Minesweeper User Manual

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Minesweeper is a single-player game designed to stimulate the brains of players, promote socialization through competition, and provide a fun way to pass time. It is a fun app that people can play to keep their mind sharp by thinking through the steps of the game logically or simply play to pass the time. The game accommodates many types of players with varying requirements for level of play, including instructions for first-time players.

Most games are either mindless or require a deep level of thought. Minesweeper encompasses many of the best parts of other games that exist, as it requires thinking through the logic as you first begin playing, then as you begin to memorize patterns and have played many times, you can figure out how to win with limited amounts of thought. Within our team, we had varying levels of familiarity and comfortability with playing Minesweeper, ranging from never having played before to very familiar with the game patterns and strategies.

One of our main goals was to incorporate features that make the game fun and exciting to play for a wide variety of players. Our user stories include the Bored User, the Personal User, the Social Player, and the First-Time Player, as seen in the Use-Case Diagram (Figure 1). To accomplish the applicability of the game to different types of users, we implemented three difficulty levels, three color schemes, a timer, as well as a display of instructions for play.

To prevent more experienced players from getting bored, Minesweeper incorporates different levels of difficulty, which change the size of the board and the number of bombs the players must manuever around when clearing the board. To increase the difficulty, we increased the board size from 14x18 to 20x24 and increased the number of bombs from 40 to 99. Similarly, to decrease the difficulty, we decreased the board size to 8x10 and decreased the number of bombs to 10.

We also implemented 3 different color schemes: Natural Mode, Pink Mode, and Grayscale Mode. The user can choose another option from the drop-down menu at any point before or during the game. For each color scheme, the color gets lighter or darker when hovered over to make it clear which cell is being clicked on.

Having a game timer allows players to time their play, try to beat their own fastest time, and compete against other players through comparing their times. When the game is won, the

“Best Time” and “Current Time” are displayed, which allows the user to know if they have beaten their previous best time. This aspect is mainly for the Social Player user story, who may want to compete with themselves or others to obtain the best time.

Our tooltip instructions are located at the top-right of the window and represented by a label with a “?” on it. When hovered over, it displays instructions on how to play. This can help a first-time player to know how to interact with the app.

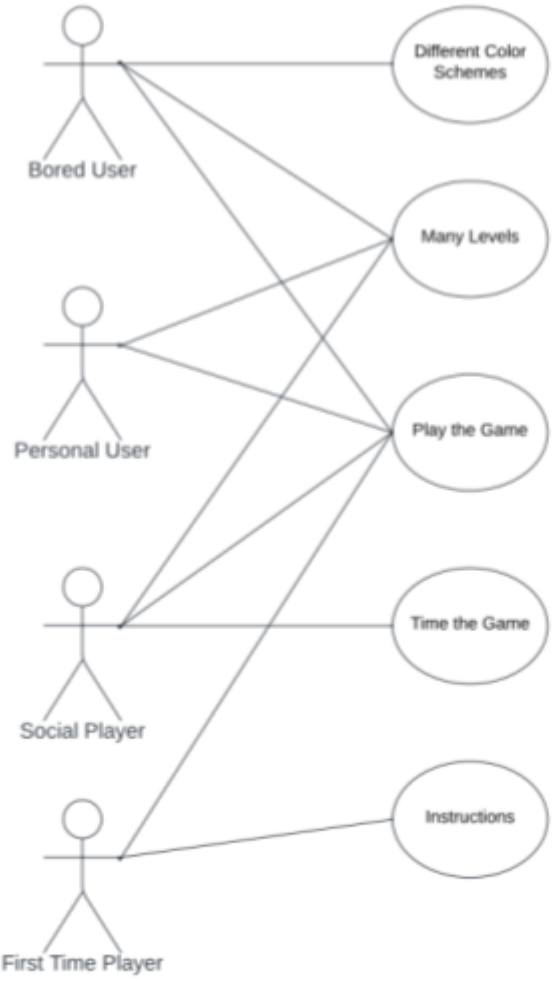

Figure 1. UML Use Case Diagram illustrating the needs of the user stories described above.

In order to run and properly use the program, run MinesweeperMain.main(). Next, a medium-size board will appear on the screen. The user should left-click on any cell to start the

game. The number in a cell represents the number of neighboring bombs (vertically, horizontally, or diagonally). The goal is to flag any cells that contain a bomb by right-clicking, and left click on any cells that do not contain bombs to show the cell contents. If the user successfully clicks all the non-bomb-containing cells without detonating any with bombs, they win! If the user left-clicks on a bomb, they lose.

Before beginning a new game, the user can choose between different difficulty levels from a drop down menu at the top left of the app. As levels increase in difficulty, the board size and number of bombs to work around increase. The user can also choose between three different color schemes before or during play by choosing from the drop down menu at the top right of the app. In each color scheme, hovering over a cell will cause a color change so that the user knows where their mouse is to limit the amount of mistaken clicks.

When the user first clicks a cell, a timer at the top of the screen begins. When the game is over, the user can see the time it took to clear the current board if they won, dashed lines if they lost, and their overall best time for that board size.

Finally, when the user wins or loses the game, a popup display showing the game result (Game Won or Game Lost) will show and the user will then have the option to either play again or to exit the game. At any point throughout the game, the user can decide to quit the game by clicking on the “Quit” button, which will bring up the Game Lost popup display.

In an early version of our minesweeper app, we created a board with rows and columns of squares. They had alternating green and light green colors to form a checkered pattern. Next, we randomly added bombs to some of the squares, representing them with an asterisk. Then, the numbers of neighboring bombs for a cell were generated and shown in the cell. This number could range from 0 to 8, though the higher numbers are less probable to occur. On a right click, the cell was marked with an “F”, representing a flag (Figure 2).

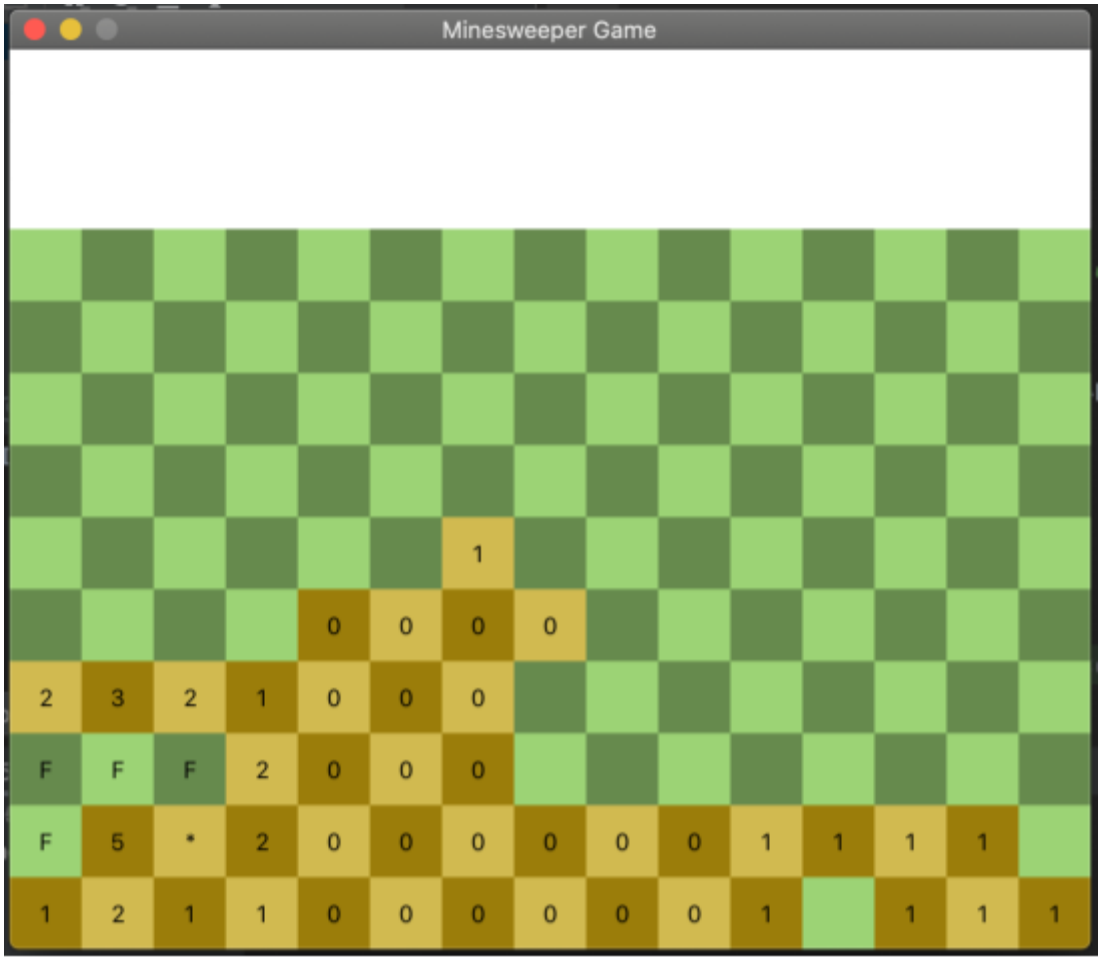

Figure 2. An early version of the Minesweeper app, showing the board of cells, bombs, flags, and numbers represented by characters

Next, the asterisks for the bombs and “F” for the flags were replaced with flag and bomb images. A top panel was also added, providing game level and color mode dropdown options, a quit button, and a “?” label for the instructions. It also includes a timer and flag counter for the number of flags left to place. None of the pieces of the top panel were implemented yet. Another addition during this stage was successfully updating the game state (new, in progress, won, or lost), and upon winning or losing the game, the corresponding pop-up window appears. Also, all of the hidden bombs appear after losing (Figure 3).

Figure 3. Flag and bomb visuals implemented, top panel complete but not implemented, game state changes when won or lost and pop-up window appears

Then, we implemented the parts of the top panel. The number next to the timer now represents your play time for a game and the number next to the flag symbol represents how many flags you have left to place if they were all correctly placed on the bombs (1 flag for each bomb hidden). The color schemes also were implemented, with the hover color change feature working for each. Also, the quit button brings up the "Game Lost" window, and the user then has the option to play again or exit the game. Choosing play again now resets the board and allows the user to play multiple games without closing and restarting the app. Additionally, the cells with 0 neighboring bombs are now represented by an empty cell, rather than the 0 that it was previously (Figure 4). The "?" instructions label also now displays the instructions for play upon hovering over it (Figure 5).

Figure 4. Color modes implemented with hover feature, flags remaining and timer implemented (shows as you play), removed 0s from cells with no neighboring bombs

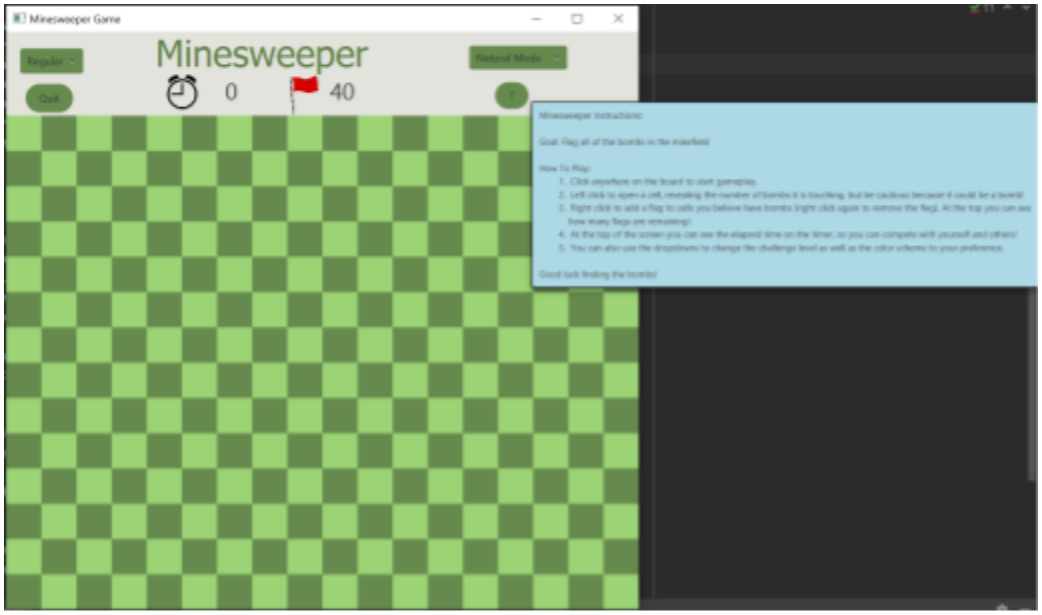

Figure 5. The instructions appear as a tooltip when hovering over the "?"

Finally, the different game levels were implemented. The easy level is 8 rows by 10 columns, the medium level is 14 rows by 18 columns, and the hard level is 20 rows by 24 columns. The number of bombs also increase with difficulty, from 10 bombs to 40 bombs to 99 bombs. (Figure 6).

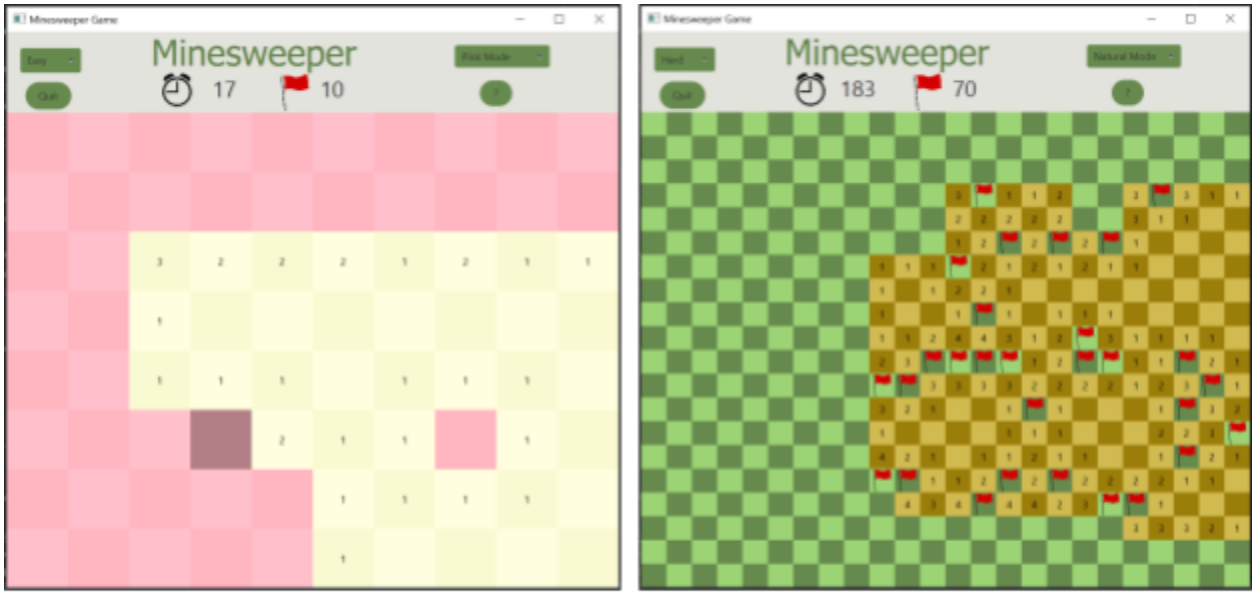

Figure 6. Easy and difficult levels of the Minesweeper app.