**Sudoku game Programming project**

**Introduction**

Sudoku is a logic-based, combinatorial number-placement puzzle. In classic Sudoku, the objective is to fill a 9 × 9 grid with digits so that each column, each row, and each of the nine 3 × 3 subgrids that compose the grid (also called "boxes", "blocks", or "regions") contain all of the digits from 1 to 9. The puzzle setter provides a partially completed grid, which for a well-posed puzzle has a single solution.

French newspapers featured variations of the Sudoku puzzles in the 19th century, and the puzzle has appeared since 1979 in puzzle books under the name Number Place. However, the modern Sudoku only began to gain widespread popularity in 1986 when it was published by the Japanese puzzle company Nikoli under the name Sudoku, meaning "single number". It first appeared in a U.S. newspaper, and then The Times (London)

**Technical Details**

The project was developed using Python 3 and the Pygame library. Pygame is a set of Python modules designed for game development and other multimedia applications. It provides functionality for creating 2D graphics, handling input events, and playing audio and video. The main component of the game is Sudoku grid, main menu and menu for choosing difficulty of Sudoku.

**Libraries used**

Pygame – for implementing objects of the game

Dokusan – library for creating a Sudoku grid

Numpy

Copy – library for creating a copy of the Sudoku grid

**Issues**

One of the main issues in this project is that after quit button is pressed, i.e. the window is closed, there occurs an error “display Surface quit”, which doesn’t affect on the game while it’s running, but I couldn’t find an issue of this error and how to fix this

**How to play this game**

Install Pygame, Dokusan, numpy, copy libraries and run the program

**User interface**

Interface is simple. At the beginning you can see a menu with two buttons “START” and “QUIT”. After pressing “START” button, you can see the list of levels “EASY”, “MEDIUM”, “HARD”. After choosing the difficulty, there occurs a Sudoku grid in front of you. You have maximum of three mistakes. If you exceed this value, then you lost the game, but you can restart it or quit. If you succeed, then you can also restart or quit the game. If your input is wrong then the respective error occurs. If your input is correct, then the cell is colored in blue.

**Test cases**

1.If you try to write the number without choosing a cell, then nothing happens

2.If you try to write the number in the already filled cell, then nothing will happen

3.If you try to write the invalid character in the cell, then occurs a warning “INVALID DATA”