

## Sudoku Game Project

Contributors:

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#### Introduction

Sudoku is a mathematical game that originated in Switzerland in the 18th century. It is a logic game that uses paper and pencil to perform calculations. Players need to reason out the numbers of all the remaining spaces based on the known numbers on a 9×9 board, and satisfy that the numbers in each row, column, and thick-line palace (3\*3) contain 1-9 and are not repeated.

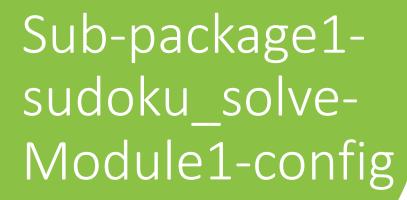
#### Process Flow :

- Choose Level [Easy/Medium/Difficult]
- Generate Sudoku Layout
- Game process (i.e. identify same number user input)
- Input Success Tracking
- Finish Game



#### Real World Application of Sudoku Game:

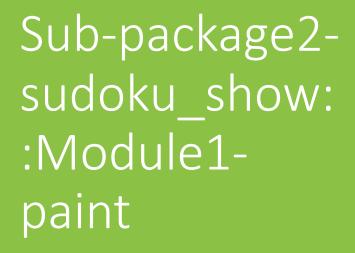
- 1)<u>Artificial Intelligence:</u>
- Sudoku algorithms are actively used in Artificial Intelligence to train bots for various tasks. These grids and the logic behind them helps developers train bots to understand human behavior and adapt to it.
- 2) Mathematics:
- Sudoku grids are sometimes translated to coloring grids and this links them to solve crucial mathematical complications.
- 3)Spyware :
- Sudoku grids are sometimes used to hide secret messages in hiding techniques such as Steganography, a key is hidden behind the puzzle to find the answer.



- Module1-config
- A configuration file where some parameters can be changed by the developer. These parameters include: screen height, screen width, block size, difficulty level, etc.
- Function1 Default Main window parameters (screen height, width for the game window)
- Function2 Default Selected window parameters(screen height/width for difficulty window)
- Function3 level and block parameters. It defines the size of blocks within the matrix.

### Sub-package1sudoku\_solve:: Module2-Game\_sudoku

- User inputs settings and determining whether user input matches the rules of the game
- Function1 Overriding default main and select window settings by developer
- Function2 reading user actions for main and select window
- Function3 Determine if the numbers filled in match the game requirements
- Function4 Determine if the end game is successful
- \*\* This module's Game\_sudoku class is a child of Paint Class from sub\_packagesudoku\_show



- Module1-paint
- Mainly brush functions to paint the interface of the window for background, size, fonts and color
- Function1 formatting the selected window (difficulty level)
- Function2 formatting the main window

>Paint module will be parent of Game\_sudoku module.

# Sub-package2 – sudoku\_show:: Module2-sudoku generate

- Mainly generates random Sudoku puzzles that conform to the rules of the game, and guarantees unique solutions
- Function1 build matrix based on difficulty level input by the user.
  - > Easy → 30 blanks
  - > Medium > 40 blanks
  - > Difficult  $\rightarrow$  50 blanks
- Function2 LasVegas algorithm to build sudoku to randomly generated numbers in matrix.
- Function3 solve sudoku using depth first search algorithm
- Function4 Determine if there is only one answer by checking for other values between 1 to 10.