

Project 3 - Minesweeper Game

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Date: May 25, 2024

Description:

Minesweeper game using Qt and C++. The aim is to reveal all cells without hitting a mine, cells have distinct numbers based on their adjacent mine numbers.

Design:

The program consists of the following modules:

1. Cell.h : Declares the Cell class with certain data fields.
2. CustomButton.h : Declares the CustomButton class which is a subclass of QPushButton class.
3. MainWindow.h : Declares the relevant slots, constructor and data fields that are used in MainWindow.cpp
4. Cell.cpp : Contains the constructor with default values and two slots for Cell class which are reset() and updateIcon().
5. CustomButton.cpp : Contains the constructor and an overridden slot named mousePressEvent in order to check left or right click events.
6. MainWindow.cpp : Creates the widget and layout of the game, initializes the grid and buttons that are actually a Cell class, contains relevant slots for the game functionality.
7. main.cpp : Starts the game.

Implementation Details:

1. Initializing the game:

- Creates the specified grid with given row and column values, distributes the given number of mines to the grid randomly. Assigns relevant adjacentMine values to the each cell.

2. Gameplay:

- Waits user to click a cell, checks if a cell is a mine or not, if the cell is not a mine, it reveals the cell, calls the updateIcon() function of that cell, if there is no adjacent mine of that cell, it reveals neighboring cells recursively. If user clicks a mine, game is over.
- If a cell is right-clicked, the flag will be attached to it. The second right-click will remove that flag.
- User gets a point for each revealed cell that is not mine. Score label shows the current points gained by user.
- If a cell has a flag or is revealed, it is not clickable.

3. End Game :

- The game is over when all the cells but mines are revealed or user hits a mine before that.
- All buttons but Restart is not functional before the new game.
- The new game is initialized when Restart button is clicked with default values.

4. Hint:

- The program suggests an empty cell according to the user's current perspective.
- It uses the basic patterns as the following:
 - i) If a number is touching the same number of cells, then these cells are all mines.

ii) If a number is touching the same number of known Mines, then all adjacent cells can be opened.

- After finding safe cells, suggests one of them to the user.
- Reveals the cell itself after the second click.

Challenges Encountered:

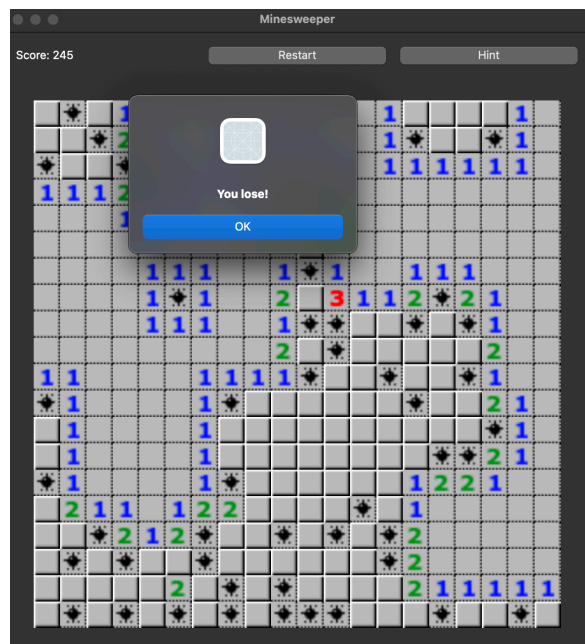
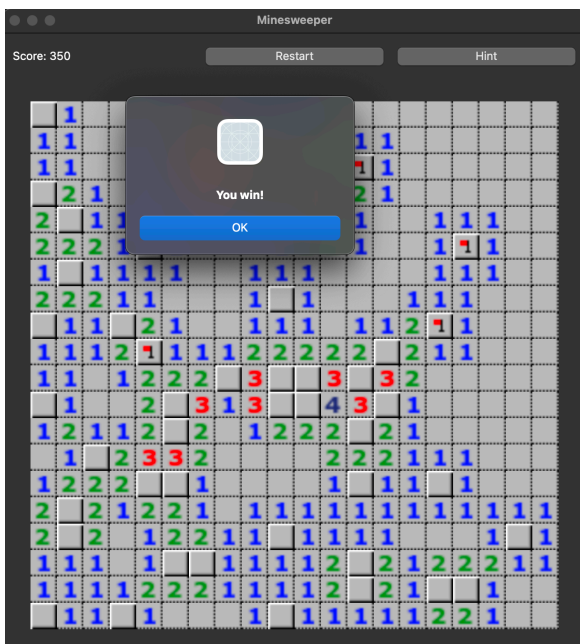
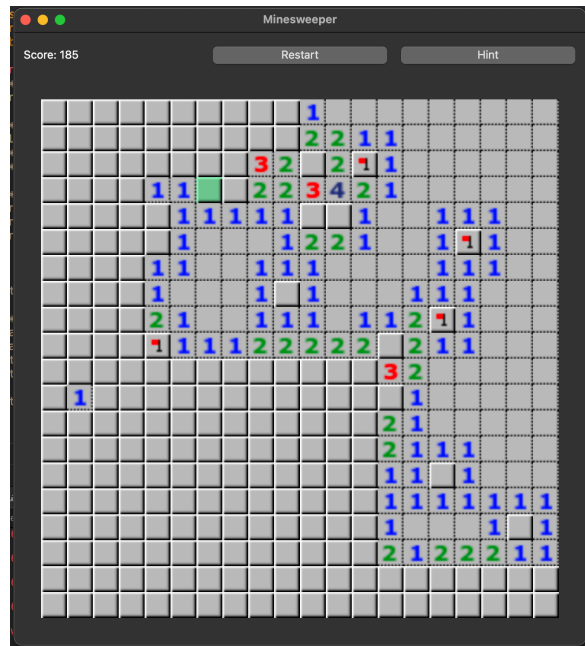
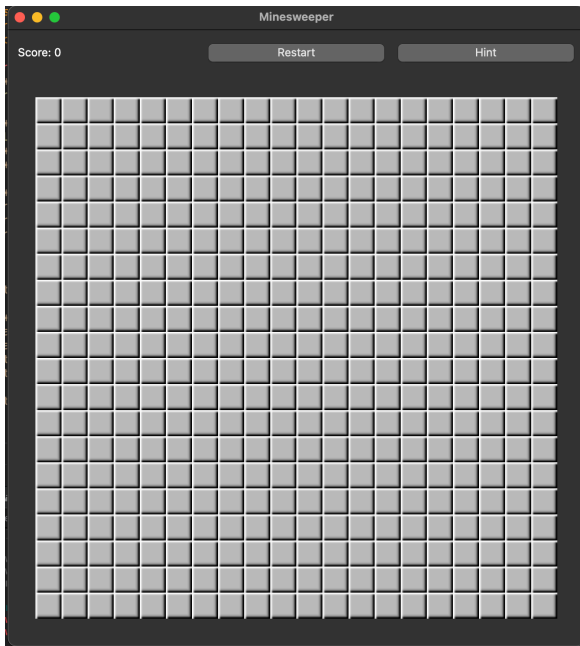
1. Implementing the right-click functionality:

- CustomButton class is created as a subclass of QPushButton which have the functionality of detecting both left and right clicks.

2. Algorithm of the Hint button:

- A basic pattern to finding safe cells is implemented recursively until no other safe cell is found.

Example Images From The Game:



How to Use:

1. Open Qt Creator with Minesweeper.pro
2. Click Run.
3. Enjoy the game.