

Mill game

User's documentation

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1 Abstract

Mill game is an implementation of the old board game called Nine Men's Morris in Java. Due to its simple rules it's suitable for players of all ages.

This implementation offers the classic game, where the board consists of a grid with twenty-four points and each player has nine pieces, or "men", coloured black and white.

The game can be played either by taking turns with another player or against an artificial intelligent opponent.

2 How to run

For running the program a `build.xml` file is provided with ant configuration. Run `ant clean-build` for compiling the source code and creating an executable jar file. Run `ant main` for compilation and execution of the program or just `ant run` for program execution.

Run `ant doc` for generating program documentation from javadocs.

JDK version 16 is necessary for compilation and execution, as specified in `build.xml` file.

3 User stages

3.1 Menu

The program starts in a fixed sized graphical window. The first part of the program a user will encounter is game's main menu. It is titled The Mill Game and offers tree button options, leading to other scenarios.

The "Quit" option will end the program.

The "Instructions" option will display the game play instructions screen with the "Back" button option, leading back to the main menu.

Lastly, the "Play" option will lead to the game settings screen, where a user can choose his color (black, white), by clicking the current color button, and his artificial intelligent opponent (minimax, minimax with alphaBeta pruning), by clicking on the current AI button. Then the user should proceed to the game against another player by "Player vs Player" option or against AI opponent by "Player vs AI" option. If not, he can go back to the main menu by "Back" button option.

In the upper middle part of the game screen there is a "Menu" button for going back to the main menu once the game has started.

The Menu user interface is controllable solely through mouse. User can end the program at any time by clicking on the upper right "X" button.

3.2 Game

According to the rules the game is divided into three phases.

3.2.1 Phase 1: Placing stones

The game begins with an empty board. The human player with the specified color from menu always plays first, then both players take turns placing their stones on empty spots.

If someone manages to place three of their pieces on contiguous spots in a straight line, vertically or horizontally, they have formed a mill and can remove one of their opponent's stones from the board.

After all stones have been placed, phase two begins.

3.2.2 Phase 2: Moving stones

Players continue with taking turns, this time moving a stone to an adjacent spots. A stone can be moved only vertically or horizontally and cannot jump over another stone.

When the stone is chosen for moving and the choice is valid, a yellow ring lights over the chosen stone. It is possible to change the chosen stone.

Players continue with forming mills and removing their opponent's stones. A player can break his mill by moving one of his stones out of an existing mill, then moving it back to form the same mill a second time (or any number of times), each time removing one of his opponent's men. When any of the players has been reduced to three men, phase three begins.

3.2.3 Phase 3: Flying

When a player is reduced to three stones, there is no longer a limitation of moving his stones only to adjacent points: The player's men may "fly" from any point to any vacant point.

Game is won when one of the players has less than three stones.