

**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

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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

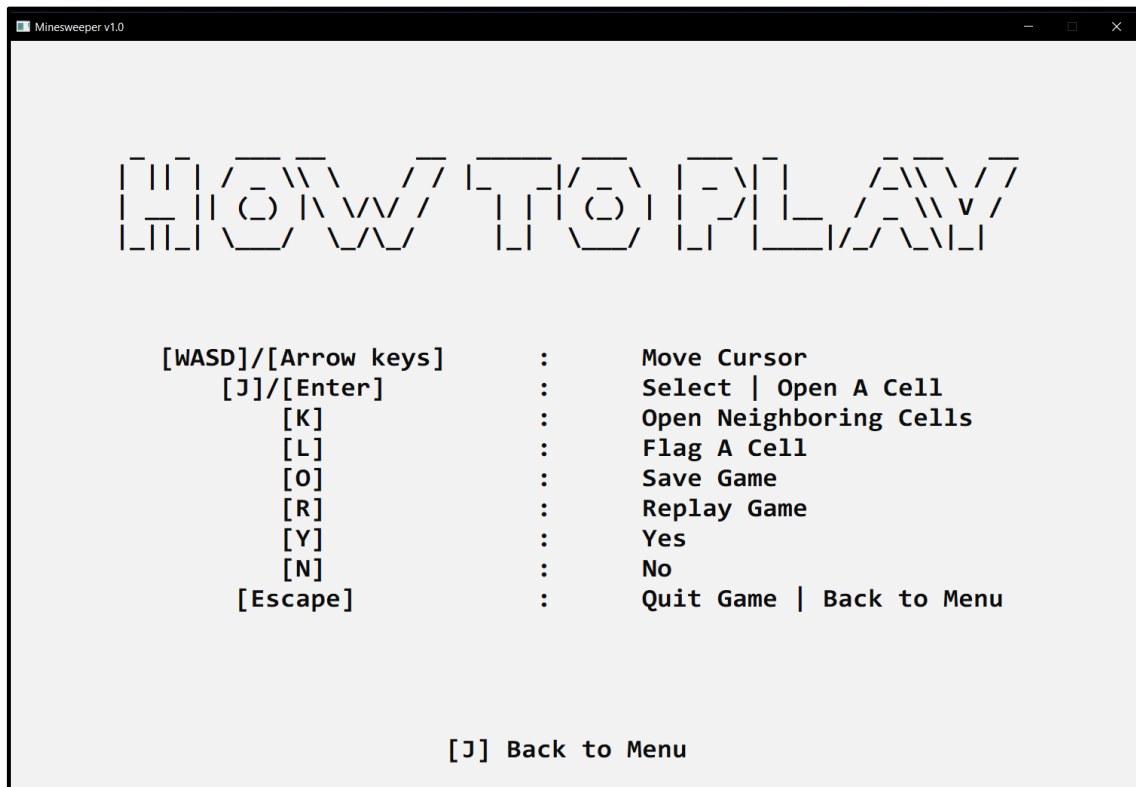
Week	Tấn Sang (21125063)	Nhật Hưng (21125041)
15/11 ↓ 21/11	<ul style="list-style-type: none"> Plan out the project Set up the developing environment (Task planner on Notion) Set up Github repository Research about “windows.h” for manipulating the console Create our own “cmanip.h” library used to manipulate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

IV. Screenshots

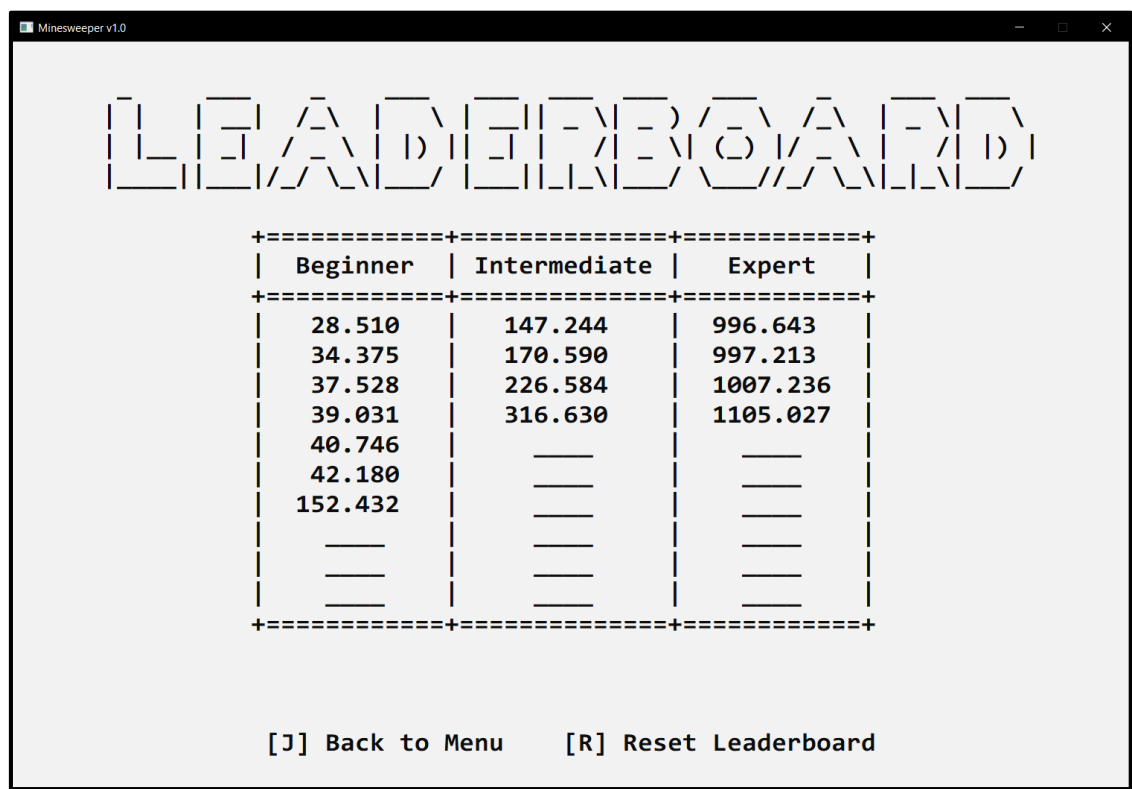
1. Welcome scene



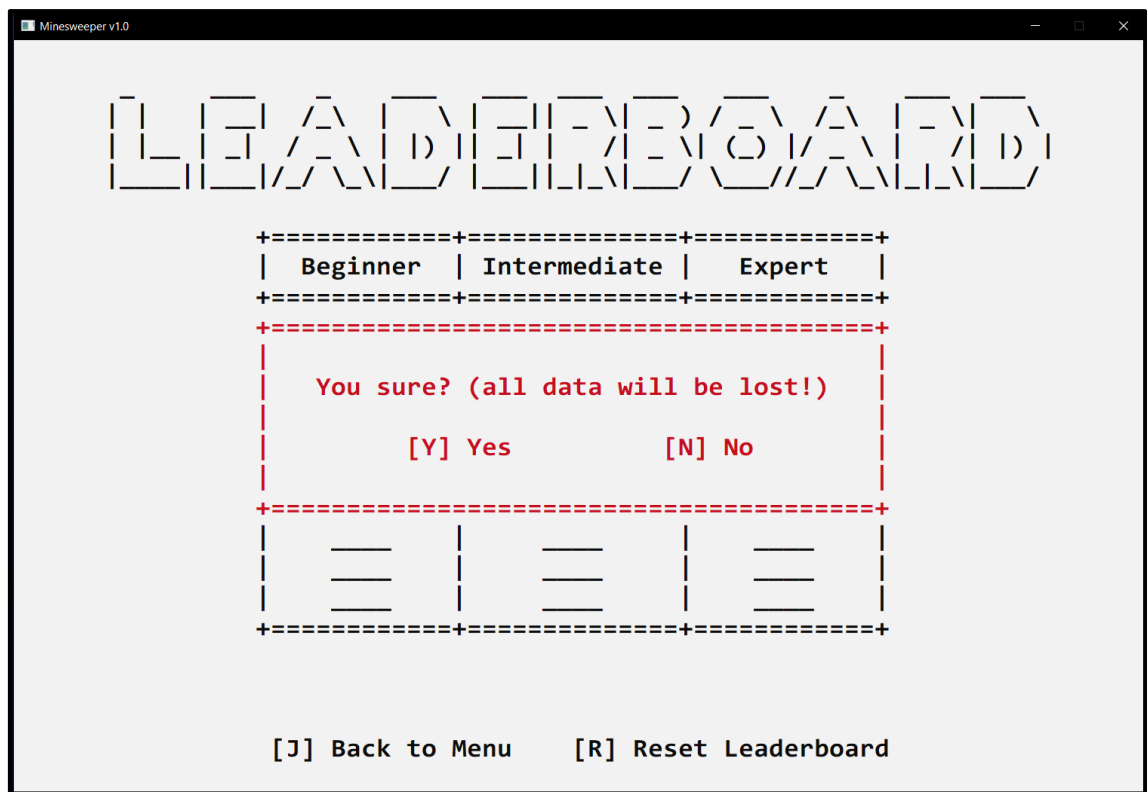
2. Instruction scene



3. Leaderboard scene

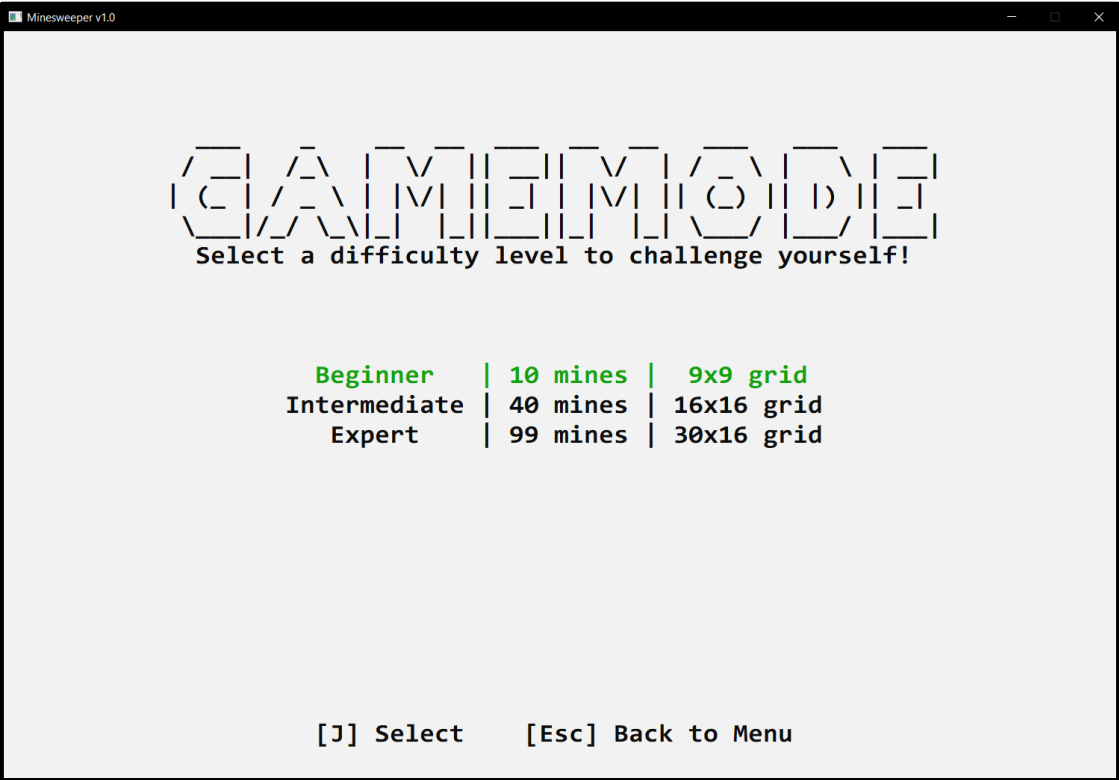


Leaderboard scene

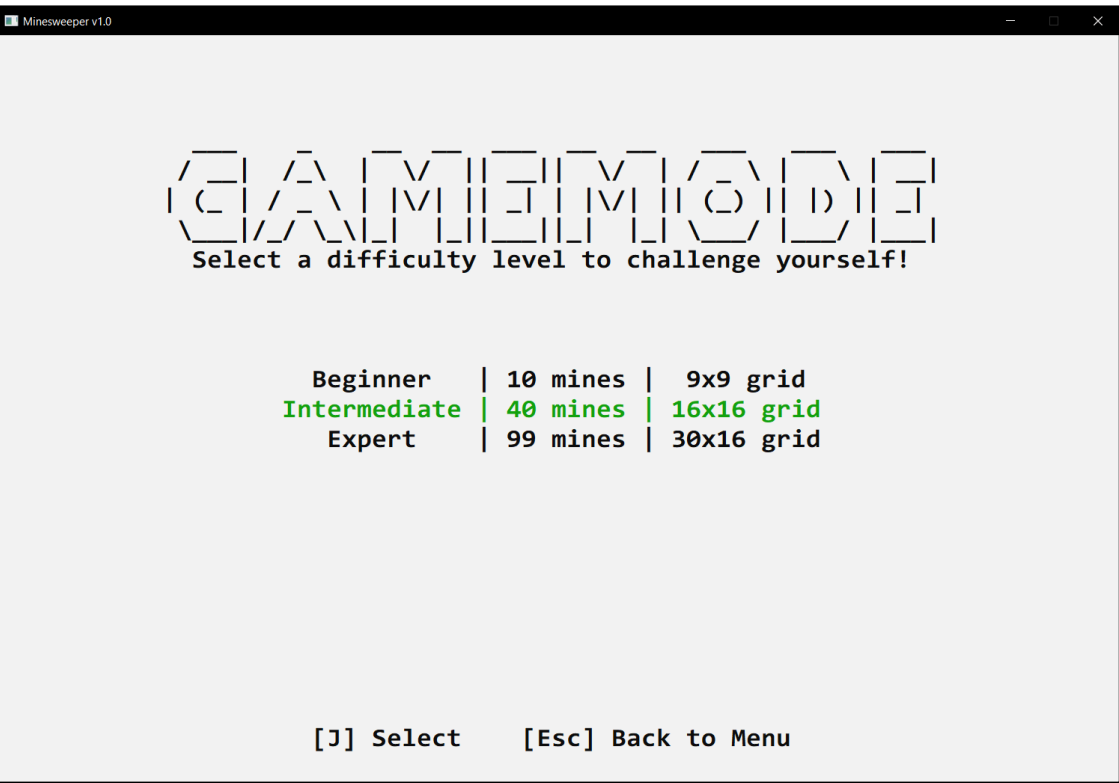


Warning before resetting leaderboard

4. Game mode scene

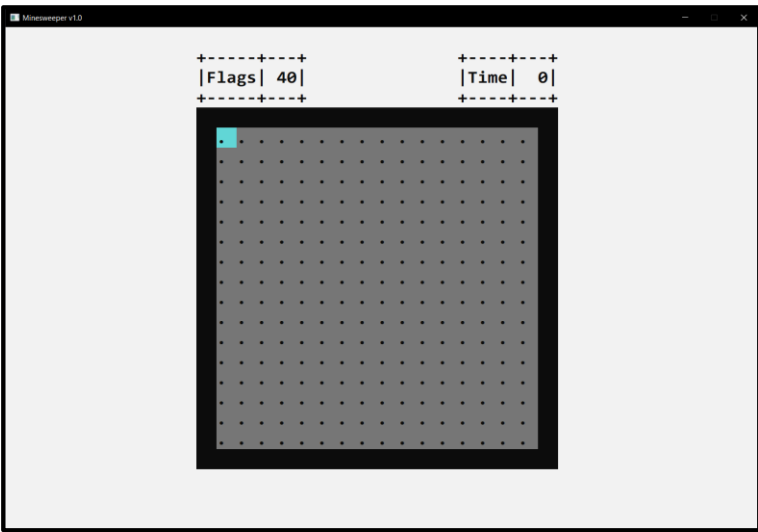


Choosing game mode scene

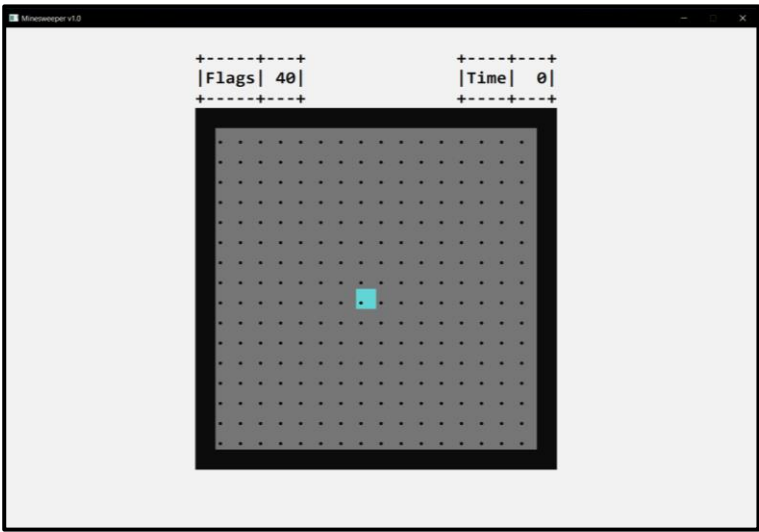


The intermediate game mode is selected

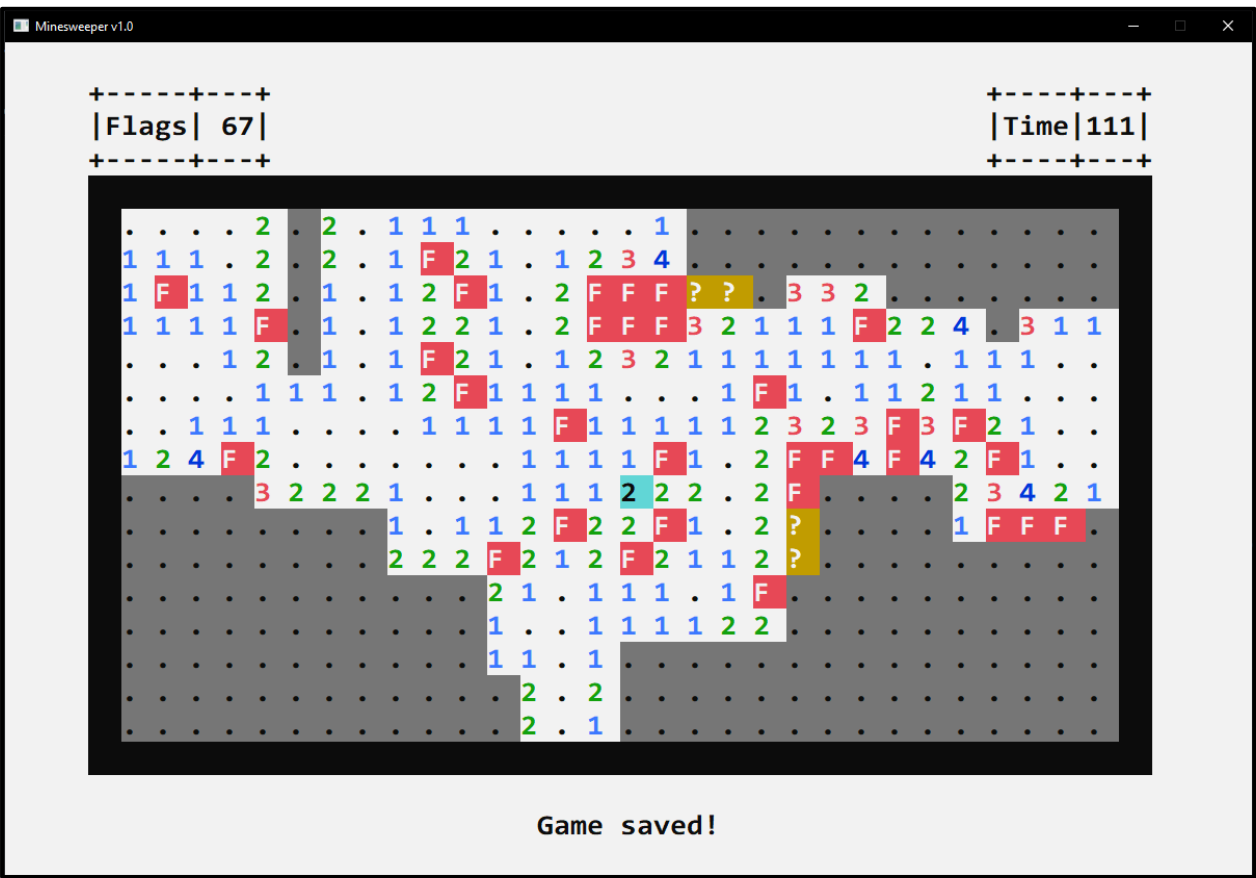
5. In-game display



Main game display (intermediate game mode)

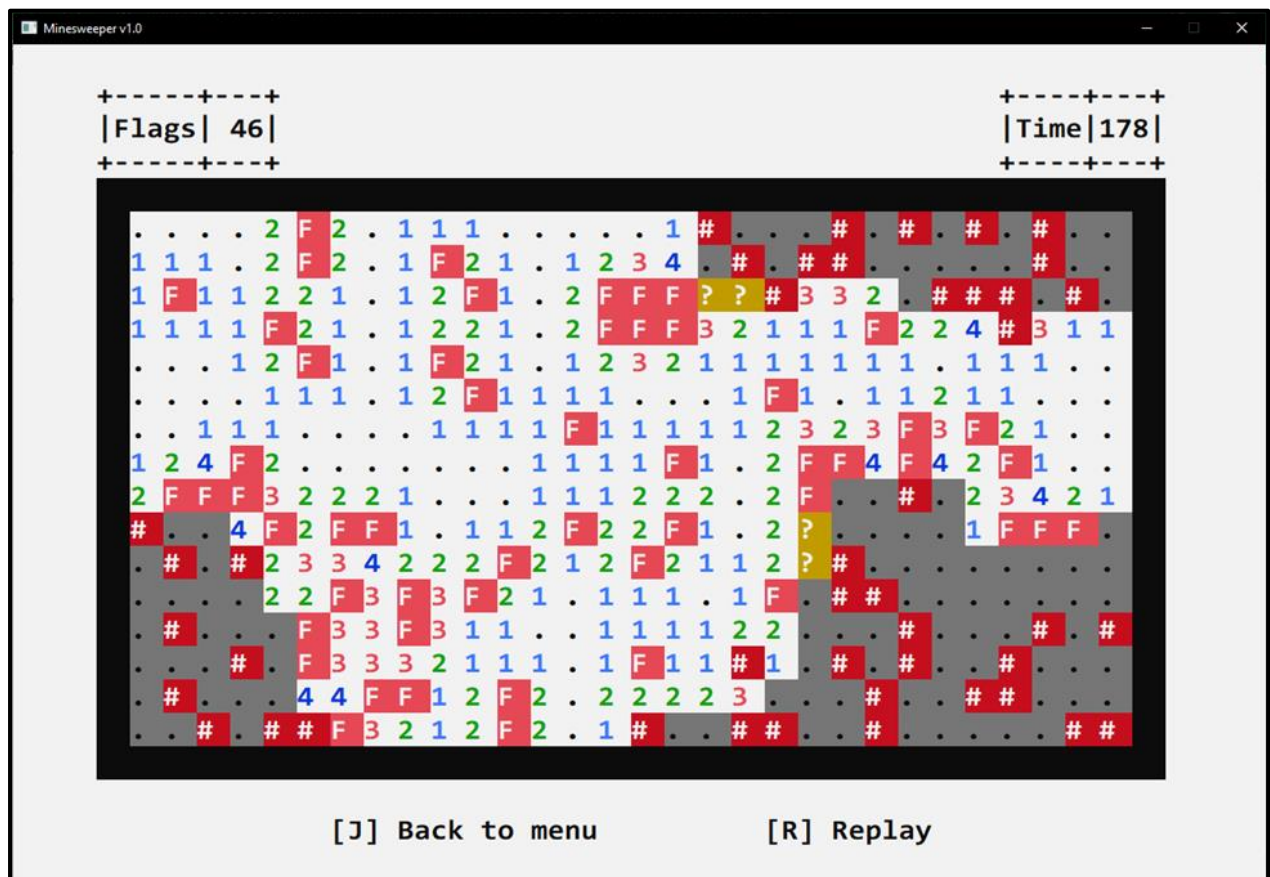
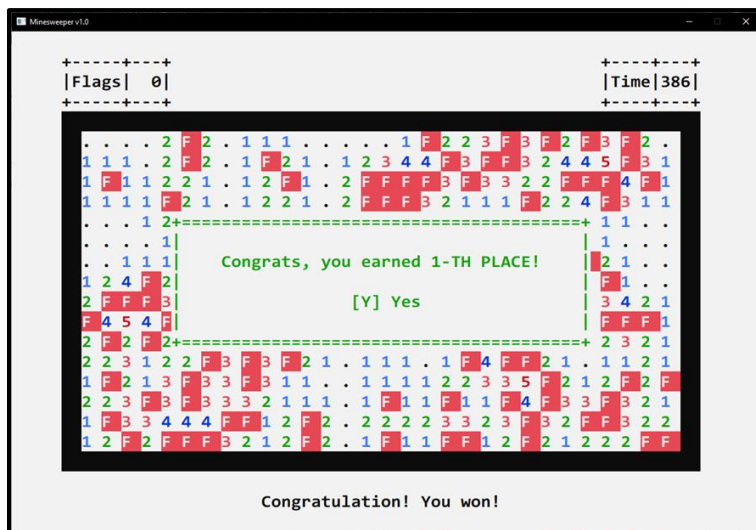


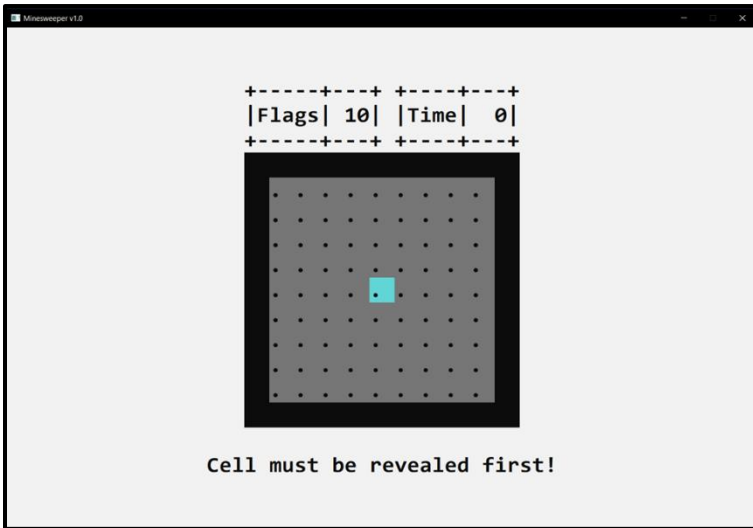
You can move the cursor around



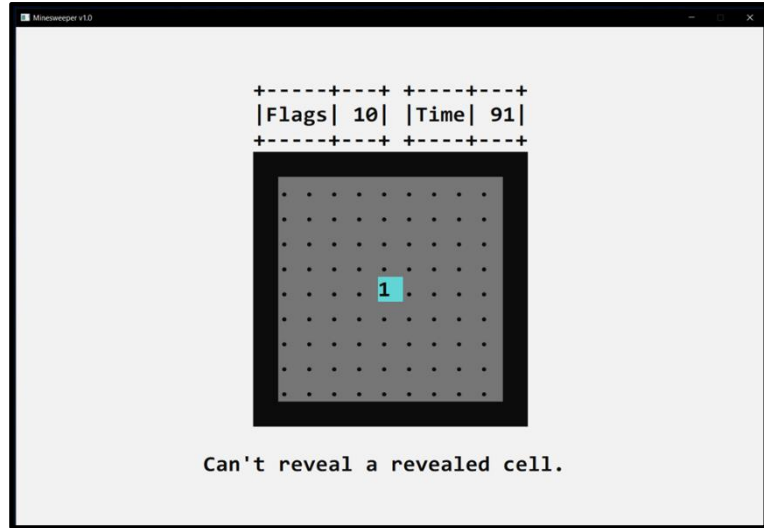
Cells with 4 states: Opened, Flagging, Questioning and Unknown

6. Some warning messages shown when playing

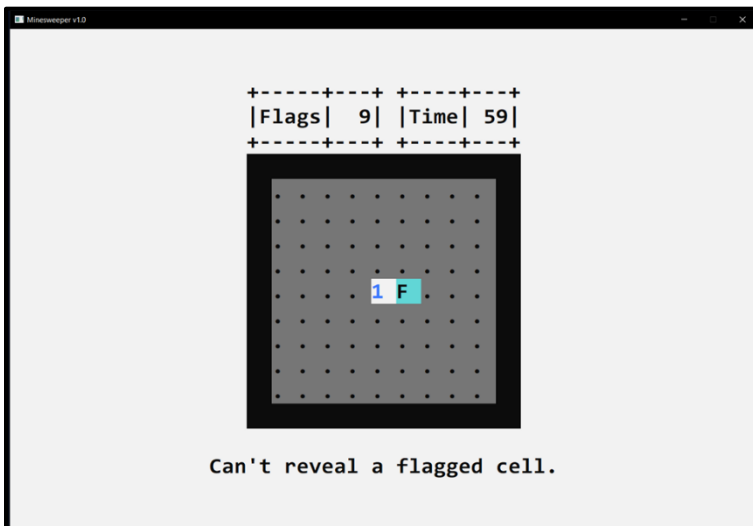




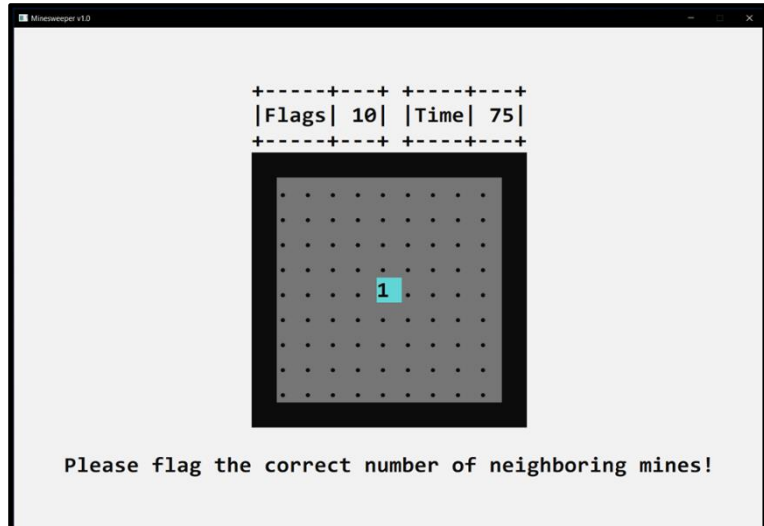
Flag a unopened cell



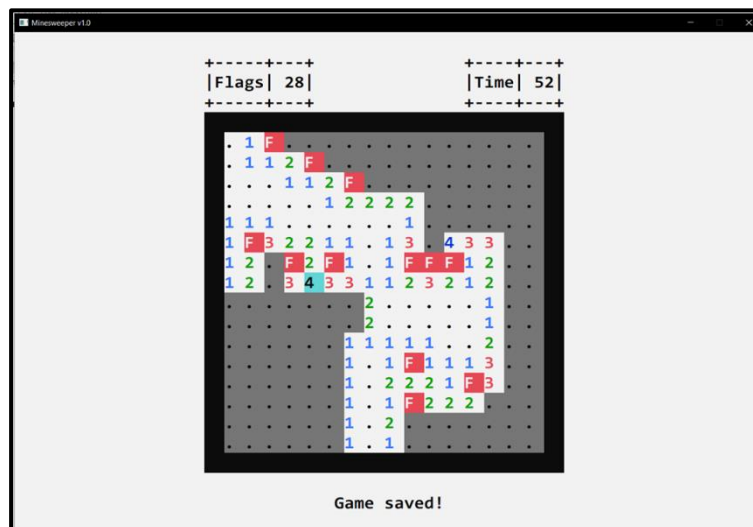
Reveal a revealed cell



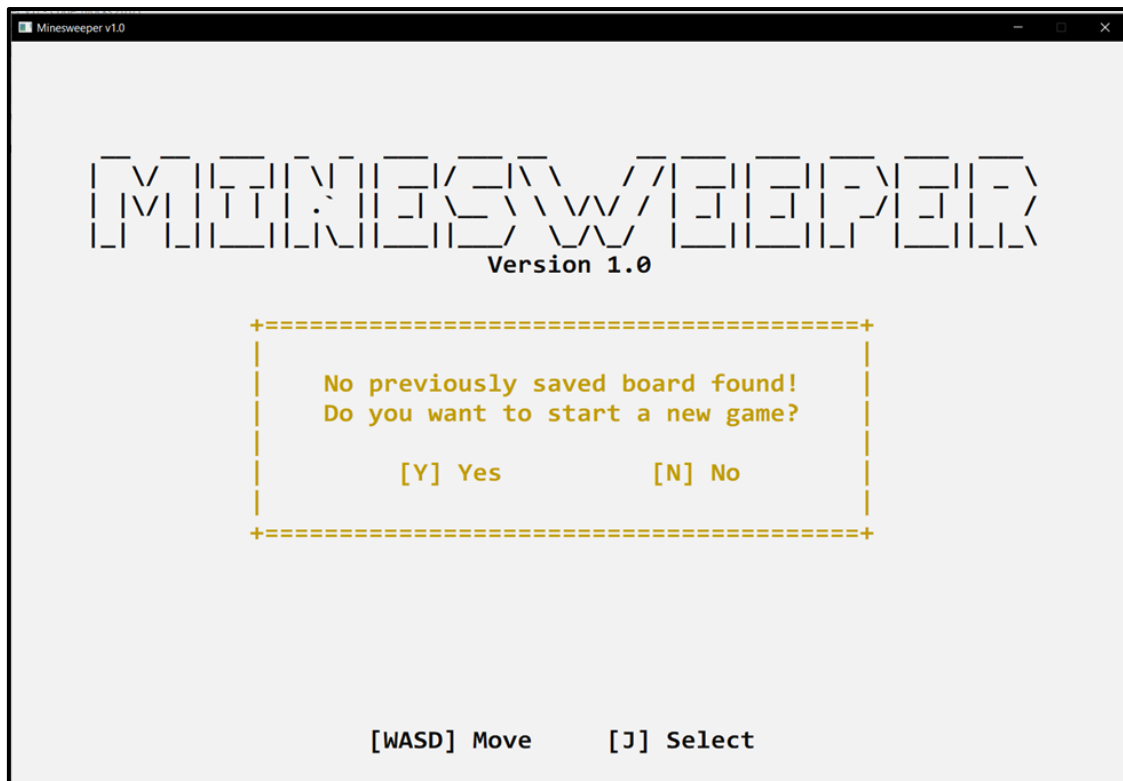
Open a flagged cell



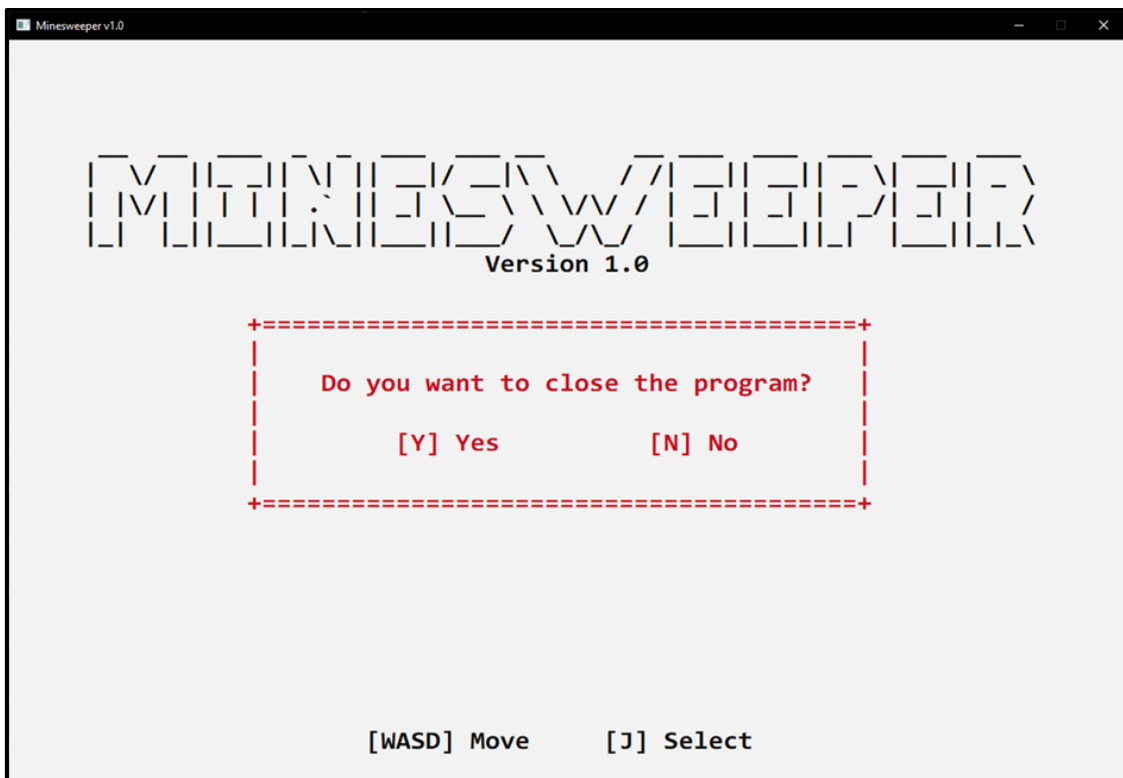
Open the neighboring cells without flagging the correct number of neighboring mines



Successfully save game message



Warning when unsuccessfully find previous game save



Warning when closing the game