

**UNIVERSITY OF SCIENCE  
HO CHI MINH NATIONAL UNIVERSITY  
FACULTY OF INFORMATION TECHNOLOGY**



# **FINAL ASSIGNMENT REPORT**

## **SUBJECT**

**Introduction to Computer Science  
(CS161)**

**LECTURER:** Professor Dinh Ba Tien

## **GROUP 16 MEMBER**

Pham Van Tan Sang – 21125063

Dang Hoang Nhat Hung – 21125041





# TABLE OF CONTENT

<b>I. Features .....</b>	<b>1</b>
<b>II. Links .....</b>	<b>2</b>
<b>III. Tasklist .....</b>	<b>2</b>
<b>IV. Screenshots .....</b>	<b>3</b>
1. Welcome scene.....	3
2. Instruction scene.....	3
3. Leaderboard scene .....	4
4. Game mode scene.....	5
5. In-game display.....	6
6. Some warning messages shown when playing .....	7

# CS161 FINAL ASSIGNMENT REPORT

## I. Features

- Adjust the game's resolution based on the current level to improve user experience (in Beginner level, the size of the cells are bigger)
  - Using the keyboard to play and navigate the menu.
  - Display a real-time timer when playing
  - Display the rank of the user if they win a position on the leaderboard
  - Save the current playing game in midgame: saving both the board and the timer
  - Continue saved game (timer starts from saved timestamp too)
  - Replay the current game while playing (by pressing "R")
  - Displaying the number of flags left
  - You can flag a cell twice to mark a cell as a "questioning" cell
  - Reveal all adjacent cells when finish flagging the mines (by pressing "K")
  - Save player's rank in leaderboard
  - ASCII art for UI
  - Escape to menu while playing
  - Message box
  - Guarantee that the first cell opened is not a bomb
- 

### ❖ There are 3 game levels:

- Beginner: 9x9 cells, 10 mines.
- Intermediate: 16x16 cells, 40 mines.
- Expert: 30x16 cells, 99 mines.

### ❖ How to Play

- **W**, **A**, **S**, **D**: Move cursor.
- **J**, **Enter**: Select options | Reveal current cell.
- **K**: Reveal all adjacent cells of the current cell.
- **L**: Flag current cell.
- **O**: Save current board.
- **R**: Restart current game.
- **Esc**: Exit current game | Go back to menu.

## II. Links

- [Github repository](#)
- [Task planner on Notion](#)
- [Game flowchart using draw.io](#)

## III. Tasklist

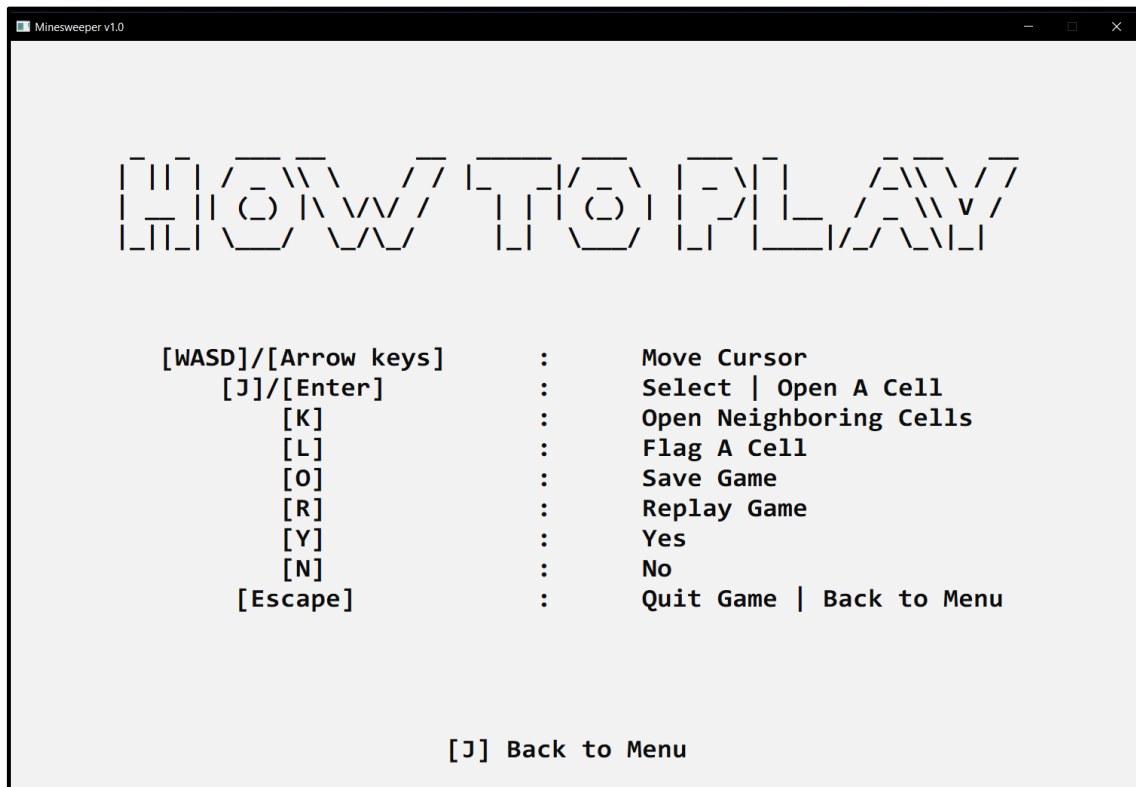
Week	Tấn Sang (21125063)	Nhật Hưng (21125041)
15/11 ↓ 21/11	<ul style="list-style-type: none"> <li>Plan out the project</li> <li>Set up the developing environment (<a href="#">Task planner on Notion</a>)</li> <li>Set up <a href="#">Github repository</a></li> <li>Research about “windows.h” for manipulating the console</li> <li>Create our own “cmanip.h” library used to manipulate the console</li> <li>Set up game scenes structure + files architect for the game</li> <li>Finish the welcome scene</li> </ul>	<ul style="list-style-type: none"> <li>Research about the game rules</li> <li>Learn how to use Git</li> <li>Use draw.io to plan out the functions of the project (<a href="#">Game flowchart using draw.io</a>)</li> <li>Start implementing game logic</li> </ul>
22/11 ↓ 28/11	<ul style="list-style-type: none"> <li>Refactor the whole game after merging with Hung’s code</li> <li>Add keyboard maneuvering mechanics into Hung’s “game-logic”</li> <li>Design the UI for the game board</li> <li>Review + merge my code with Hung’s code</li> <li>Discuss the overall shape of the game</li> </ul>	<ul style="list-style-type: none"> <li>Finish implementing game logic</li> <li>Set up saving and loading game data</li> <li>Design + code leaderboard scene</li> <li>Design + code level-choosing scene</li> <li>Discuss the overall shape of the game</li> </ul>
29/11 ↓ 5/12	<ul style="list-style-type: none"> <li>Add Timer</li> <li>Add Replay midgame functionality</li> <li>Add Endgame message box</li> <li>Optimize the render functions</li> <li>Fixing bugs from the “windows.h” library</li> </ul>	<ul style="list-style-type: none"> <li>Add reset leaderboard option</li> <li>Return rank of a player when they win</li> <li>Update several UI elements</li> <li>Design + code Instruction scene</li> </ul>
6/12 ↓ 12/12	<ul style="list-style-type: none"> <li>Test the game</li> <li>Edit the README file on Github repo</li> <li>Look through the whole project and make a report about the project</li> </ul>	<ul style="list-style-type: none"> <li>Test the game</li> <li>Edit the README file on Github repo</li> <li>Look through the whole project and make a report about the project</li> </ul>

## IV. Screenshots

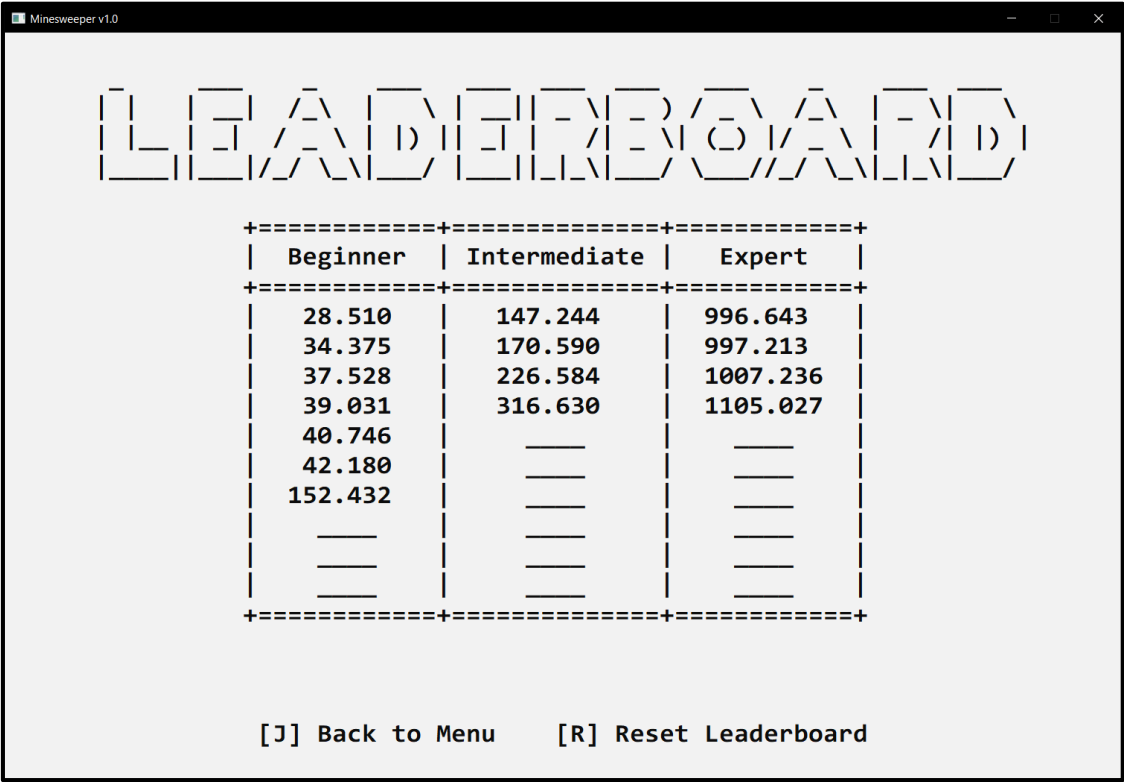
### 1. Welcome scene



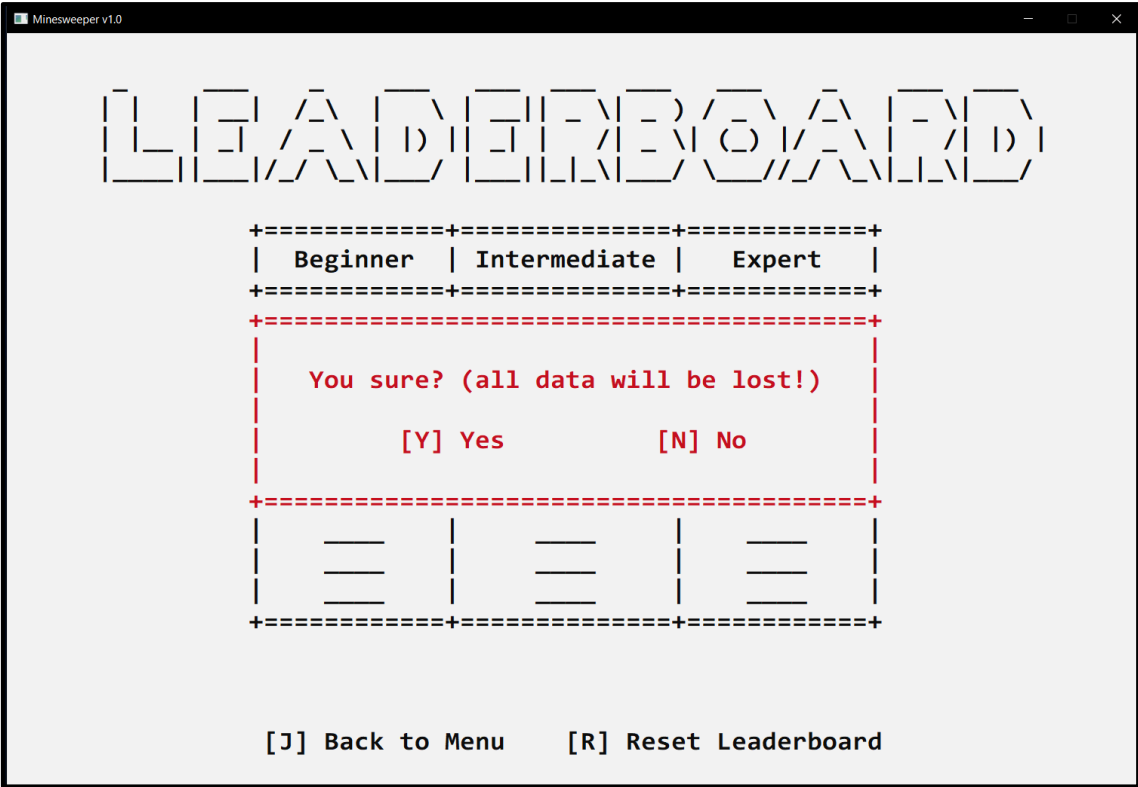
### 2. Instruction scene



### 3. Leaderboard scene

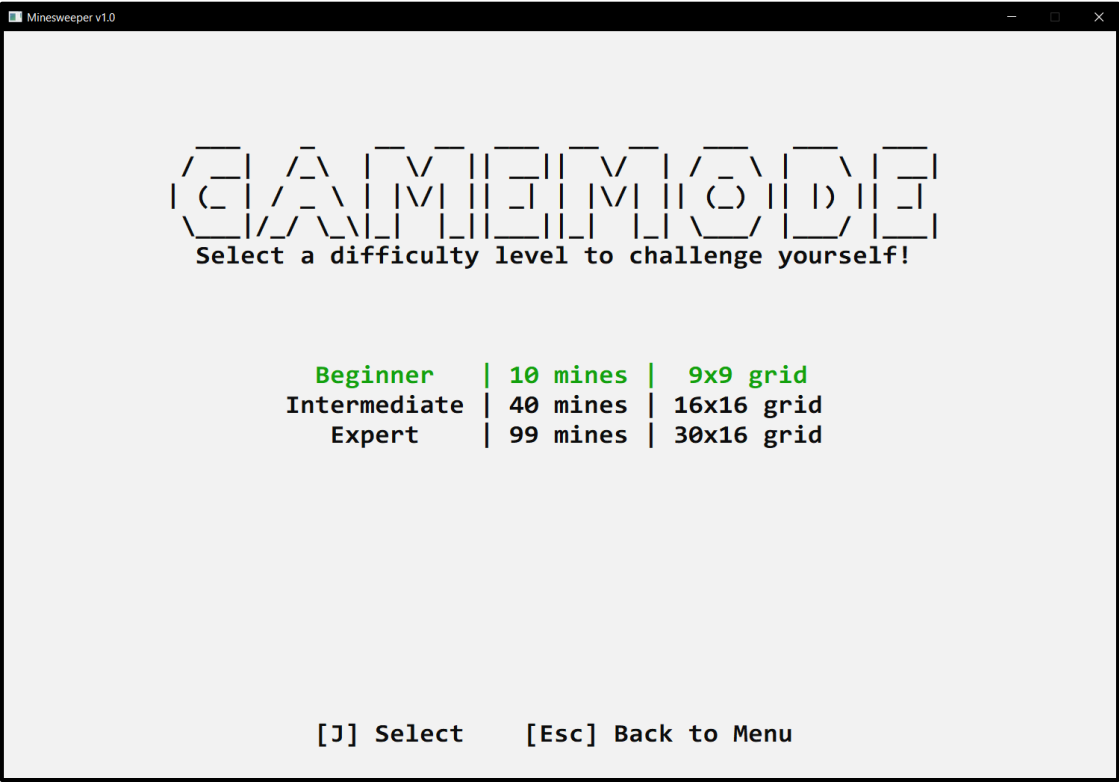


Leaderboard scene

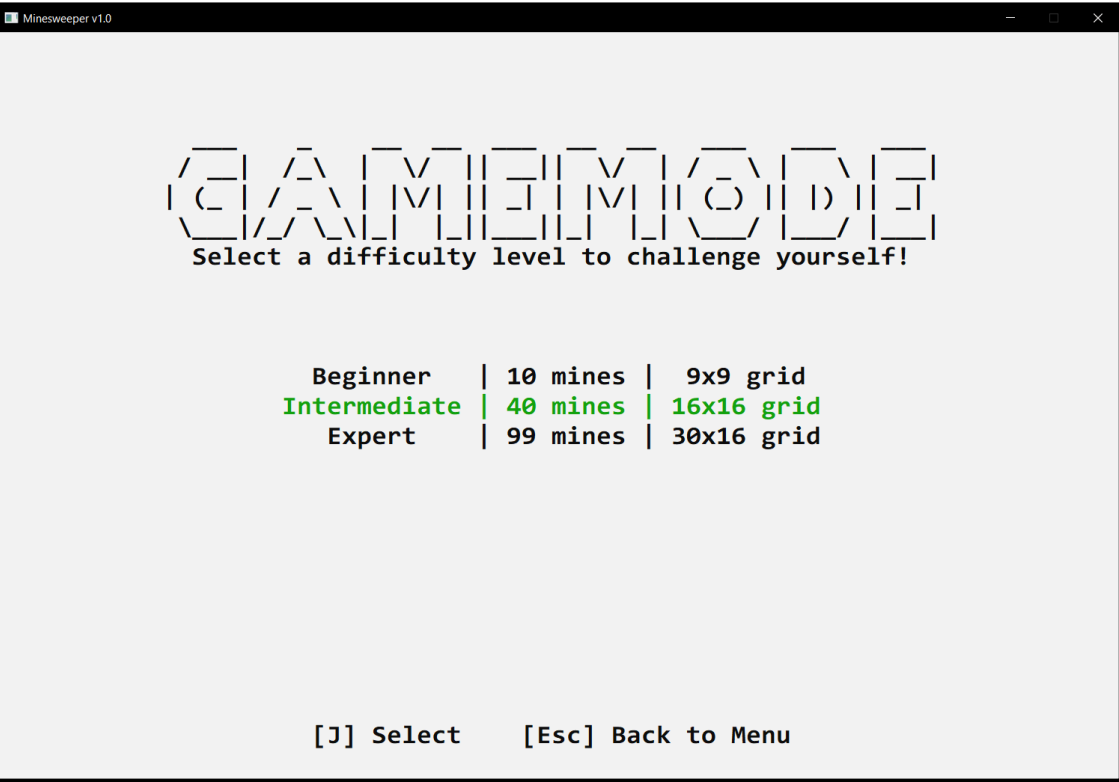


Warning before resetting leaderboard

#### 4. Game mode scene



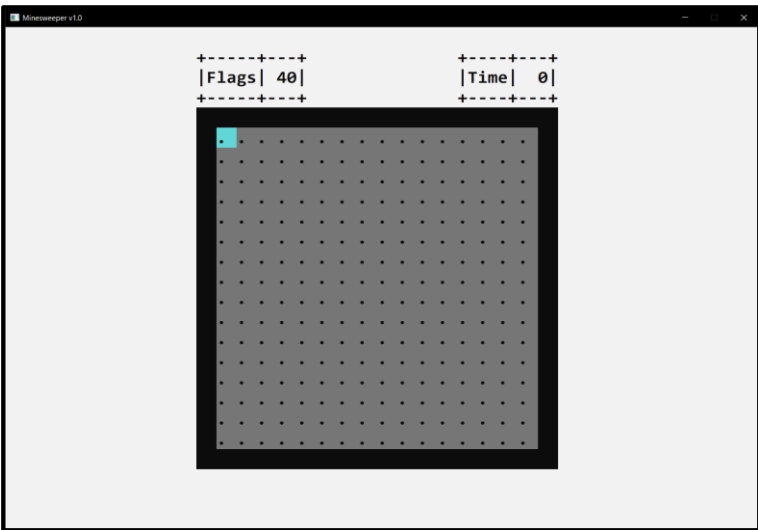
Choosing game mode scene



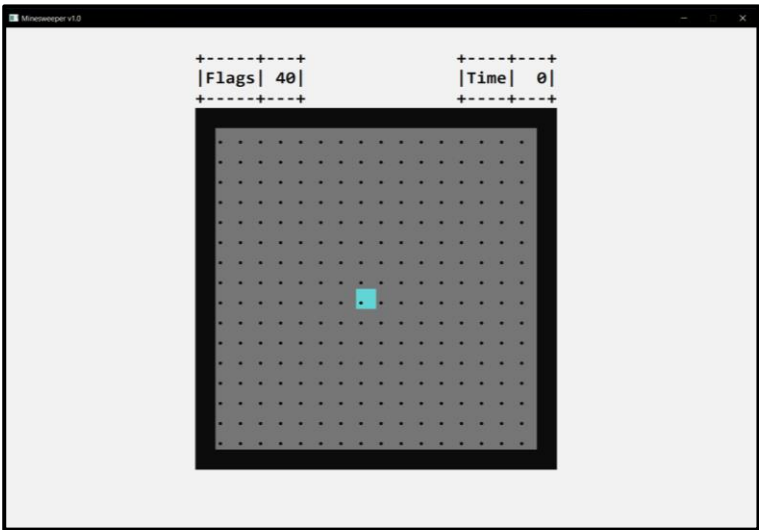
The intermediate game mode is selected



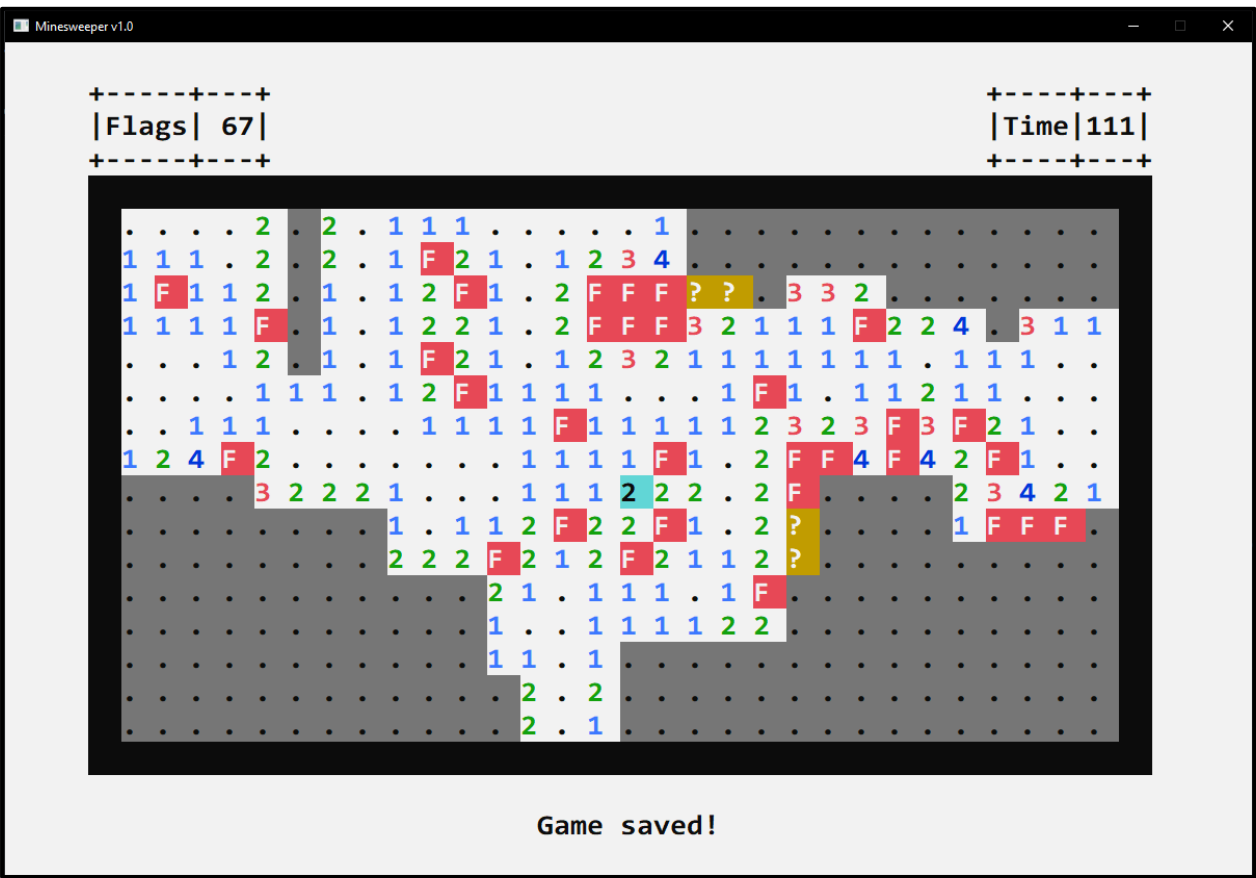
5. In-game display



Main game display (intermediate game mode)

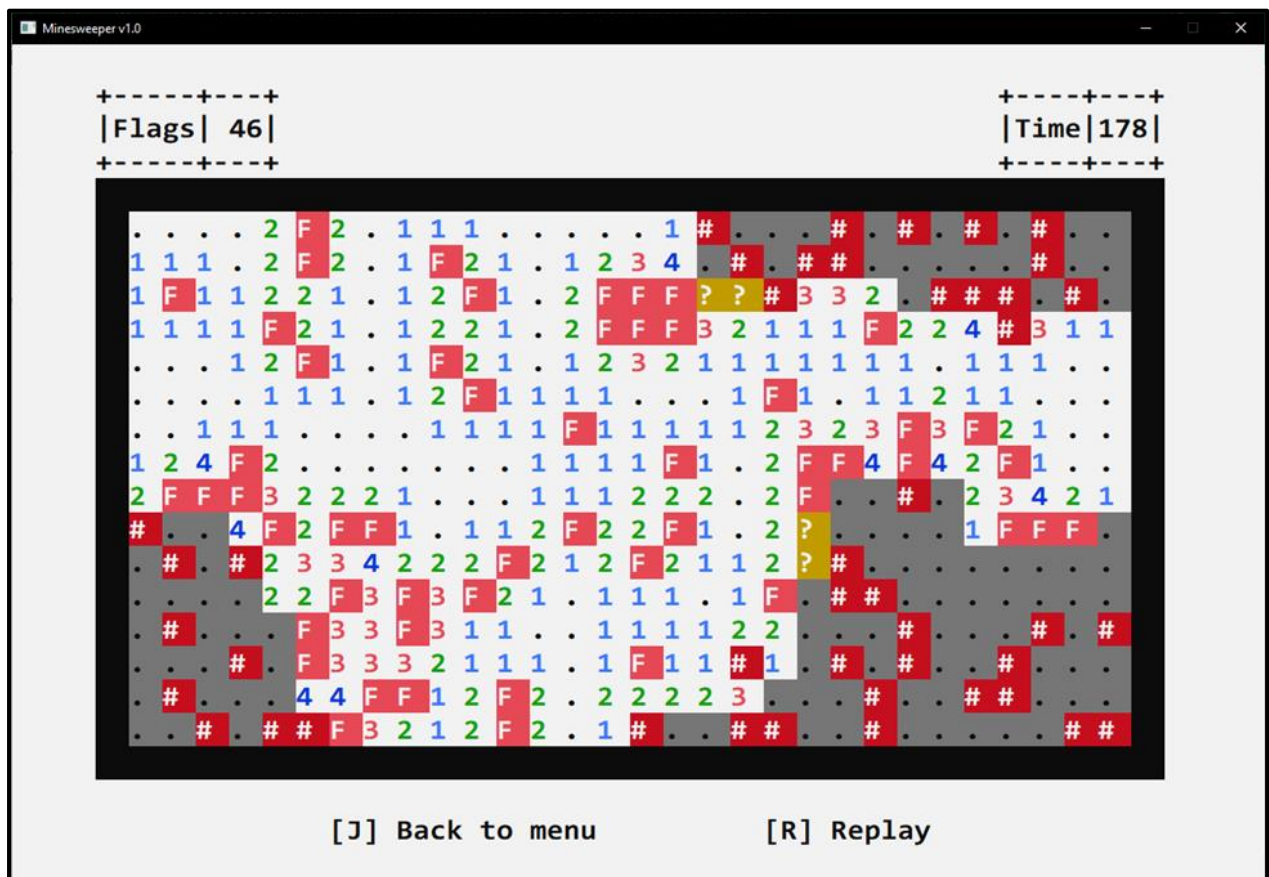


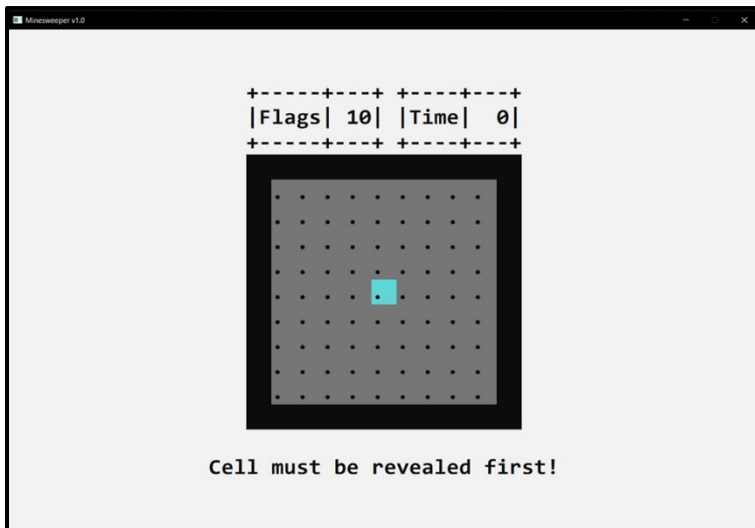
You can move the cursor around



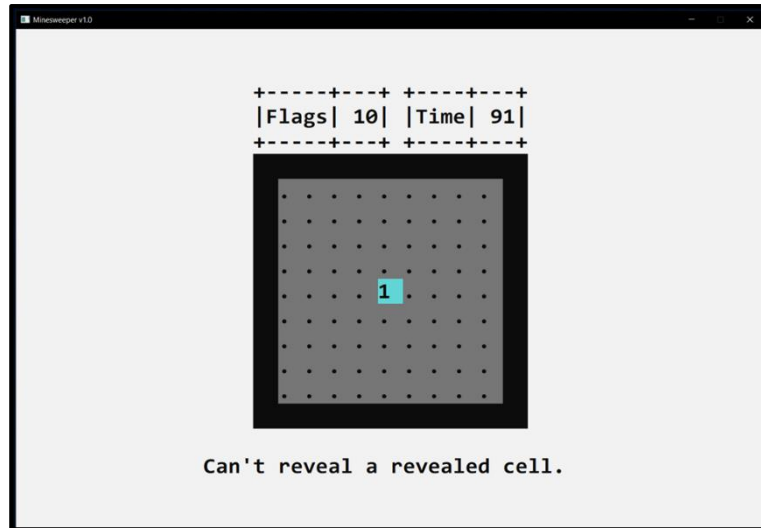
Cells with 4 states: Opened, Flagging, Questioning and Unknown

## 6. Some warning messages shown when playing

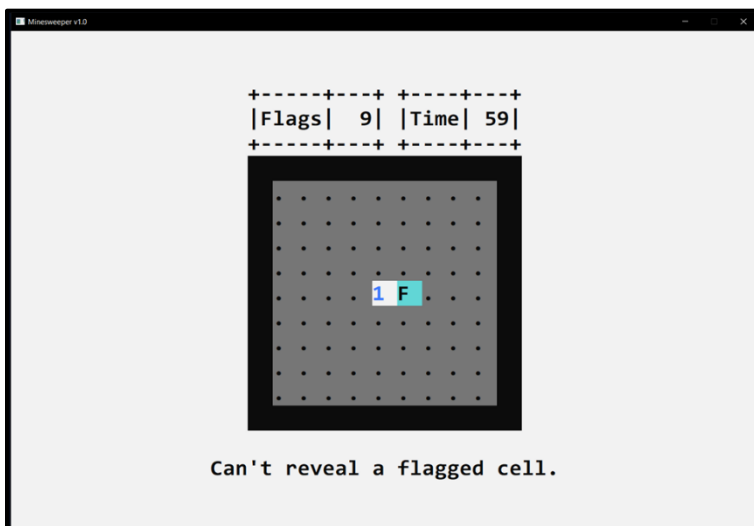




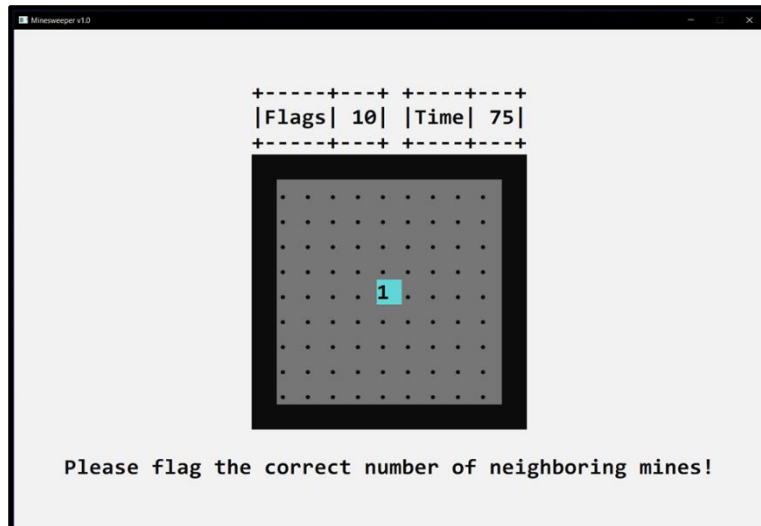
Flag a unopened cell



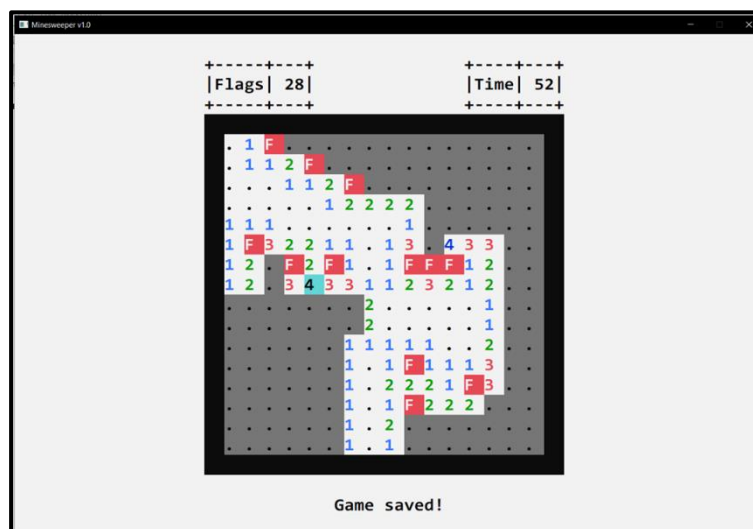
Reveal a revealed cell



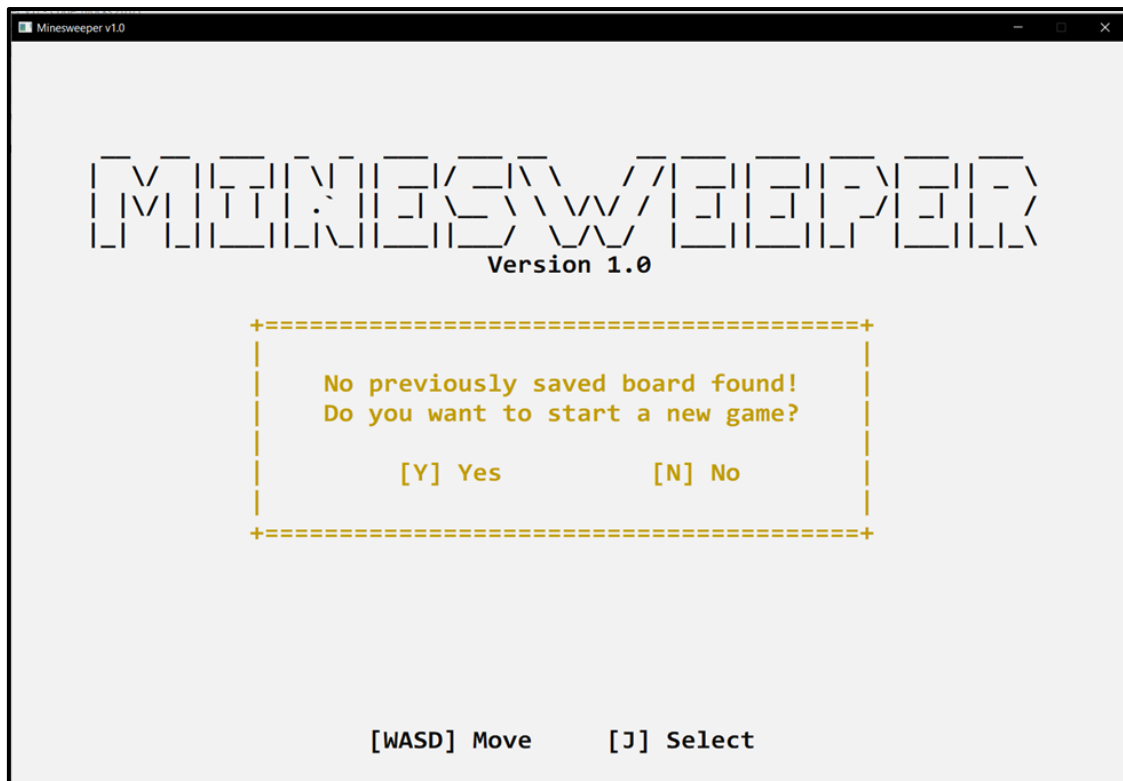
Open a flagged cell



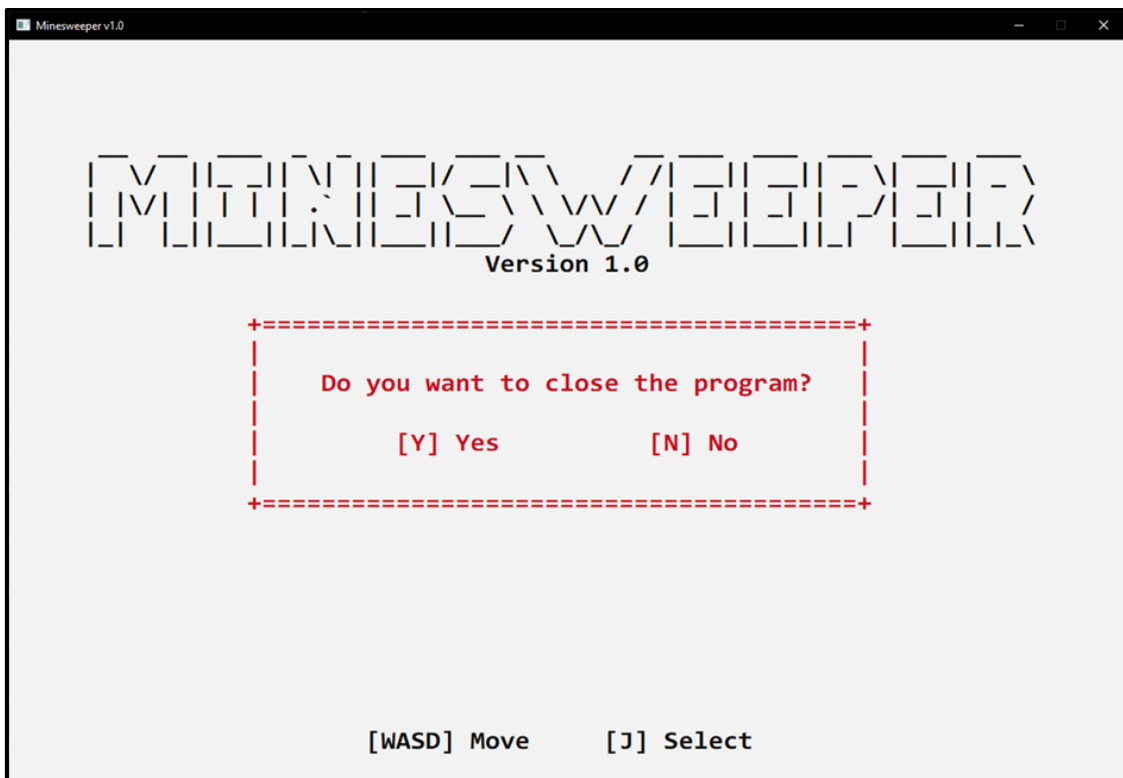
Open the neighboring cells without flagging the correct number of neighboring mines



Successfully save game message



Warning when unsuccessfully find previous game save



Warning when closing the game