . .|. . .|. 1 .|       0 1                 Piece:     17
   |     |     |     |
 2 |. 1 0|. . .|. 1 .|       0 0
   |     |     |     |
 3 |. . .|. . .|. 1 .|
   +-----+-----+-----+
 4 |. . .|. . .|. 1 .|
   |     |     |     |
 5 |. . .|. . .|. 0 .|
   |     |     |     |       Calculations:
 6 |. . .|. . .|. 1 .|       (111101110)2 = (494)10
   +-----+-----+-----+
 7 |. . .|. . .|. 1 .|
   |     |     |     |
 8 |. 0 .|0 . .|. 1 .|
   |     |     |     |
 9 |. . .|. 1 0|. 0 .|
   +-----+-----+-----+
```

Suggested Weekly Program

1. Discussing and designing solution alternatives. Creating the necessary variables, structures. Screen.
2. In a one-dimensional array, converting the binary number into the decimal number.
3. Generating random game pieces. Placing pieces on the board.
4. Determining completely filled row(s)/column(s)/block(s). Calculating score. Determining end of the game. Remaining parts of the game. Testing/Debugging.

First Evaluation: 18.12.2020	**Final Evaluation:** 28.12.2020 (powerpoint + poster)
Report: 18.12.2020	**Report:** 28.12.2020